WEST WYALONG SOLAR PROJECT

Biodiversity Development Assessment Report

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Lightsource Development Services Australia Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18343-R01-v4.0	21 January 2019	Gilbert Whyte	Jeremy Pepper	Jeremy Pepper

EXECUTIVE SUMMARY

Lightsource Development Services Australia Pty Ltd is proposing the development of a Solar Farm Project to be located to the north-east of West Wyalong in Western NSW. The proposed development will facilitate a 90 MW AC solar farm and supporting infrastructure. The project has been deemed 'State Significant Development' and will be assessed under Part 4 (Division 4.1) of the NSW *Environmental Planning and Assessment Act 1979*.

This Biodiversity Development Assessment Report has been prepared in accordance with the NSW Biodiversity Assessment Method. The assessment determines that the project site contains the following features and biodiversity values:

- The Project Site is comprised of Lot 17 and 18 (DP753081). The majority of the proposed development is restricted to Lot 18 (280 hectares) with access via Lot 17.
- The elevation within the Project Site ranges from 237m (north-east) to 227m (south-east);
- Mapped waterways occur within the Project Site; however, no aquatic habitat or obvious drainage channels are present. Five constructed dams are present; however, all of these lack aquatic and emergent vegetation;
- The soils within the Project Site consist of Red Earths derived from Devonian Wyalong Granite (north-west) and Quaternary alluvial deposits (south-east);
- Extensive vegetation clearing has (evidently) occurred for agricultural development. The remaining native vegetation consists of small patches of woodland and isolated paddock trees;
- A total of 123 plant species were identified. These comprise 86 native species and 37 exotic species.
- No threatened plant species listed under the NSW *Biodiversity Conservation Act 2016* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were detected.
- Native vegetation comprises five plant community types. These consist of two non-listed vegetation communities and three threatened ecological communities as follows:
  - *Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions* (PCT 55).
  - *Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion* (PCT 185).
  - *Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion* (PCT 177). This vegetation is listed as 'critically endangered' under the NSW *Biodiversity Conservation Act 2016* as *Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion*.
  - *Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76).* This vegetation is listed as 'endangered' under the NSW *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*)
  - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26). This vegetation is listed as 'endangered' under the NSW *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*Weeping Myall Woodlands*).

- A total of 73 fauna species were detected within the Project Site, comprising 51 birds, 15 mammals and seven amphibians.
- Three threated fauna species listed under the NSW *Biodiversity Conservation Act 2016* were detected. These comprise the following species:
  - Grey-crowned Babbler (*Pomatostomus temporalis temporalis*);
  - Painted Honeyeater (*Grantiella picta*); and
  - Inland Forest Bat (*Vespadelus baverstocki*).
- The Painted Honeyeater (*Grantiella picta*) is also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
- Important habitat features for fauna species within the Project Site include woodland vegetation and habitat trees containing hollows.

The proposed layout of the solar project has been specifically designed to avoid areas of high biodiversity value such as larger woodland patches with higher vegetation integrity. Impacts of the proposed development consist of the following:

- The removal of 1.83 hectares of native vegetation comprising;
  - 0.80 hectares of 'Belah woodland' (PCT 55); and
  - 1.03 hectares of Weeping Myall open woodland (PCT 26);
- The removal of 32 paddock trees;
- The removal of 1.83 hectares of woodland habitat for fauna species; and
- The removal of 11 habitat trees (containing 16 hollows).

Mitigation measures have been presented to reduce the potential for impacts to biodiversity values.

The BAM Calculator was used on the 18/12/2018 to determine the offset obligation for the removal of native vegetation (habitat for threatened species) and the removal of paddock trees within the development footprint of the Project Site. The purchase and retirement of 68 ecosystem credits is required to meet the offset obligation (subject to future development consent conditions). The offset obligation can also be met by purchasing and retiring credits from the biodiversity credit market or by direct payment of $188,143.67 into the Biodiversity Conservation Fund.

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Stage 1 - Biodiversity Assessment

1 Introduction

This section introduces the proposal and provides the context of the Biodiversity Development Assessment Report (BDAR). Key features of the Project Site, the proposed development, report objectives and key acts and policies are detailed below.

1.1 The Project Site

The Project Site is located within the Bland Shire Local Government Area (LGA) in Western NSW, approximately 15 km north-west of West Wyalong (**Figure 1**). The Project Site occupies a large portion of the parcels of land titles identified in **Figure 2** and is zoned "RU1 - Primary Production" under the provisions of the *Bland Local Environment Plan 2013* (LEP, 2011). For the purposes of this assessment, the road reserves known as Blands Lane (north-west boundary), Gordons Lane (north-east) and Myers Lane (south-east boundary) have also been assessed. The long-standing and existing use of the Project Site is traditional agricultural production. A summary of relevant project details are presented in **Table 1**.

Table 1 Project details

West Wyalong Solar Farm	
Address	Blands Lane, West Wyalong, NSW South Wales, 2671
Applicant	Lightsource Development Services Australia Pty Ltd
Council	Bland Shire Council
Titles	Lot 17 and 18 (DP753081)
Total Indicative Development Area	280 hectares for primary solar farm infrastructure
Land Use	Agriculture (Cropping)
Solar Farm Capacity	90 MW AC

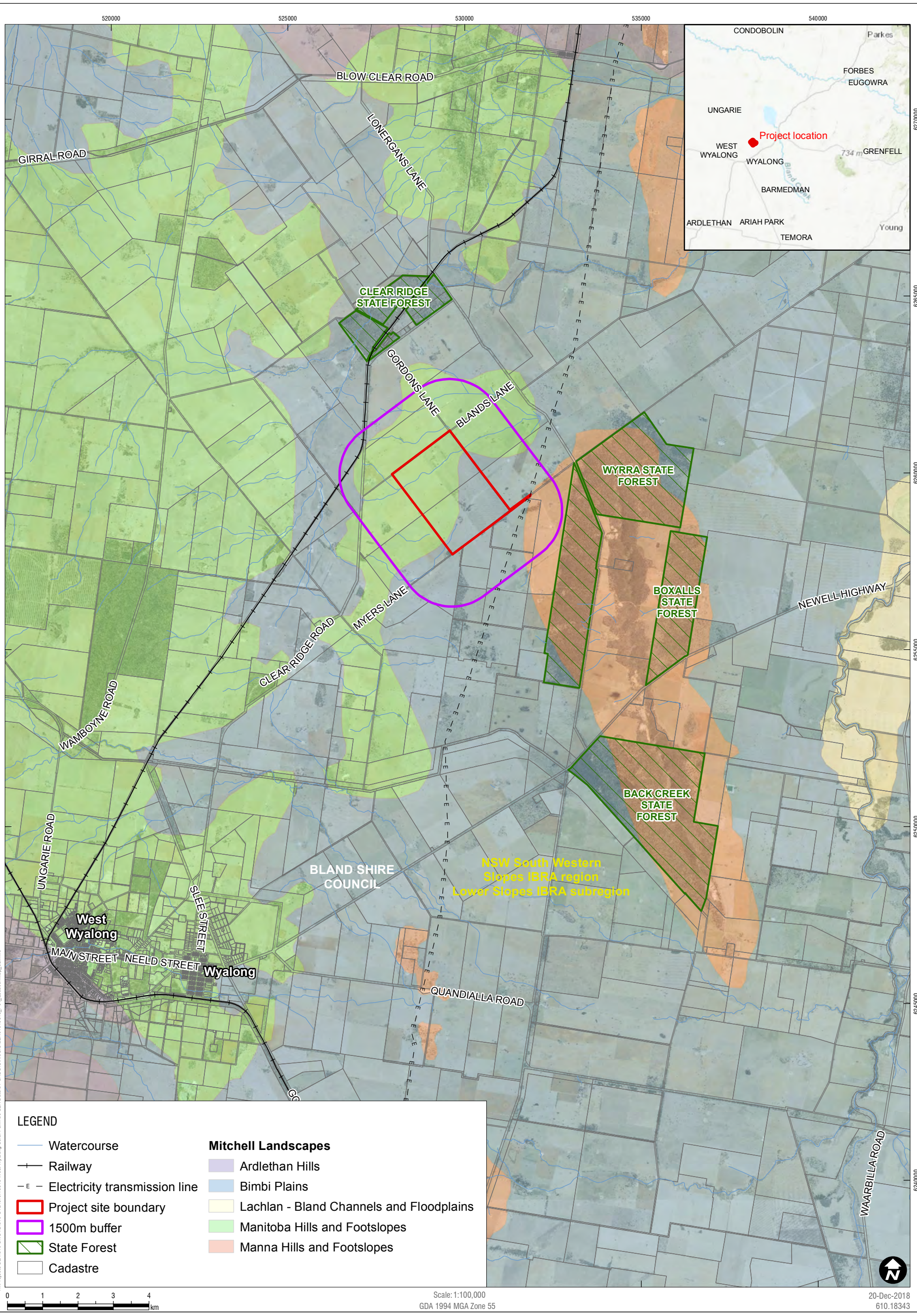
1.2 The Project

Lightsource Development Services Australia Pty Ltd is proposing the development of a Solar Project within the Project Site. The proposed development will facilitate a 90 MW AC solar farm and supporting infrastructure. The key features of the proposal include the following:

- Installation of 296,000 solar panels on a mounting structure with tracking capabilities. Each panel will be approximately 1.95 metres (m) x 0.992 m with a depth of 50 millimetres (mm). Total height of the mounted panels will be 4.01 metres;
- Substation and battery energy storage system up to eight metres in height with the exception of an 18 metre lightening rod;
- Internal access roads and access points;
- Perimeter security fencing up to two metres high;
- A connection to powerline via Myers Lane; and

- CCTV poles up to 2.5 metres high located along the perimeter of the Project Site.

The solar farm will operate for 30-40 years. The existing agricultural use of grassing will continue during operation. After decommissioning, the Project Site would be returned to its pre-works state. Any areas excavated during decommissioning will be backfilled with top soil, harrowed, and either seeded or left ready for crops.



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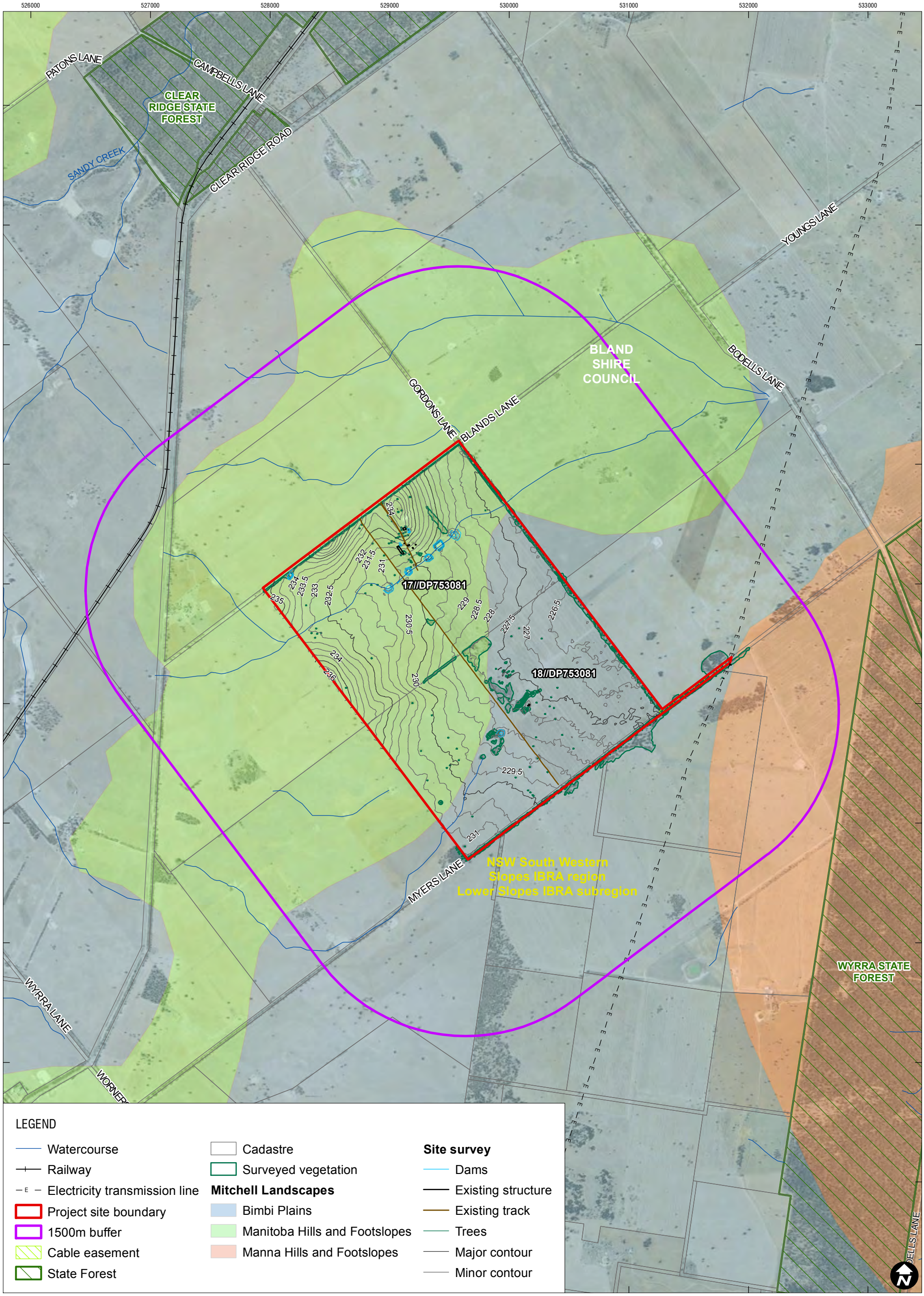
Location Map

FIGURE 1



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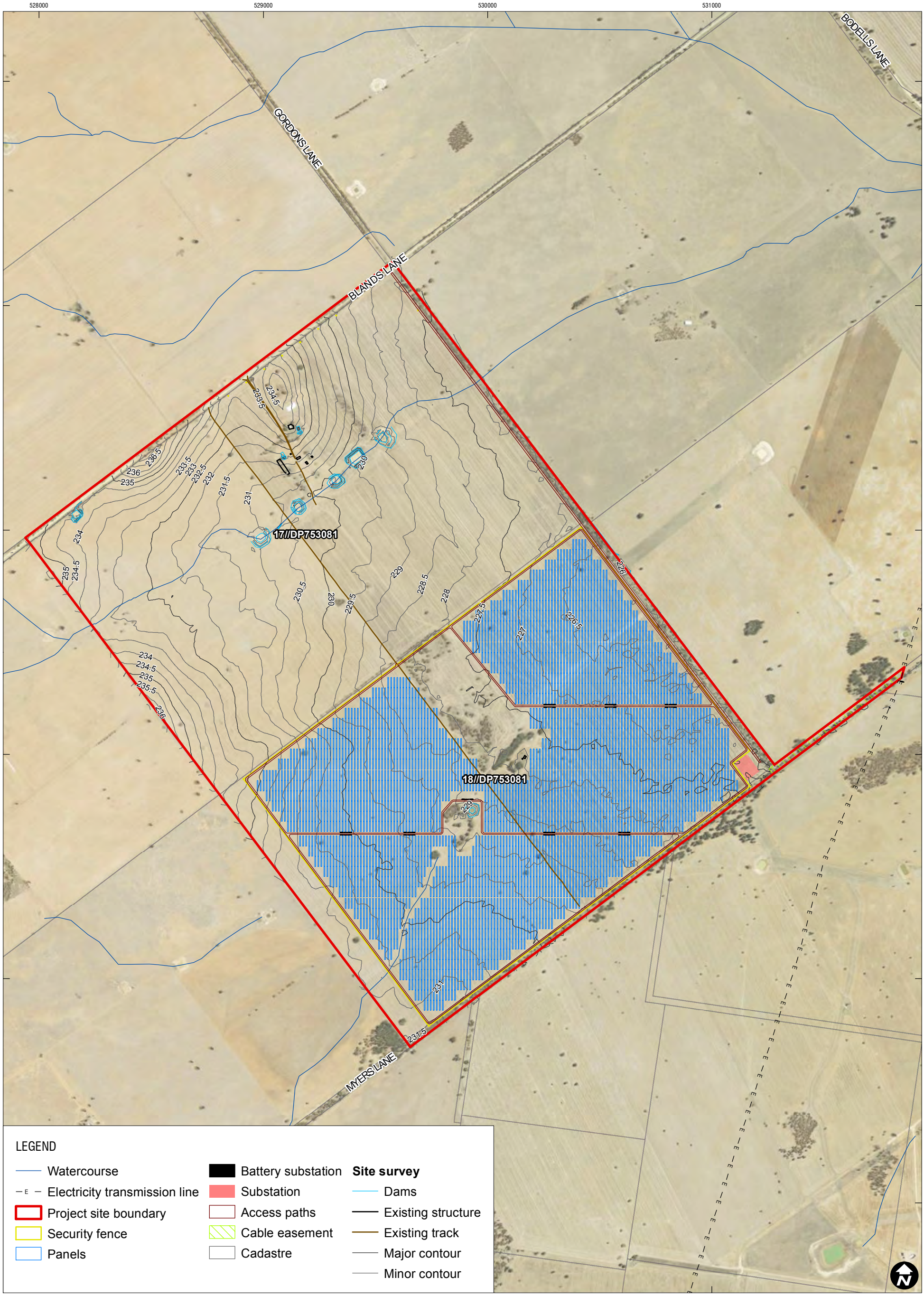
Site Map

FIGURE 2



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Proposed Development Design

FIGURE 3

1.3 Report Objectives

1.3.1 Secretaries Environmental Assessment Requirements

An Environmental Impact Statement (EIS) has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs), which were provided to the proponent on 8 November 2018 by the Department of Planning and Environment (Application number: SSD 9504).

The SEARs require that an assessment of the likely biodiversity impacts of the development be conducted, having regard to section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), as well as the Biodiversity Assessment Method (OEH, 2017b).

1.3.2 Biodiversity Assessment Method

The Biodiversity Assessment Methodology (BAM) comprises three stages that set out the biodiversity assessment requirements and offset practices for major projects:

- Stage 1 – Biodiversity assessment;
- Stage 2 – Impact assessment; and
- Stage 3 – Improving biodiversity values.

Stage 1 and Stage 2 are documented in this BDAR, which is required to accompany the EIS.

1.4 Key Acts and Policies

1.4.1 NSW Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (NSW EP&A Act) forms the legal and policy platform for proposal assessment and approval in NSW and aims to 'encourage the proper management, development and conservation of natural and artificial resources'. All development in NSW is assessed in accordance with the provisions of the EP&A Act and EP&A Regulation 2000.

The project is deemed to be 'State Significant Development' (SSD9504) by virtue of State Environmental Planning Policy (State and Regional Development) 2011 and pursuant to Division 4.7 of the NSW EP&A Act.

The NSW Department of Planning and Environment is the consent authority under Part 4 of the EP&A Act with input from various government departments and Bland Shire Council.

1.4.2 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act), the NSW *Biodiversity Conservation Regulation 2017* (BC Regulation) and amendments to the *Local Land Services Act 2013* (LLS Act) commenced on 25 August 2017. The legislation aims to deliver "a strategic approach to conservation in NSW whilst supporting improved farm productivity and sustainable development". The BC Act repeals several pre-existing Acts, most notably the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the *Native Vegetation Act 2003*. Relevant provisions from each of the repealed Acts has been saved and incorporated into the new legislative framework. Transitional arrangements are in place to ensure a smooth transition from the repealed legislation to the BC Act.

In accordance with the BC Act, the BAM (OEH, 2017b) and entry into the Biodiversity Offsets Scheme (BOS) is applicable to certain development activities based on specific criteria. Preparation of a BDAR is required for Part 4 development activities deemed to be 'State Significant' under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.4.3 NSW Biodiversity Values Map

Preparation of a BDAR is required for activities that impact areas identified as having high biodiversity value by the NSW Biodiversity Values Map (BV Map) (OEH, 2018d). Although not strictly relevant to this assessment, SLR reviewed the NSW Biodiversity Values Map (BC Map) and found that no areas of high biodiversity value are mapped within the Project Site. The nearest occurrence of BV mapped areas occurs to the west (**Figure 4**).

524000 526000 528000 530000 532000 534000 536000

6268000 6266000 6264000 6262000 6260000 6258000 6256000 6254000 6252000

CAMPBELLS LANE
LONERGANS LANE
CLEAR RIDGE ROAD
WILSONS LANE
SANDY CREEK
CLEAR RIDGE STATE FOREST
YOUNGS LANE
PATONS LANE
GORDONS LANE
BODELLS LANE
BLANDS LANE
WYRRA STATE FOREST
CLEAR RIDGE ROAD
WYRRALANE
MYERS LANE
WORNERS LANE
BOXALLS STATE FOREST
YALMS LANE
NEWELL HIGHWAY
COTTINGLEY LANE
BACK CREEK STATE FOREST

LEGEND

- Watercourse
- Railway
- Project site boundary
- Access paths
- Cable easement
- State Forest
- Cadastre
- Biodiversity Values

0 0.5 1 1.5 2 km

Scale: 1:50,000
GDA 1994 MGA Zone 55

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NSW Biodiversity Values Map (Office of Environment and Heritage)

FIGURE 4

1.4.4 NSW Biosecurity Act 2015

The NSW *Biosecurity Act 2015* provides a streamlined statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds. The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers. In NSW, 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.

Priority weeds recorded within the Project Site are addressed in **Section 3.2.6** of this report.

1.4.5 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NP&W Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NP&W Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. The NP&W Act is administered by the NSW Office of Environment and Heritage (OEH).

No areas of National Park occur within or adjacent to the Project Site. An assessment of the proposal in relation to impacts on native flora and fauna; with an emphasis on threatened species and habitat, is undertaken in **Section 4**.

1.4.6 NSW Water Management Act

Controlled activities carried out in, on or under waterfront land are regulated by the NSW *Water Management Act 2000* (WM Act). The NSW Office of Water (known as DPI Water) administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary. This means that a controlled activity approval must be obtained from the Office of Water before commencing the controlled activity.

Two mapped waterways occur within the Project Site (1st and 2nd Order Streams). An inspection of these areas determined that due to agricultural development, no drainage channels, aquatic habitat or associated riparian vegetation occurs in these areas. Therefore, these areas do not constitute water front land. The proposal is unlikely to be deemed a controlled activity and approval from the NSW Office of Water is unlikely to be required.

1.4.7 Environment Protection and Biodiversity Conservation Act 1999

The purpose of the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' undergo an assessment and approval process. Under the EPBC Act, an action includes a proposal, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Australian Minister for the Environment.

The EPBC Act identifies matters of NES as:

- World heritage properties
- National heritage places
- Wetlands of international importance (Ramsar Wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development..

As part of the current investigation, matters of national environmental significance (and their habitats) that are predicted to occur within the locality (applying a 10 kilometre buffer) were obtained from the on-line Protected Matters Search Tool (DoEE, 2018a). These records are discussed in **Section 3.6**. The EPBC Act has been further addressed in this assessment through:

- Targeted field surveys for EPBC listed threatened biota and migratory species;
- Assessment of potential impacts on EPBC listed threatened species and migratory biota;
- Identification of suitable impact mitigation and environmental management measures for EPBC listed threatened species and migratory biota; and
- Identification of the need for an EPBC referral based on the EPBC Significant Impact Guidelines (DEWHA, 2013)

1.4.8 State Environmental Planning Policy No. 44- Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection aims to encourage the "*proper conservation and management of areas of natural vegetation that provide habitat for Koalas (Phascolarctos cinereus) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline*". The SEPP is currently being amended by the NSW Department of Planning and Environment. Key changes to the amended SEPP relate to the following:

- Definitions of koala habitat;
- List of Koala feed tree species;
- List of councils to which the SEPP applies; and
- Various changes to the development assessment process.

Bland Shire LGA is not identified in Schedule 1 of SEPP 44 and therefore consideration of SEPP 44 is not required. Moreover, no Koala feed trees were identified within the Project Site.

1.4.9 Local Environmental Planning Instruments

The Project Site is located within the Bland Shire Local Government Area (LGA). The Bland Local Environmental Plan (LEP, 2011) controls development within the Project Site through zoning and development controls.

2 Stage 1 – Biodiversity Assessment Methodology

This chapter described the methods undertaken to identify biodiversity values within the Project Site in accordance with Stage 1 of the BAM.

2.1 Personnel

The roles and qualifications of all staff responsible for preparation of this BDAR are listed in **Table 2**.

Table 2 Staff Roles and Qualifications

Staff Name	Project Role	Qualifications
Jeremy Pepper Principal Ecologist	Project management and report review.	Bachelor of Science (Hons Class 1) University of NSW 1996 Certificate II Bushland Regeneration, TAFE NSW BioBanking accredited assessor (0107) BAM accredited assessor (BAAS0107)
Dr. Gilbert Whyte Associate Botanist	Project management, field work (BAM Plots) and report writing.	Doctorate of Philosophy (PhD), Murdoch University, Perth Western Australia. Bachelor of Biological Sciences, 1st Class Honours, La Trobe University, Melbourne, Victoria. BAM accredited assessor (BAAS18041)
Daniel O'Brien Senior Ecologist	Fieldwork (fauna surveys).	Bachelor of Environmental Science and Management (Hons Class 1), University of Newcastle Doctorate of Philosophy candidate, University of Wollongong
Emily Mitchell	CAD/GIS Technical Officer	Bachelor of Development Studies (2008 – University of Newcastle) Cert IV Spatial Information Services, TAFE NSW

2.2 Information Sources

Existing information on the flora and fauna of the Project Site and the locality, including relevant threatened biota was also obtained from:

- Regional vegetation mapping – Mid-Lachlan Extant Vegetation (VIS ID 876) (OEH, 1999);
- The NSW Office of Environment and Heritage BioNet Atlas of NSW for previous records of threatened species, populations and ecological communities (as listed under the BC Act) within a 10 kilometre radius of the site (OEH, 2018a)(date searched 22/11/2018);
- The Department of the Environment and Energy Protected Matters Search Tool, which involved a search for matters of national environmental significance within a 10 kilometre radius of the site (DoEE, 2018a)(date searched 22/11/2018);
- Department of the Environment and Energy (DoEE, 2018b). *Species Profile and Threats Database* (SPRAT);
- The NSW Office of Environment and Heritage (OEH, 2018f) *Threatened Species Profiles*; and
- Relevant published literature on threatened biota (see References – **Section 6**).

The results of the database searches were used to compile a list of threatened species, populations and communities (listed under the BC Act and EPBC Act) that could potentially occur within the Project Site.

2.3 Assessment of Biodiversity Values

The field assessment was undertaken by SLR Associate Ecologist, Gilbert Whyte, and SLR Senior Ecologist, Daniel O'Brien. Methods utilised during the field surveys are described in the following sections. The assessment was undertaken in accordance with the BAM (OEH, 2017b)and with reference to the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)(DEC, 2004). Limitations of the survey are discussed in **Section 2.6**.

2.3.1 Tree Survey

For each paddock tree and habitat tree within the Project Site, the following information was collected:

- GPS coordinates (handheld GPS);
- tree species;
- Tree size class category – Class 2 ≥ 20cm DBH and Class 3 (≥ large tree benchmark);
- Presence of tree hollows; and
- Other relevant features (i.e. presence of nests or fauna species).

The above information was compiled into a tree survey register. Impacts of the proposed development on paddock trees and habitat trees are described in **Section 4**.

2.3.2 Vegetation Mapping

All plant species detected within the Project Site were identified to species level (**Appendix A**). Native vegetation types were identified based on dominant flora species present within each structural layer (i.e. canopy, shrub and ground layers). Exotic or highly modified native vegetation was defined based on structure and species composition. Boundaries of vegetation types and communities were marked with a hand-held GPS and mapped using geographical information system (GIS) software.

Vegetation types within the Project Site were assessed against identification criteria for State and Commonwealth listed threatened ecological communities (DoEE, 2018b; OEH, 2018f). Vegetation and habitats were compared with descriptions provided in the *Bionet Vegetation Information System* (OEH, 2018e) to identify Plant Community Types (PCTs).

The vegetation condition of each PCT was defined as either 'moderate to good' or 'low' based on the definitions presented in **Table 3**. Vegetation condition was then used to delineate vegetation zones as required by the BAM (OEH, 2017b).

Table 3 Vegetation Condition Definitions

Vegetation Condition	Definition
Moderate	Vegetation retaining the species complement and structural characteristics of the pre-European equivalent. Such vegetation has changed very little over time and displays resilience to weed invasion due to intact groundcover, shrub and canopy layers.
Low	Vegetation retaining a native canopy with a modified understorey due to disturbance. This condition class may also contain weed incursions.

2.3.3 Threatened flora surveys

Targeted threatened flora surveys were conducted in accordance with the *NSW Guide to Surveying Threatened Plants* (OEH, 2016) over five days from 24 to 28 September 2018. The survey effort coincided with detectability for all threatened flora with a moderate likelihood of occurrence within the Project Site, including the following:

- *Austrostipa metatoris;*
- *Brachyscome papillosa* (Mossgiel Daisy);
- *Caladenia arenaria* (Sand-hill Spider Orchid);
- *Diuris tricolor* (Pine Donkey Orchid);
- *Lepidium aschersonii* (Spiny Pepper-cress);
- *Lepidium monoplocoides* (Winged Peppercress);
- *Philotheca ericifolia;*
- *Swainsona sericea* (Silky Swainson-pea);
- *Swainsona murrayana* (Slender Darling-pea); and
- *Tylophora linearis.*

Given that the Project Site contains habitat for mainly threatened herbs, threatened flora surveys consisted of a random meander followed by parallel field traverses (i.e. 10 m apart). This methodology is consistent with the survey effort required to adequately detect threatened herb, shrubs and trees in open forest according to (OEH, 2016).

2.3.4 Vegetation Survey Plots (BAM Plots)

Following delineation of vegetation zones within the Project Site, 400m² floristic plot/transects (BAM Plots) were sampled. Plot/ transects were positioned to sample areas that were most representative of the floristic characteristics of each PCT vegetation zone. The number of plot/transects sampled in each vegetation zone was based on the requirements of the BAM (OEH, 2017b), which are presented in **Table 4**.

Table 4 Minimum number of plots and transects required per zone area

Vegetation Zone Area (ha)	Minimum number of plots/transects
<2	1 plot/transect
>2-5	2 plot/transect
>5-20	3 plot/transect
>20-50	4 plot/transect
>50-100	5 plot/transect
>100-250	6 plot/transect
>250-1000	7 plot/transect
>1000	8 plot/transect

Vegetation integrity was determined using data collected from vegetation survey plot/ transects (BAM Plots) by examining the vegetation composition, structure and function attributes as follows:

- The assessment of vegetation composition was based on the number of native plant species (richness) observed within the 400m² plot/transect (standard 20m x 20m BAM Plot);
- The assessment of vegetation structure was based on the % of foliage cover for each plant growth form group within the 400m² plot (standard 20m x 20m BAM plot); and
- The assessment of vegetation function was based on an assessment of the following attributes within the 1000m² plot (20m x 50m BAM Plot):
- Number of large trees
- Tree regeneration
- Tree stem size class
- Total length of fallen logs
- Litter cover (i.e. assessed using five 1m² quadrats along the 50m transect)
- High threat exotic vegetation cover
- Hollow bearing trees

For a more detailed description of how vegetation integrity was calculated, refer to the BAM (OEH, 2017b).

2.3.5 Plant Identification and nomenclature

Plant identification and nomenclature was based on species descriptions presented within *The Flora of New South Wales* Volumes 1 to 4 (Harden, 1993) and the taxonomic updates in PlantNET - The Plant Information Network System of Botanic Gardens Trust, Sydney, Australia (Botanic Gardens Trust, 2007).

528000 529000 530000 531000

6262000 6261000 6260000 6259000 6258000 6257000

GORDONS LANE

BODELLS LANE

BLANDS LANE

MYERS LANE

1 2 3 4 5 6 7 8 9 10 11 12 13

LEGEND

- Watercourse
- Project site boundary
- Cable easement
- Cadastre
- BAM Plot / Transect
- Threatened Flora Survey

0 200 400 600 800 m

Scale: 1:16,000
GDA 1994 MGA Zone 55

20-Dec-2018
610.18343

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Vegetation Assessment - Survey Effort

FIGURE 5

2.3.6 Assessing the Habitat Suitability for Threatened Species

Threatened Species Surveys for fauna were undertaken over five days from 24 to 28 September 2018 to assess and map the presence of candidate species credit species in accordance with Section 6 of the BAM (OEH, 2017b). All fauna species detected were identified to species level (**Appendix B**).

In identifying threatened species survey requirements, the following key guidelines were considered:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, for threatened species (excluding frogs) listed under the BC Act (DEC, 2004);
- Amphibians - Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians (DECCW, 2009);
- Threatened bats - Survey Guidelines for Australia's Threatened Bats, Commonwealth of Australia (DEWHA, 2010a);
- Threatened birds - Survey Guidelines for Australia's Threatened Birds, Commonwealth of Australia (DEWHA, 2010b);
- Threatened reptiles - Survey Guidelines for Australia's Threatened Reptiles, Commonwealth of Australia (DEWHA, 2011b);
- Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act(DEWHA, 2010c); and
- Threatened mammals - Survey Guidelines for Australia's Threatened Mammals, Commonwealth of Australia (DEWHA, 2011a).

In accordance with 6.4 of the BAM (OEH, 2017b), the locations of important habitat features, such as breeding or roosting habitat for threatened fauna species were captured with a handheld GPS unit and photographed where appropriate. Searches for potential habitat for threatened fauna species included but were not limited to:

- Foraging trees for threatened birds;
- Habitat trees;
- Potential roosts for threatened microchiropteran bats;
- Vegetated ponds, riparian vegetation and drainage lines for threatened frogs and waterbirds; and
- Woody debris and logs.

2.3.7 Diurnal Opportunistic Threatened Fauna Surveys

Diurnal opportunistic and incidental observations of fauna species were recorded at all times during field surveys. These included opportunistic observation of fauna activity such as scats, tracks, burrows or other traces. Fauna species that were observed were recorded and identified to species level.

2.3.8 Threatened Bird Surveys

Dawn bird surveys were completed on foot using binoculars for a 30min period on four separate mornings: 24-28/09/18. Bird species that were detected were recorded and identified to species level. Habitat for the following predicted threatened bird species was identified within the Project Site:

- Barking Owl (*Ninox connivens*);

- Black-breasted Buzzard (*Hamirostra melanosternon*);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*)
- Brolga (*Grus rubicunda*);
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)
- Diamond Firetail (*Stagonopleura guttata*);
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*);
- Flame Robin (*Petroica phoenicea*);
- Gilbert's Whistler (*Pachycephala inornata*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*);
- Grey Falcon (*Falco hypoleucos*);
- Hooded Robin (*Melanodryas cucullata cucullata*);
- Little Eagle (*Hieraaetus morphnoides*)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*);
- Masked Owl (*Tyto novaehollandiae*);
- Malleefowl (*Leipoa ocellata*);
- Painted Honeyeater (*Grantiella picta*);
- Regent Honeyeater (*Anthochaera phrygia*);
- Scarlet Robin (*Petroica boodang*);
- Spotted Harrier (*Circus assimilis*)
- Superb Parrot (*Polytelis swainsonii*)
- Swift Parrot (*Lathamus discolor*);
- Speckled Warbler (*Chthonicola sagittata*); and
- White-throated Needletail (*Hirundapus caudacutus*).

No candidate threatened bird species, as predicted by the BAM, are relevant to this assessment.

2.3.9 Threatened Amphibian and Reptile Surveys

Amphibians were searched for during nocturnal and diurnal fauna surveys on five separate days: 24-28/09/18. Suitable habitat for threatened amphibians was targeted for survey using spotlights and head torches. Reptiles were surveyed for during diurnal opportunistic fauna surveys (see **Section 2.3.7**).

No candidate threatened reptiles or amphibians, as predicted by the BAM, are relevant to this assessment.

2.3.10 Nocturnal Spotlighting and Fauna Call Playback

Spotlighting was completed after dusk following the targeted nocturnal search transects for two hours on four separate nights: 24-28/09/18. Nocturnal spotlighting surveys were completed on foot using high-powered spotlights. Spotlighting was used to target arboreal, flying and ground dwelling mammals, nocturnal birds, reptiles and amphibians and the following threatened mammal species:

- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Spotted-tailed Quoll (*Dasyurus maculatus*); and
- Squirrel Glider (*Petaurus norfolcensis*).

Fauna call playback was conducted using best practise methods (Debus, 1995; Debus & Rose, 1994). This involved broadcasting the calls of specific species through a megaphone to attract individuals or incite a response allowing identification. Recorded calls of each threatened species were played through a megaphone after dusk on the nights: 24-28/09/18. An initial listening period of 15 minutes was followed by a spotlighting search.

Fauna call playback was used to survey for the following threatened fauna species:

- Barking Owl (*Ninox connivens*);
- Masked Owl (*Tyto novaehollandiae*); and
- Koala (*Phascolarctos cinereus*).

Note that the Koala is a candidate threatened species, as predicted by the BAM, that is relevant to this assessment.

2.3.11 Remote Survey Methodologies

Remote camera trapping was conducted within each vegetation patch from 24-28/09/18 to detect terrestrial fauna including introduced species. Surveys specifically targeted exotic species (such as rabbits, foxes and cats) that are likely to impact native fauna present within each vegetation patch. A minimum of one remote camera was installed within each vegetation patch, directed towards a PVC bait station that contained a mixture of peanut butter, rolled oats and honey; or fish. The cameras were left in place for four days/nights. Cameras are triggered to take photos when movement is detected using an infrared sensor. Photos were later analysed in house to identify fauna species.

The location of where each remote camera was placed within the Project Site is presented in **Figure 6**.

2.3.12 Microbat Surveys

Anabat Express detectors (Titley Scientific) were deployed for two consecutive nights in four locations (24-28/09/18) to collect microbat call data. The locations of where each Anabat was deployed are presented in **Figure 6**.

Analysis of all bat calls was completed. Calls were identified using zero-crossing analysis and AnalookW software by visually comparing the time-frequency graph and call characteristics (e.g. characteristic frequency and call shape) with reference calls and/or species call descriptions from published guidelines.

The *Bat calls of NSW: Region based guide to the echolocation calls of microchiropteran bats* (Pennay, Law, & Reinhold, 2004) was used to assist call analysis. Call identification was also assisted by consulting distribution information for possible species (Churchill, 2009; Duffy, Lumsden, Caddle, Chick, & Newell, 2000; Pennay et al., 2004) and records from the Bionet Atlas (OEH, 2018a). No reference calls were collected during the survey.

A call (pass) was defined as a sequence of three or more consecutive pulses of similar frequency and shape. Calls with less than three defined consecutive pulses of similar frequency and shape were not identified to species level, but were used as part of the activity count for the survey area. Due to variability in the quality of calls and the difficulty in distinguishing some species the identification of each call was assigned a confidence rating (Duffy et al., 2000; Mills, Norton, Parnaby, Cunningham, & Nix, 1996) as summarised in **Table 5**. Due to the high level of variability within a bat call and overlap in call characteristics between some species, a conservative approach was taken when analysing calls.

Table 5 Confidence rating applied to Anabat calls

Identification	Description
D – Definite	Species identification not in doubt.
PR – Probable	Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call type or call lacks sufficient detail.
SG – Species Group	Call made by one of two or more species. Call characteristics overlap making it difficult to distinguish between species. For example the calls of Chalinolobus gouldii and Ozimops species and various Nyctophilus species can be easily confused during the analysis process and are therefore grouped together.

Based on local records and habitat availability within the Project Site, microbat species that were targeted during the survey included the following threatened species:

- Corben's Long-eared Bat (*Nyctophilus corbeni*);
- Inland Forest Bat (*Vespadelus baverstocki*); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

The Inland Forest Bat (*Vespadelus baverstocki*) and the Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) are predicted threatened species as returned by the BAM. No candidate threatened microbat species are relevant to this assessment.

528000
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6257000
GORDONS LANE
BODELLS LANE
BLANDS LANE
MYERS LANE

LEGEND

Watercourse
Project site boundary
Cable Easement
Cadastre

SurveyEffort

Anabat
Bird Survey
Call Playback
Fauna Habitat Assessment
Harp Trap
Remote Camera
Diurnal and Nocturnal Fauna Survey

0 200 400 600 800 m

Scale: 1:16,000
GDA 1994 MGA Zone 55

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Fauna and Habitat Assessment - Survey Effort

FIGURE 6

2.3.13 Weather Conditions[1]

A summary of the weather conditions prior to and during the survey period are presented in **Table 6**. Although no rainfall was received during the survey period, the temperatures were considered to be conducive to fauna activity within the Project Site including target threatened fauna species.

Table 6 Weather Conditions during the Survey Period

Date	Daily Rainfall (mm)	Daily Minimum Temp (°C)	Daily Maximum Temp (°C)	Daily Global Solar Exposure (kwh M²)
17-09-2018	0	-1.4	19.0	20.0
18-09-2018	0	0.4	24.8	20.2
19-09-2018	0	10.5	18.2	20.4
20-09-2018	0	2.1	19.2	20.4
21-09-2018	0	2	22.2	20.7
22-09-2018	0	7.5	22.4	18.0
23-09-2018	0	4.7	24.6	21.0
24-09-2018	0	6.8	21.5	19.5
25-09-2018	0	5.1	21.4	20.2
26-09-2018	0	3.9	23.0	21.5
27-09-2018	0	3.5	25.6	21.7
28-09-2018	0	12	25.4	21.5

[1] Weather conditions sourced from Bureau of Meteorology Weatherzone application. Weather Station: 050017 (West Wyalong Airport AWS). Note that no wind speed/direction data is available at this weather station.

2.3.14 Survey Effort Summary

A summary of the flora and fauna survey effort is presented in **Table 7**.

Table 7 Flora and Fauna Survey Effort Summary

Field Survey Technique	Target Species	Survey Effort	No. units	Dates	Time
Threatened Flora Surveys	All flora including the following threatened plant species: • *Austrostipa metatoris* • *Brachyscome papillosa* (Mossgiel Daisy) • *Caladenia arenaria* (Sand-hill Spider Orchid) • *Diuris tricolor* (Pine Donkey Orchid) • *Lepidium aschersonii* (Spiny Pepper-cress) • *Lepidium monoplocoides* (Winged Peppercress) • *Philotheca ericifolia* • *Swainsona sericea* (Silky Swainson-pea) • Swainsona murrayana (Slender Darling-pea) • *Tylophora linearis*	5 days	-	24-28 Sep 2018	9am-5pm
Flora Survey Plot/Transects	As above	5 days	13 Plots	24-28 Sep 2018	9am-5pm
Fauna Habitat Assessment	All fauna species	5 days	-	24-28 Sep 2018	9am-5pm
Diurnal Opportunistic Fauna Surveys	All fauna species	5 days	-	24-28 Sep 2018	9am-5pm
Dawn Bird Surveys	All birds including the following threatened bird species: • Black-breasted Buzzard (*Hamirostra melanosternon*); • Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*) • Brolga (*Grus rubicunda*); • Brown Treecreeper (eastern subspecies)	4 mornings	-	25-28 Sep 2018	5:30am-6:30am

Field Survey Technique	Target Species	Survey Effort	No. units	Dates	Time
	(*Climacteris picumnus victoriae*) • Diamond Firetail (*Stagonopleura guttata*); • Dusky Woodswallow (*Artamus cyanopterus cyanopterus*); • Flame Robin (*Petroica phoenicea*); • Gilbert's Whistler (*Pachycephala inornata*); • Glossy Black-Cockatoo (*Calyptorhynchus lathami*); • Grey-crowned Babbler (*Pomatostomus temporalis temporalis*); • Grey Falcon (*Falco hypoleucos*); • Hooded Robin (*Melanodryas cucullata cucullata*); • Little Eagle (*Hieraaetus morphnoides*) • Major Mitchell's Cockatoo (*Lophochroa leadbeateri*); • Malleefowl (*Leipoa ocellata*); • Painted Honeyeater (*Grantiella picta*); • Regent Honeyeater (*Anthochaera phrygia*); • Scarlet Robin (*Petroica boodang*); • Spotted Harrier (*Circus assimilis*) • Superb Parrot (*Polytelis swainsonii*) • Swift Parrot (*Lathamus discolor*); • Speckled Warbler (*Chthonicola sagittata*); and • White-throated Needletail (*Hirundapus caudacutus*).				
Amphibian Survey	All amphibians.	4 nights	-	24-27 Sep 2018	7:30-9:30pm
Reptile Survey	All reptiles.	5 days	-	24-28 Sep 2018	9:00-5:00pm
Nocturnal Spotlighting	Nocturnal fauna species and the following threatened species:	4 nights	-	24-27 Sep 2018	7:30-9:30pm

Field Survey Technique	Target Species	Survey Effort	No. units	Dates	Time
	• Grey-headed Flying-fox (*Pteropus poliocephalus*); • Spotted-tailed Quoll (*Dasyurus maculatus*); and • Squirrel Glider (*Petaurus norfolcensis*).				
Call Playback	Fauna call playback was used to survey for the following threatened fauna species: • Barking Owl (*Ninox connivens*); • Masked Owl (*Tyto novaehollandiae*); and • Koala (*Phascolarctos cinereus*).	4 nights	-	24-27 Sep 2018	7:30-9:30pm
Camera Surveillance	All fauna (including pest species	4 days/nights	4 units	24-27 Sep 2018	5:30-6:30pm
Microbat Surveys	Microbat species and the following threatened species: • Corben's Long-eared Bat (*Nyctophilus corbeni*); • Inland Forest Bat (*Vespadelus baverstocki*); and • Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).	2 nights	4 Anabats	24-27 Sep 2018	6:00 -6:00am

2.4 Threatened Biodiversity Data Collection

Following collation of database records and species and community profiles, as returned by the BAM Credit Calculator, the Bionet Atlas of NSW (OEH, 2018a) and the EPBC Protected Matters Search Tool (DoEE, 2018a), a 'likelihood of occurrence' assessment was prepared with reference to the broad habitats contained within the Project Site (**Appendix D**). Likelihood of occurrence was based on species distribution (IBRA subregion), native vegetation cover, minimum patch size, geographic constraint, habitat constraints, past records and the class of credit for threatened species (relevant to species credit species only). Likelihood of occurrence was defined for each species using the criteria presented in **Table 8**.

Table 8 Key to Likelihood of Occurrence for Threatened Species

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

The Protected Matters Search Report (PMSR) is also presented in **Appendix E**.

2.5 Biodiversity Credit Calculations

The BC Act, together with the BC Regulation, outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme.

In accordance with Section 3.2.1.5 of the BAM '*Where the subject land contains paddock trees and intact native vegetation, an assessor may use the module for assessing clearing of paddock trees for that part of the proposal and the full BAM for the remaining areas*'.

An assessment of all paddock trees within the development site was undertaken. Under the BAM, vegetation meets the definition of paddock trees if:

- *"A) The trees located on category 2 land are surrounded by category 1 land on the regulatory maps under the BC Act, or*
- *B) The native vegetation that comprises the groundcover is*
  - *Less than 50% of the cover of indigenous species of vegetation; and*
  - *Not less than 10% of the area is covered with vegetation (whether dead or alive), and*
  - *The assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of nonindigenous vegetation in the area is likely to be at its maximum, and*
- *C) The foliage cover for the tree growth form group is less than 25% of the benchmark for tree cover for the most likely plant community type, or*
- *D) It is a tree located more than 50 m away from any living tree that is greater than 20 cm DBH and the tree is located on category 2 land that is surrounded by category 1 land; or it is in a group of three (3) or fewer living trees within a distance of 50 m of each other, that in turn, are greater than 50 m from the next living tree that is greater than 20 cm DBH and located on category 2 land that is surrounded by category 1 land."*

Under part B and C of the definition described above, a large number of trees within the development footprint of the Project Site meet the definition under the BAM to qualify as paddock trees. On this basis, a streamlined paddock tree assessment based on Appendix 1 of BAM is provided.

Biodiversity credits required to offset impacts of the proposal were calculated using:

- Full BAM Calculator(Case No: 00013377) for impacts to mapped native vegetation zones; and
- Module for assessing clearing of paddock trees (Case No" 00013425), for impacts on paddock trees.

Version 1.2.5.00 of the calculator was used with BAM data last updated 7/11/2018 – (Version: 4), available at https://www.lmbc.nsw.gov.au/bamcalc in accordance with the Biodiversity Offsets Scheme. These calculations were performed by SLR Associate Ecologist – Dr. Gilbert Whyte (BAM Accredited Assessor - BAAS18041) on 18/12/2018.

2.5.1 Ecosystem Credit Species and Candidate Threatened Species

'Ecosystem credit species' and 'candidate threatened species' as returned by the BAM (OEH, 2017b) are discussed in **Section 3.5.5** and **Section 3.5.6** respectively. Relevant habitat information for these species is presented in **Appendix D**. All BAM output reports are presented in **Appendix F** and **Appendix G**.

2.6 Survey Limitations and Assumptions

The current survey was designed to provide an overall assessment of the ecological values within the Project Site and fulfil the requirements of the BAM (OEH, 2017b). Given the duration and timing of the field survey, it is likely that some of the species that may occur within the Project Site (i.e. permanently, seasonally or transiently) were not detected during the survey. However, the survey timing coincided with the appropriate season with favourable weather conditions for all threatened species with a moderate or higher likelihood of occurrence (see **Section 2.3.3**).

Site conditions (including the presence of threatened species of flora and/or fauna) may change after the date of this report. SLR does not accept responsibility arising from, or in connection with, any change to the site conditions. SLR is also not responsible for updating this report if the site conditions change.

3 Stage 1 - Biodiversity Assessment Results

This chapter describes the biodiversity values of the site, in accordance with Stage 1 of the BAM.

3.1 Landscape Context

3.1.1 Project Site - Key Landscape Features

Site specific landscape information relevant to this assessment is presented in **Table 9**.

Table 9 Site specific landscape Information

Landscape	Site Specific Information	Relevant BDAR Section
Interim Biogeographic Regionalisation for Australia (IBRA)	NSW South Western Slopes	Section 3.1.2
IBRA Sub Region	Lower Slopes	Section 3.1.3
NSW(Mitchell) Landscape(DECC, 2002)	Bimbi Plains Manitoba Hills and Footslopes	Section 3.1.4
Native vegetation extent – Project Site	37.28 ha	Section 3.1.5
Native vegetation extent -- 1500 Buffer	135.09 ha 4.95% (Class 0-10%)	Section 3.1.5
Cleared area -- 1500 Buffer	95.05%	Section 3.1.5
Rivers, streams, wetlands and estuaries	Constructed dams (x 5)	Section 3.1.6
Habitat connectivity	Negligible or zero	Section 3.1.7
Geology and Soils	Devonian Wyalong Granite and Quaternary alluvial deposits	Section 3.1.8
Karst, caves, crevices, cliffs and areas of geological significance	None	Section 3.1.9
Areas of outstanding biodiversity value	None	Section 3.1.9
Additional features in SEARs	None	N/A

3.1.2 IBRA Bioregion

The Project Site is located wholly within the NSW South Western Slopes Bioregion. The South Western Slopes Bioregion lies in the foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range, extending into western Victoria, and is approximately 8,657,426 ha in area, with 8,070,608 ha (or 93%) of it within NSW

The South Western Slopes Bioregion extends from Albury in the south, to Dunedoo in the northeast. Towns located in the bioregion include Wagga Wagga, Mudgee, Cootamundra, Narrandera, Parkes, Gundagai and Young. The bioregion includes parts of the Murray, Murrumbidgee, Lachlan and Macquarie River catchments (NSW Office of Environment and Heritage 2017o).

3.1.3 IBRA Subregions

The Project Site is located wholly within the Lower Slopes sub-region of the NSW South Western Slopes Bioregion. Information pertaining to this subregion is presented in **Table 10**.

Table 10 Lower Slopes Subregion

Feature	Information
Geology	Ordovician to Devonian folded and faulted sedimentary sequences with inter-bedded volcanic rocks and large areas of intrusive granites. Areas of Tertiary and Quaternary alluvium.
Characteristic Landforms	Undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.
Typical Soils	Shallow stony soils on steep slopes, texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. Alluvial sands, loams and clays, including red-brown earths on undulating plains and extensive grey clays on alluvium.
Vegetation	Dwyer's Gum *Eucalyptus dwyeri* on granite, Red Ironbark on sedimentary rocks. Hill Red Gum *Eucalyptus dealbata*, White Cypress Pine *Callitris glaucophylla* and Red Stringybark *Eucalyptus macrorhyncha* in the ranges. Grey Box woodlands with Yellow Box *Eucalyptus melliodora*, White Cypress Pine *Callitris glaucophylla* and Belah *Casuarina cristata* on lower areas. Poplar Box *Eucalyptus populnea*, Kurrajong *Brachychiton* sp., Wilga *Geijera parviflora* and Red Box *Eucalyptus polyanthemos* in the north, limited areas of Bull Mallee *Eucalyptus behriana*, Blue Mallee *Eucalyptus polybractea*, Green Mallee *Eucalyptus viridis* and Congoo Mallee *Eucalyptus dumosa* in the central west. Myall *Acacia papyrocarpa*, Rosewood *Dysoxylum pachyphyllum* and Yarran *Acacia homalophylla* on grey clays, Yellow Box, Poplar Box *Eucalyptus populnea*, and Belah *Casuarina cristata* on alluvial loams. River Red Gum *Eucalyptus camaldulensis* on all streams with black box in the west with some lignum and river cooba.
Area	3,938,809 ha

3.1.4 NSW Landscape

The Project Site lies within two NSW Landscapes (DECC, 2002): Bimbi Plains (South East of Project Site) and Manitoba Hills and Footslopes (North West of Project Site). Information pertaining to these landscapes is presented in **Table 11**.

Table 11 NSW Landscapes within the Project Site

NSW Landscape	Information
Bimbi Plains	Quaternary alluvial plains from bedrock hills and ridges of the Gobondery/ Gillenbine and the Belmont/Brooklyn land systems. General elevation 200 to 250m, local relief 30m. Gravelly clay loams and red brown clays, red-brown texture-contrast soils on higher slopes grading to red-brown gradational and uniform profiles of clay loams and clays along creeks. Grey Box (*Eucalyptus microcarpa*) and white Cypress Pine (*Callitris glaucophylla*) originally dominant, sparse Bimble Box (*Eucalyptus populnea*) along creek lines. Mostly cleared and cultivated.
Manitoba Hills and Footslopes	Manitoba Hills and Footslopes landscape includes parts of two land systems: Manitoba and Warrowie. Low ridges with outcrops and tors of granite with narrow, incised drainage contributing to major creeks. General elevation 200 to 310m, local relief to 30m. Calcareous and neutral red earths with hills of shallow loamy and sandy lithosols with abundant surface grit grading into red earths down slope. Moderate to open Dwyer's Mallee Gum (*Eucalyptus dwyeri*), Tumbledown Gum (*Eucalyptus dealbata*), White Cypress Pine (*Callitris glaucophylla*), Red Box (*Eucalyptus polyanthemos*), Kurrajongs (*Brachychiton populneus*), Bimble Box (*Eucalyptus populnea*), scattered Western Golden Wattle (*Acacia decora*), Variable Speargrass (*Austrostipa* spp.) and wire grass (*Aristida* spp). River Redgum (*Eucalyptus camaldulensis*) and Bimble Box along major creeks. Also mallee (*Eucalyptus* spp.), Sugarwood (*Myaporum platycarpum*), Grey Box (*Eucalyptus microcarpa*), Yarran (*Acacia homalophylla*), Dean's wattle (*Acacia deanei*), grasses and forbs.

3.1.5 Native Vegetation Extent

Vegetation clearing has occurred within the Project Site for agriculture (**Photo 1**). The remaining native vegetation consists of patches of native woodland (**Photo 2**) and isolated paddock trees (**Photo 3**). The lack of large trees in some woodland areas also indicates that the Project Site may have been selectively logged at some point in the past thirty to fifty years. A lack of mid-storey species in many of the woodland patches is likely to be due to grazing by native herbivores such as Kangaroos.

It is estimated that the area of woody vegetation extent within the 1500m buffer is 135.09 ha. The total 1500m buffer area (including the Project Site) is 2729 ha therefore the percentage of native vegetation extent is 5 %.

Photo 1 Agricultural land within the Project Site

Photo 2 A woodland vegetation patch within the Project Site

Photo 3 Isolated paddock trees within the Project Site

3.1.6 Rivers, Streams and Estuaries

The elevation within the Project Site ranges from 237m (near the north-east boundary) and 227m in the south-east corner. Five constructed dams occur in the northern portion of the Project Site; however, these were found to lack any aquatic or emergent vegetation (**Photo 4**). These dams may originally have been constructed within a natural drainage channel that has since been modified by intense agricultural practises.

Photo 4 Constructed dam within the Project Site

Two mapped waterways occur within the Project Site. The mapping indicates that these are 1st and 2nd Order Streams according to the Strahler System (Stahler, 1952) (see **Figure 2**). An inspection of these areas determined that due to agricultural development, no natural drainage channels, aquatic habitat or associated riparian vegetation occurs in these areas.

3.1.7 Habitat Connectivity

Due to agricultural development, the native vegetation within the Project Site has low internal and external connectivity. Approximately 95.05% of the area within the 1500 buffer is cleared agricultural land. Patches of native vegetation within the Project Site range in size from 0.01 ha to 6.74 ha and the gaps between these patches range from 30-800 metres. The woodland vegetation within adjacent road corridors has greater connectivity than the Project Site; however, due to land clearing practises, this vegetation is also fragmented in several areas and is currently subjected to severe edge effects.

3.1.8 Geology and Soils

The Soil Landscapes of Central and Eastern NSW (OEH, 2017d) indicates that the underlying geology of the Project Site predominantly consists of Devonian Wyalong Granite (north-west of Project Site) and Quaternary alluvial deposits (south-east of Project Site). Information pertaining to each soil landscape is presented in **Table 12**.

Table 12 Soil Landscape

Soil Landscape	Information
Wah Way Plain (south-east corner of the Project Site)	The Wah Way Plain and plains country extending westwards to parts of the Barmedman Creek floodplain. Soils are predominantly very deep (>150 cm), poorly drained clays with Red Clays (Ug5.36, Ug5.38; Epipedal Episodic Epihypersodic and Endohypersodic, Red Vertosols; Sodic Eutrophic Red Dermosols), Grey Clays (Ug5.24, Ug5.28, Ug5.31, Ug6.2; Episodic, Epihypersodic and Endohypersodic Epipedal Grey Vertosols) and Brown Clays (Ug5.34, Ug5.36, Ug6.1, Ug6.3; Episodic, Epihypersodic and Endohypersodic Epipedal Brown Vertosols). Localised small areas of gilgai occur. Very deep (150 cm), imperfectly drained Red Brown Earths/Red Clays intergrades (Uf6.21, Dr2.13, Dr4.13, Dr2.43; Haplic and Sodic, Calcic Red Chromosols; Haplic and Sodic, Calcic Red Dermosols) occur on some slightly more elevated plains.
Spy Hill (north-west corner of the Project Site)	Gently undulating plains and rises on the Devonian Wyalong Granite and reworked granite materials. Moderately deep (50-80 cm), moderately well-drained Red Earths (Gn2.11; Haplic Eutrophic Red Kandosols) occur on upper and some mid-slopes and lower slopes. Shallow to moderately deep (4080 cm), well-drained Earthy Sands (Uc4.22, Uc5.21; Basic Paralithic Orthic Tenosols) and Siliceous Sands (Uc5.11; Acidic and Basic Paralithic Orthic Tenosols) occur on some slopes along some drainage lines. Moderately deep (>60 cm), moderately well-drained Red Podzolic Soils (Dr4.11; Haplic and Sodic, Eutrophic Red Chromosols) are found on mid and lower slopes. Deep (>100 cm), imperfectly drained Yellow and Brown Solodic Soils (Dy3.22; Dy3.42; Eutrophic Mottled Mesonatric and Mottled-Subnatric Brown and Yellow Sodosols) occur along some drainage lines.

3.1.9 Other Notable Landscape Features

The Project Site contains no other notable landscape features relevant to the assessment. These include those listed below:

- Karst, caves, crevices, cliffs or areas of geological significance; or
- Areas of Outstanding Biodiversity Value (AOBV) as listed under the BC Act.

3.2 Vegetation Assessment

3.2.1 Regional Vegetation Mapping

The regional scale mapping: Mid Lachlan Extant Vegetation (OEH, 1999) shows that no native vegetation is mapped within the Project Site (**Figure 7**). Two areas of native vegetation are mapped to the south and east of the Project Site. These comprise the following:

- Bulloak/ Belah Woodland; and
- White Cypress Pine Woodlands.

Although the vegetation within the subject does somewhat correspond to these vegetation types, the NSW Vegetation Information System has been progressively updated to include PCTs that more accurately define the vegetation communities within the region. The vegetation mapping was therefore revised following completion of a vegetation assessment within the Project Site (see **Section 3.2.3**, **Figure 8**).

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6264000 6263000 6262000 6261000 6260000 6259000 6258000 6257000 6256000 6255000

PATONS LANE
CAMPBELLS LANE
CLEAR RIDGE STATE FOREST
CLEAR RIDGE ROAD
SANDY CREEK
YOUNGS LANE
BODELLS LANE
GORDONS LANE
BLANDS LANE
MYERS LANE
WYRRA LANE
WORNERS LANE
WYRRA STATE FOREST
ELLIS LANE

LEGEND

- Watercourse
- Railway
- Electricity transmission line
- Project site boundary
- 1500m buffer
- Cable easement
- Cadastre
- State Forest

Mid Lachlan Extant Vegetation
(NSW Office of Environment and Heritage, 1999)

- Black Box/Coolabah Woodlands
- Bulloak/Belah Woodlands
- White Cypress Woodlands
- Non woody vegetation

0 0.5 1 1.5 2 km

Scale: 1:30,000
GDA 1994 MGA Zone 55

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Regional Vegetation Mapping

FIGURE 7

3.2.2 Flora Diversity and Composition

A total of 123 plant species were identified within the Project Site during the field assessment. These comprised 86 native species and 37 exotic species. Of the exotic species, three of these species are High Threat Exotics (HTEs) as determined by the OEH high threat weeds list (OEH, 2018b). A complete list of all flora species identified during the assessment is presented in **Appendix A**. Attributes included in this list include, stratum, growth form, species name and cover for each species.

3.2.3 Plant Community Types

PCT Descriptions

An analysis of the floristic structure and species composition of the vegetation using the Bionet Vegetation Information System (OEH 2018b) determined that five Plant Community Types (PCTs) are present within the Project Site:

- Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (PCT 177);
- Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (PCT 55);
- Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76);
- Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion (PCT 185); and
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26).

A summary of information pertaining to each PCT is presented in the following series of tables: **Table 13, Table 14, Table 15, Table 16** and **Table 17**. Representative photographs of each PCT are also presented.

Table 13 Vegetation Community Characteristics - Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (PCT 177)

Vegetation Community	Floristic Structure and Composition
Vegetation Formation (Keith, 2004)	KF-CH11B – Semi Arid Woodlands (Shrub sub-formation)
Vegetation Class (Keith, 2004)	Inland Rocky Hills Woodlands
PCT Equivalent (PCT Code) (OEH, 2018e)	Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (PCT 177)
PCT Scientific Name (OEH, 2018e)	*Eucalyptus polybractea , Eucalyptus behriana , Eucalyptus viridis / Melaleuca uncinata , Acacia hakeoides , Dodonaea viscosa subsp. cuneata / Dianella revoluta var. revoluta , Austrostipa scabra subsp. falcata , Austrodanthonia setacea*
Conservation Status (BC Act and EPBC Act)	A critically endangered ecological community listed under the BC Act as 'Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion'. Not listed under the EPBC Act.
Cleared Status (OEH, 2018e)	87%
Approximate area (ha) within the Project Site	Approximately 15.24 hectares of the community occurs within the Project Site.
General Vegetation Structure	The community has a low woodland structure with a sparse shrub layer and a groundcover dominated by grasses, forbs and chenopods.
Floristic Composition	The dominant canopy species are *Eucalyptus behriana* (Bull Mallee) and *Eucalyptus dumosa* (White Mallee). Other tree species that occur to a lesser extent include *Eucalyptus microcarpa* (Inland Grey Box) and *Casuarina cristata* (Belah). The dominant shrubs are *Geijera parviflora* (Wilga) and *Melaleuca lanceolata* (Black Teatree). Other shrubs that occur to a lesser extent include *Choretrum glomeratum* (Berry Broom-bush), *Myoporum montanum* (Western Boobialla), *Senna artemisioides* subsp*. Zygophylla*, *Acacia microcarpa*(Manna Wattle), *Acacia salicina* (Sally Wattle), *Melaleuca uncinata* (Broombush), *Acacia oswaldii* (Umbrella Wattle), *Eremophila mitchelli*(False Sandalwood) and *Acacia trineura* (Three-nerve Wattle). The groundcover is dominated by grasses, herbs and chenopods. The dominant grasses include *Rytidosperma fulvum* (Wallaby Grass), *Austrostipa aristiglumis* (Plains Grass) and *Panicum effusum*. The dominant forbs include *Chrysocephalum apiculatum* (Yellow Buttons), *Goodenia cycloptera*, *Brachyscome ciliaris* (Variable Daisy), *Oxalis perennans* and *Zygophyllum glaucum* (Pale Twinleaf). The dominant chenopod species include *Sclerolaena birchii* (Galvanised Burr), *Enchylaena tomentosa* (Ruby Saltbush), *Atriplex semibaccata* (Creeping Saltbush), *Einadia nutans* subsp. *nutans* (Climbing saltbush) and *Einadia polygonoides.* The dominant exotic species within the community comprise several grasses and herbs. Two High Threat Exotic(HTE) species were identified in the community: *Lycium ferocissimum* (African Box-thorn) and *Xanthium spinosum*(Bathurst Burr).
Soil Type and Geology	Red Loam.
Evidence of Disturbance	With the exception of weed encroachment, Zone 1 contains only minor evidence of disturbance. Zone 2 has been disturbed via agricultural development.
Vegetation Zones	Zone 1 and Zone 2
BAM Plots/transects	P3, P4, P6, P10 and P12

Photo 5 Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (PCT 177)

Table 14 Vegetation Community Characteristics - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (PCT 55)

Vegetation Community	Floristic Structure and Composition
Vegetation Formation (Keith, 2004)	KF-CH11A – Semi Arid Woodlands (Grassy sub-formation)
Vegetation Class (Keith, 2004)	North-west Floodplain Woodlands
PCT Equivalent (PCT Code) (OEH, 2018e)	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (PCT 55)
PCT Scientific Name (OEH, 2018e)	*Casuarina cristata / Geijera parviflora , Alectryon oleifolius subsp. canescens , Eremophila mitchellii , Capparis mitchellii / Einadia nutans subsp. nutans , Enchylaena tomentosa , Monachather paradoxus , Sclerolaena birchii*
Conservation Status (BC Act and EPBC Act)	Not listed
Cleared Status (OEH, 2018e)	83%
Approximate area (ha) within the Project Site	Approximately 14.56 hectares of the community occurs within the Project Site.
General Vegetation Structure	The community has a low to tall woodland structure with a sparse shrub layer and a groundcover dominated by grasses, forbs and chenopods.
Floristic Composition	The dominant canopy species is *Casuarina cristata* (Belah). Shrub species include *Acacia oswaldii*(Umbrella Wattle), *Acacia pendula* (Weeping Myall or Boree), *Acacia salicina*(Sally Wattle), *Myoporum montanum* (Western Boobialla), *Senna artemisioides* subsp. *zygophylla, Acacia ligulata*(Small Cooba), *Geijera parviflora* (Wilga), *Alectryon oleifolius* subsp. *canescens* (Western Rosewood)and *Duma florulenta* (Lignum). The groundcover is dominated by grasses, forbs and chenopods. The dominant grasses include *Austrostipa* sp.(A Speargrass). *Chloris truncata* (Windmill Grass), *Panicum effusum*, *Enneapogon* sp. And *Rytidosperma fulvum* (Wallaby Grass). The dominant forbs include *Zygophyllum glaucum* (Pale Twinleaf), *Brachyscome ciliaris* (Variable Daisy), *Chrysocephalum apiculatum* (Yellow Buttons) and *Solenogyne bellioides.* The dominant chenopod species include *Atriplex suberecta* (Sprawling Saltbush) *Einadia nutans* subsp. *nutans* (Climbing saltbush), *Enchylaena tomentosa* (Ruby Saltbush), *Sclerolaena birchii* (Galvanised Burr) and *Atriplex semibaccata* (Creeping Saltbush). The dominant exotic species are grass species including *Hordeum vulgare* (Barley), *Lactuca serriola* (Prickly Lettuce) and *Panicum capillare* (Witch Grass). One High Threat Exotic (THE) was identified: *Lycium ferocissimum* (African Box-thorn).
Soil Type and Geology	Red Loam.
Evidence of Disturbance	With the exception of weed encroachment, Zone 1 contains only minor evidence of disturbance. Zone 2 has been disturbed via agricultural development.
Vegetation Zones	Zone 1 and Zone 2
BAM Plots/transects	P1, P2 and P7

Photo 6 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (PCT 55)

Table 15 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76)

Vegetation Community	Floristic Structure and Composition
Vegetation Formation (Keith, 2004)	KF-CH3 – Grassy Woodlands
Vegetation Class (Keith, 2004)	Floodplain Transition Woodlands
PCT Equivalent (PCT Code) (OEH, 2018e)	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76)
PCT Scientific Name (OEH, 2018e)	*Eucalyptus microcarpa / Dodonaea viscosa subsp. cuneata , Acacia buxifolia subsp. buxifolia / Austrodanthonia caespitosa , Austrostipa scabra subsp. falcata, Chloris truncata , Sida corrugata*
Conservation Status (BC Act and EPBC Act)	An endangered ecological community listed under the BC Act as 'Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions'. An endangered ecological community listed under the EPBC Act as 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia'.
Cleared Status (OEH, 2018e)	92%
Approximate area (ha) within the Project Site	Approximately 0.46 hectares of the community occurs within the Project Site.
General Vegetation Structure	The community has a low woodland structure. Due to agricultural development, the shrub layer is absent and the groundcover is dominated by exotic grasses and forbs.
Floristic Composition	The dominant canopy species is *Eucalyptus microcarpa* (Inland Grey Box). *Amyema miquelii* was identified parasitizing several of the trees. Atriplex semibaccata (Creeping Saltbush). Shrub species are largely absent due to vegetation clearing activities. The dominant groundcover species are chenopods including *Einadia nutans* subsp*. nutans* (Climbing saltbush) and *Sclerolaena birchii* (Galvanised Burr). Exotic species are dominant in this community and include forbs such as *Polygonum aviculare* (Wire Weed), *Brassica napus* (Rapeseed), *Brassica rapa* (Field Mustard), Panicum capillare (Witch Grass). The dominant exotic grasses are *Hordeum vulgare* (Barley) and *Avena sativa* (Oats).
Soil Type and Geology	Red Loam.
Evidence of Disturbance	The vegetation is fragmented due to previous land clearing activities. Minor encroachment of groundcover weeds occurs.
Vegetation Zones	Zone 1
BAM Plots/transects	P3

Photo 7 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76) - Highly modified

Table 16 Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion (PCT 185)

Vegetation Community	Floristic Structure and Composition
Vegetation Formation (Keith, 2004)	KF-CH11B – Semi Arid Woodlands (Shrub sub-formation)
Vegetation Class (Keith, 2004)	Inland Rocky Hills Woodlands
PCT Equivalent (PCT Code) (OEH, 2018e)	Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion (PCT 185)
PCT Scientific Name (OEH, 2018e)	*Eucalyptus dwyeri , Callitris glaucophylla , Acacia doratoxylon / Cassinia laevis , Leptospermum divaricatum , Grevillea floribunda / Melichrus urceolatus , Cheilanthes austrotenuifolia , Gonocarpus elatus , Austrodanthonia setacea*
Conservation Status (BC Act and EPBC Act)	Not listed
Cleared Status (OEH, 2018e)	20%
Approximate area (ha) within the Project Site	Approximately 1.23 hectares of the community occurs within the Project Site.
General Vegetation Structure	The community has an open woodland structure and is highly modified, lacking a midstorey layer. The groundcover dominated by grasses, forbs and chenopods.
Floristic Composition	The vegetation community is fragmented, therefore in some areas *Callitris glaucophylla* (White Cypress) is dominant, while in other areas *Eucalyptus dwyeri* (Dwyer's Redgum) is dominant. *Casuarina cristata* (Belah) also occurs to a lesser extent in association with these species. The shrub layer is sparse to dense and dominated by several shrub species including *Melaleuca uncinata* (Broombush), *Dodonaea viscosa* (Sticky Hop-bush), *Cassinia laevis* (Cough Bush) *Myoporum montanum* (Western Boobialla) and *Senna artemisioides* subsp. *zygophylla.* The groundcover is dominated by grasses, forbs and chenopods. The dominant grasses include *Panicum effusum*, *Austrostipa scabra* (A Speargrass) and *Rytidosperma fulvum* (Wallaby Grass). The dominant forbs include *Dianella* sp. and *Sida corrugate* (Corrugated Sida). The dominant chenopods include *Atriplex semibaccata* (Creeping Saltbush), *Sclerolaena birchii* (Galvanised Burr), *Einadia trigonos* (Fishweed) and *Enchylaena tomentosa* (Ruby Saltbush). The vegetation community contains several exotic groundcover species including *Hordeum leporinum* (Barley Grass), *Cucumis myriocarpus* subsp. *leptodermis* (Paddy Melon), *Panicum capillare* (Witch Grass), *Arctotheca calendula* (Cape Daisy), *Lepidium bonariense*, *Lolium perenne* (Perennial Ryegrass) and *Sonchus oleraceus* (Common Sowthistle). Two High Threat Exotic (HTE) species were identified: Asparagus asparagoides (Bridle Creeper) and *Lycium ferocissimum* (African Box-thorn).
Soil Type and Geology	Red Loam.
Evidence of Disturbance	The vegetation is fragmented due to previous land clearing activities. Minor encroachment of groundcover weeds also occurs.
Vegetation Zones	Zone 1
BAM Plots/transects	P9 and P13

Photo 8 Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion (PCT 185)

Table 17 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)

Vegetation Community	Floristic Structure and Composition
Vegetation Formation (Keith, 2004)	KF-CH11A – Semi Arid Woodlands (Grassy sub-formation)
Vegetation Class (Keith, 2004)	Riverine Plain Woodlands
PCT Equivalent (PCT Code) (OEH, 2018e)	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)
PCT Scientific Name (OEH, 2018e)	*Acacia pendula , Casuarina cristata / Rhagodia spinescens , Maireana decalvans / Austrodanthonia caespitosa , Atriplex semibaccata , Einadia nutans subsp. nutans, Rhodanthe corymbiflora*
Conservation Status (BC Act and EPBC Act)	An endangered ecological community listed under the BC Act as 'Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions'. An endangered ecological community listed under the EPBC Act as 'Weeping Myall Woodlands'.
Cleared Status (OEH, 2018e)	90%
Approximate area (ha) within the Project Site	Approximately 5.77 hectares of the community occurs within the Project Site.
General Vegetation Structure	The community has a low woodland structure with a sparse to moderately dense shrub layer and a groundcover dominated by grasses, forbs and chenopods.
Floristic Composition	The community is dominated by *Acacia pendula* (Weeping Myall or Boree) and to a lesser extent by *Casuarina cristata* (Belah). The dominant shrub species is *Acacia oswaldii* (Umbrella Wattle). The groundcover is dominated by grasses forbs and chenopods. The dominant grasses are *Rytidosperma fulvum* and *Austrostipa aristiglumis* (Plains Grass). The dominant forbs include *Pycnosorus chrysanthes, Chrysocephalum apiculatum* (Yellow Buttons), *Brachyscome ciliaris* (Variable Daisy) and *Asperula conferta* (Common Woodruff). The dominant chenopods include *Enchylaena tomentosa* (Ruby Saltbush), *Maireana microphylla* and *Einadia nutans* subsp. *nutans* (Climbing saltbush). Several exotic groundcover species were identified including *Lolium perenne* (Perennial Ryegrass), *Lactuca serriola* (Prickly Lettuce), *Lolium rigidum* (Wimmera Ryegrass), *Panicum capillare* (Witch Grass) and *Brassica tournefourtia* (Mediterranean Turnip). One High Threat Exotic (HTE) was identified: *Xanthium spinosum* (Bathurst Burr).
Soil Type and Geology	Red Loam.
Evidence of Disturbance	The vegetation is fragmented due to previous land clearing activities. Minor encroachment of groundcover weeds occurs.
Vegetation Zones	Zone 1
BAM Plots/transects sampled within each vegetation zone	P8 and P11

Photo 9 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)

Plant Community Type Justification

Justification for each of the PCT identifications is provided below:

- *Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion* (PCT 177):
    - The vegetation is a native vegetation community within the South Western Slopes Bioregion;
    - The vegetation is commensurate with an Inland Rocky Hills Woodlands as indicated by its floristic structure;
    - The canopy of the community contains indicator species including *Eucalyptus behriana* (Bull Mallee) and *Eucalyptus dumosa* (White Mallee);
    - The shrub layer of the community contains indicator species including *Melaleuca uncinata* (Broombush); and
    - The groundcover of the community contains characteristic species.
- *Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions* (PCT 55):
    - The vegetation is a native vegetation community within the South Western Slopes Bioregion (central NSW);
    - The vegetation is commensurate with North-west Floodplain Woodlands as indicated by its floristic structure;
    - The canopy of the community is dominated by *Casuarina cristata* (Belah);
    - The shrub layer of the community contains indicator species including *Geijera parviflora* (Wilga) and *Alectryon oleifolius subsp. canescens* (Western Rosewood); and
    - The groundcover of the community contains characteristic species including *Einadia nutans subsp. nutans, Enchylaena tomentosa* (Ruby Saltbush) and *Sclerolaena birchii* (Galvanised Burr).
- *Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions* (PCT 76):
    - The vegetation is a native vegetation community within the South Western Slopes Bioregion (central NSW);
    - The vegetation is commensurate with Floodplain Transition Woodlands as indicated by its floristic structure; and
    - The canopy of the community is dominated by *Eucalyptus microcarpa* (Inland Grey Box).
- *Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion* (PCT 185):
    - The vegetation is a native vegetation community within the South Western Slopes Bioregion (central NSW);
    - The vegetation is commensurate with Inland Rocky Hill Woodlands as indicated by its floristic structure;
    - The canopy of the community is dominated by either *Eucalyptus dwyeri* (Dwyer's Redgum) or *Callitris glaucophylla* (White Cypress); and
    - The ground and shrub layers of the community contain characteristic species.

- *Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)*:
    - The vegetation is a native vegetation community within the South Western Slopes Bioregion (central NSW);
    - The vegetation is commensurate with Riverine Plain Woodlands as indicated by its floristic structure;
    - The canopy of the community is dominated by *Acacia pendula* (Weeping Myall) and to a lesser extent by *Casuarina cristata* (Belah); and
    - Characteristic groundcover species include *Atriplex semibaccata* (Creeping Saltbush) and *Einadia nutans* subsp. *nutans.*

3.2.4 Vegetation Zones

Vegetation communities were delineated and mapped based on species composition, structure and condition assessments following the methods described in **Section 2.3.1**. A revised vegetation map based on this assessment is presented in **Figure 8**. The condition assessment determined that seven vegetation zones occur within the Project Site as follows:

- PCT 177/ Zone 1: Moderate/ Good Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion;
- PCT 177/ Zone 2: Low Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion;
- PCT 55/ Zone 1: Moderate/ Good Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions;
- PCT 55/ Zone 2: Low Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions;
- PCT 76/ Zone 1: Low Condition Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions;
- PCT 185/ Zone 1: Low Condition Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion; and
- PCT 26/ Zone 1: Low Condition Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.

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6262000 6261000 6260000 6259000 6258000 6257000

GORDONS LANE

BODELLS LANE

BLANDS LANE

MYERS LANE

1 2 3 4 5 6 7 8 9 10 11 12 13

LEGEND

- Watercourse
- Project site boundary
- Cable easement
- Cadastre
- BAM Plot / Transect

Plant Community Type (PCT) and Vegetation Zone

- PCT 177/ Zone 1: Moderate/ Good Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion
- PCT 177/ Zone 2: Low Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion
- PCT 55/ Zone 1: Moderate/ Good Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions
- PCT 55/ Zone 2: Low Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions
- PCT 76/ Zone 1: Low Condition Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
- PCT 185/ Zone 1: Low Condition Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
- PCT 26/ Zone 1: Low Condition Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

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Scale: 1:16,000
GDA 1994 MGA Zone 55

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Plant Community Types and Vegetation Zones

FIGURE 8

3.2.5 Vegetation Integrity Assessment (Site Condition) and Patch Size

Isolated patches of vegetation occur centrally within the Project Site; however, all vegetation associated with the boundaries and adjoining road reserves is considered to be part of the same vegetation patch. This vegetation extends to the south and extends for several kilometres until becoming fragmented by agricultural areas and major roadways. This vegetation patch is estimated (via GIS software) to be approximately 86 hectares.

The vegetation integrity assessment was conducted in accordance with the BAM (OEH 2017c) for each of the vegetation zones as presented in **Table 18**. In accordance with the BAM, patch size was assigned to each vegetation zone as a class, being < 5ha, 5–24 ha, 25–100 ha or ≥ 100 ha.

Table 18 Vegetation Integrity Calculations

Veg Zone Name	Area within Project Site	Area within the Development Footprint	Patch Size (Ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 177_Moderate	7.66	0.00	86.00	52.4	83.2	43.5	57.4
PCT 177_Low	7.59	0.00	3.10	22.2	67.5	54.7	43.4
PCT 55_Moderate	7.07	0.80	86.0)	38	57.6	61.1	51.2
PCT 55_Low	7.5	0.00	86.0	16.9	46.1	31.6	29.1
PCT 76_Moderate	0.46	0.00	0.46	6.3	47.8	14.5	16.3
PCT 185_Low	1.23	0.00	86.0	9.2	14.0	4.5	8.3
PCT 26_Moderate	5.77	1.03	86.0	21.3	83.2	63.8	48.4
Total	**37.28**	**1.83**					

3.2.6 Threatened Ecological Communities (BC Act)

A search of the OEH Bionet Atlas detected six threatened ecological communities (TECs) within a 10 kilometre radius of the centre of the Project Site (**Appendix D**). The following TECS were recorded within the Project Site:

- Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (177). This vegetation is listed as 'critically endangered' under the BC Act as Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion.
- Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76). This vegetation is listed as 'endangered' under the BC Act as Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26). This vegetation is listed as 'endangered' under the BC Act as Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions.

The distribution and extent of TECs within the Project Site is displayed in **Figure 10**.

Potential impacts to these TECs are discussed in **Section 4**.

3.2.7 Priority Weeds and High Threat Exotics

A complete list of all flora species identified within the Project Site is presented in **Appendix A**. A total of 37 exotic plant species were detected. Three of these species are considered to be High Threat Exotics (HTE) according to the OEH High Threat Exotic species list (OEH 2018f):

- *Asparagus asparagoides* (Bridle Creeper);
- *Lycium ferocissimum* (African Box-thorn); and
- *Xanthium spinosum* (Bathurst Burr).

These exotic plant species were found in low abundance throughout the Project Site (mainly as single shrubs).

3.3 Habitat Suitability for Threatened Species

3.3.1 General Fauna Habitat Types

The majority of the Project Site is vegetated with non-native agricultural land (i.e. wheat crop). This vegetation is not considered to be important habitat for native flora or fauna species. However, populations of exotic species within the agricultural areas may be a resource for some native species. For example, wheat seeds left following cropping may provide food for native birds and mammals. Introduced House Mice (*Mus musculus*) were observed in the agricultural areas. This species is likely to be a prey species of native predatory species such as large forest owls.

The field surveys confirmed that two main fauna habitat types occur within or adjacent to the Project Site: Agricultural Areas and Woodland. Mapping of these habitat types is presented in **Figure 9**. Descriptions of the habitats and the associated fauna species observed during the field surveys are presented in **Table 19, Table 20**, and **Table 21** respectively.

Table 19 Agricultural Areas Habitat Description

Agricultural Areas	
Description	This habitat type is present throughout the majority of the Project Site. This habitat type consists of introduced plant species and with the exception of isolated mature paddock trees generally lacked woody vegetation, leaf litter and woody debris (habitat for terrestrial fauna).
Typical fauna species	• Feral Cat (*Felis catus*); • Eastern Grey Kangaroo (*Macropus giganteus*); • Western Red Kangaroo (*Macropus rufus*); • House Mouse (*Mus musculus*); • Feral Rabbit (*Oryctolagus cuniculus*); and • Feral Pig (*Sus scrofa*)
Threatened fauna recorded	The Grey-crowned Babbler was observed in large family groups traversing this habitat between woodland patches.

Table 20 Woodland Habitat Description

Woodland	
Description	Woodland areas are restricted to remnant patches within the Project Site. The structural diversity of the vegetation is generally low with a mature canopy of eucalypts up to 10 m tall over a sparse shrub and ground layer. The dominant canopy tree species include *Eucalyptus sideroxylon* (Mugga Ironbark), *Eucalyptus microcarpa* (Inland Grey Box) and *Eucalyptus behriana* (Bull Mallee). These species are an important foraging resource for birds and arboreal mammals. Other important feed tree species were identified including *Callitris glaucophylla* (White Cypress) and *Casuarina cristata* (Belah). The seeds from the cones of these species are fed upon by several parrot and cockatoo species. Around 300 vertebrate species are known to utilise tree-hollows and shedding bark in Australia and the shelter provided by these habitat features is critical for the survival of many species (Gibbons and Lindenmayer, 2002). Large numbers of habitat trees were present within woodland areas. A range of hollow sizes and shapes were observed and these may be utilised by a variety of species including amphibians, reptiles, micro-bats and arboreal mammals such as possums and birds including owls and cockatoos. This habitat type contained a sparse shrubby understorey, which would provide some sheltering habitat for terrestrial species such as amphibians, reptiles, terrestrial mammals and prey species for arboreal predators. Woody debris is also present. This is an important habitat resource for terrestrial fauna species.
Typical fauna species	Myrtaceous trees and other habitats contained within this habitat type provide suitable foraging and sheltering resources for a range of fauna species, particularly microbats, including the vulnerable Inland Forest Bat (*Vespadelus baverstocki*). Numerous common woodland bird species were observed within this habitat during surveys. Few terrestrial fauna species were observed during the survey. This is likely to due to disturbance from agriculture. However, native mammals that were observed include the Eastern Grey Kangaroo (*Wallabia gigantea*) and Western Red Kangaroo (*Macropus rufus*).

Table 21 Constructed Dams Habitat Description

Constructed Dams	
Description	This habitat type consists of shallow waterbodies with no aquatic, emergent or riparian vegetation.
Typical fauna species	The water within the dams may be an important source of drinking water for resident populations of fauna species including the following: • Eastern Grey Kangaroo (*Macropus giganteus*); and • Western Red Kangaroo (*Macropus rufus*). Other fauna species that may utilise the habitat include amphibians and reptiles including the following: • Eastern Sign-bearing Froglet (*Crinia parinsignifera*); and • Eastern Long-necked Turtle (*Chelodina longicollis*).
Threatened fauna recorded	None detected. Due to the lack of aquatic vegetation, emergent vegetation and riparian vegetation this habitat unsuitable for threatened amphibian and aquatic species.

3.3.2 Habitat Trees

A total of 163 habitat trees were identified within the Project Site. It is estimated that these trees contain approximately 241 hollows. The majority of these hollows were small and medium hollows as detailed below:

- 112 small hollows (<5 cm);
- 115 medium hollows (5-15 cm); and
- 14 large hollows (>20 cm).

Additionally, nesting birds were identified in 15 trees within the Project Site. Nesting species included; Cockatiels, Magpie Larks, Yellow-throated Miner nesting, Pie Butcher Birds and Grey-crowned Babblers (listed as vulnerable under the BC Act).

Detailed information pertaining to the habitat tree survey is presented in **Appendix C**. Habitat tree removal is discussed in **Section 4.1**.

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BLANDS LANE
BODELLS LANE
MYERS LANE

LEGEND

Watercourse
Project site boundary
Cable easement
Cadastre

Surveyed trees

Habitat tree to be removed
Habitat tree to be retained
Paddock tree to be removed

Agricultural areas
Woodland Habitat
Constructed Dams (Aquatic Habitat)

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Fauna Habitat Features

FIGURE 9

3.4.1 Fauna Species Recorded

A total of 81 fauna species was detected within the Project Site. This total comprises 53 birds, 19 mammals, eight reptiles and one amphibian. Each of these groups is discussed below in relation to the habitats present within the Project Site. Habitat suitability for threatened species, including predicted threatened species (ecosystem species) and candidate threatened species (species credit species) as returned by the BAM, are also discussed. Of the total fauna species recorded, three of these are threatened species. All of these species are identified by the BAM as ecosystem credit species. A complete list of all fauna species detected within the Project Site is presented in **Appendix B**.

Birds (Aves)

Dawn bird surveys detected a moderate to high diversity of birds within the Project Site, comprised mostly of Psittacines (parrot species) and Passerines (perching species). Most of these species were identified in woodland habitat where eucalypts provide feeding opportunities (parrots, cockatoos and honeyeaters predominately feed on nectar).

Two threatened bird species were detected within the Project Site; the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and the Painted Honeyeater (*Grantiella picta*) (**Photo 10**). The Grey-crowned Babblers were observed in large family groups in several woodland patches. The Painted Honeyeaters were observed foraging on mistletoes associated within woodland patches within the adjoining road reserve. Both of these species are predicted species (ecosystem credit species).

Photo 10 Painted Honeyeater (*Grantiella picta*) identified within the Project Site

Habitat was also identified within the Project Site for a range of other predicted threatened bird species. These comprise the following:

- Barking Owl (*Ninox connivens*);
- Black-breasted Buzzard (*Hamirostra melanosternon*);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*);
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*);
- Brolga (*Grus rubicunda*);
- Diamond Firetail (*Stagonopleura guttata*);
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*);
- Flame Robin (*Petroica phoenicea*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Grey Falcon (*Falco hypoleucos*);
- Hooded Robin (*Melanodryas cucullata cucullata*);
- Little Eagle (*Hieraaetus morphnoides*);
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)
- Masked Owl (*Tyto novaehollandiae*)
- Painted Honeyeater (*Grantiella picta*);;
- Scarlet Robin (*Petroica boodang*);
- Speckled Warbler (*Chthonicola sagittata*);
- Spotted Harrier (*Circus assimilis*)
- Superb Parrot (*Polytelis swainsonii*);
- Swift Parrot (*Lathamus discolor*); and
- Varied Sittella (*Daphoenositta chrysoptera*).

None of these species were excluded from the BAM Credit Calculator to determine the offset obligation for removal of native vegetation or paddock trees. The habitat requirements of each of these species is presented in **Appendix D**. Additionally, a 'Predicted Threatened Species Report' derived from the BAM Credit Calculator is provided in **Appendix F** (vegetation removal) and **Appendix G** (paddock tree removal).

Terrestrial Mammals

Seven terrestrial mammal species (two native and four exotic) were detected during the surveys, as follows:

- Feral Cat (*Felis catus*);
- Eastern Grey Kangaroo (*Macropus giganteus*);
- Western Red Kangaroo (*Macropus rufus*);
- House Mouse (*Mus musculus*);
- Feral Rabbit (*Oryctolagus cuniculus*);
- Feral Pig (*Sus scrofa*); and

- Short-beaked Echidna (*Tachyglossus aculeatus*).

All of these species are commonly found in disturbed environments (such as agricultural areas) in the region. No threatened terrestrial mammals were detected within the Project Site; however, habitat was identified for the Spotted-tailed Quoll (*Dasyurus maculatus*). This species is not a predicted threatened species or a candidate threatened species.

Arboreal Mammals

No arboreal mammal species were detected within the Project Site; however, suitable habitat was identified for one predicted threatened species (ecosystem credit species): Squirrel Glider (*Petaurus norfolkensis*). This species was included as a predicted threatened species when using the BAM Credit Calculator to determine the offset obligation for removal of native vegetation or paddock trees.

Bats

A total of eight microchiropteran bats ('microbats') were detected within the Project Site via anabat. These comprised the following species:

- Southern free-tailed bat (*Mormopterus planiceps*);
- Lesser Long-eared Bat (*Nyctophilus geoffroyi*);
- Unidentified Long-eared Bat (*Nyctophilus* sp.);
- Western broad-nosed bat (*Scotorepens balstoni*);
- Little broad-nosed bat (*Scotorepens greyii*);
- Inland Forest Bat (*Vespadelus baverstocki*);
- Southern forest bat (*Vespadelus regulus*); and
- Little Forest Bat (*Vespadelus vulturnus*).

All of these species are likely to forage for insects within the Project Site and many are likely to utilise tree hollows for roosting habitat (Churchill, 2009; Hall & Richards, 1979). A total of 163 habitat trees containing such hollows (approximately 264 hollows) were identified within the Project Site (see **Section 3.3.2**).

One species, the Inland Forest Bat (*Vespadelus baverstocki*) is listed as vulnerable in NSW under the BC Act. This species roosts in tree hollows and abandoned buildings and may also roost in small hollows in stunted trees (OEH, 2018c). The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including mallee, mulga and River Red Gum woodland. Most records of the species are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat; however, other habitats may be used for foraging and/or drinking (OEH, 2018c).

The Inland Forest Bat (*Vespadelus baverstocki*) is a predicted threatened species (ecosystem credit species), as defined by the BAM. Habitat was also identified within the Project Site for the following predicted species:

- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Little Pied Bat (*Chalinolobus pictus*); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

None of these species were excluded from the BAM Credit Calculator to determine the offset obligation for removal of native vegetation or paddock trees.

Photo 11 Lesser Long-eared Bat (*Nyctophilus geoffroyi*) captured using a harp trap

Photo 12 Little Forest Bat (Vespadelus vulturnus) captured using a harp trap within the Project Site

Reptiles and Amphibians

The following reptile and amphibian species were detected within the Project Site in woodland habitat:

- Inland snake-eyed Skink (*Cryptoblepharus australis*);
- Timid Slider (*Lerista timida*);
- Common Dwarf Skink (*Menetia greyii*);
- Boulenger's Skink (*Morethia boulengeri*);
- Eastern Bearded Dragon (*Pogona barbata*);
- Blue-bellied Black Snake (*Pseudechis guttatus*);
- Shingleback Lizard (*Tiliqua rugosa*); and
- Eastern Sign-bearing Froglet (*Crinia parinsignifera*).

No threatened reptiles or amphibians were detected within the Project Site. No suitable habitat for threatened reptiles or amphibians was identified and no predicted or candidate threatened species are relevant to this assessment.

Photo 13 Shingleback Lizard (*Tiliqua* rugosa) observed within the Project Site

3.5 Threatened Species Assessment

3.5.1 Threatened Flora Species (BC Act)

A search of the OEH Bionet Atlas detected nine threatened species of plants within a 10 kilometre radius of the centre of the Project Site (**Appendix D**). None of these threatened species were detected during the assessment; however, habitat was identified for the following species:

- *Austrostipa metatoris*

- *Brachyscome papillosa* (Mossgiel Daisy)
- *Caladenia arenaria* (Sand-hill Spider Orchid)
- *Diuris tricolor* (Pine Donkey Orchid)
- *Lepidium aschersonii* (Spiny Pepper-cress)
- *Lepidium monoplocoides* (Winged Peppercress)
- *Philotheca ericifolia*
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona murrayana* (Slender Darling-pea)
- *Tylophora linearis*

Given that surveys coincided with the detectability of all of these species, it is unlikely that any of these species will be directed impacted by the proposed development.

3.5.2 Threatened Fauna Species (BC Act)

A search of the OEH Bionet Atlas detected 49 threatened fauna species within a 10 kilometre radius of the Project Site. These comprised 42 birds, two amphibians, four mammals and one reptile (see **Appendix D**).

Two threatened bird species were detected within the Project Site during threatened species surveys for the current assessment: the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and the Painted Honeyeater (*Grantiella picta*). One threatened microbat species was also detected: Inland Forest Bat (*Vespadelus baverstocki*). All of these species are identified by the BAM as ecosystem credit species. The locations of where each threatened species was detected during the assessment are presented in **Figure 10**. Potential impacts on these species are discussed in **Section 4**.

3.5.3 Threatened Populations (BC Act)

No endangered populations were recorded on the Project Site and none have been previously recorded within the locality of the Project Site.

3.5.4 Biodiversity Risk Weighting

The BAM uses a biodiversity risk weighting to evaluate the ecological risks of threatened entities from the biodiversity offsets scheme. The biodiversity risk weighting is comprised of two components:

- 'Sensitivity to loss' – this considers the increased threat posed to an entity from offsetting the loss of habitat or population, and
- 'Sensitivity to potential gain' – this considers the ability of a species to respond to improvements in habitat condition at an offset site.

The biodiversity risk weightings of threatened biota, which are relevant to this assessment, are presented in **Table 25**.

3.5.5 Predicted Species (BAM Credit Calculator) Summary

The predicted occurrence of these threatened species in the BAM Credit Calculator is based on several factors, including PCTs mapped within the Project Site, IBRA subregion, distributional range of each species, the condition of the vegetation and patch size (as per Section 6 of the BAM). A total of 27 threatened species are predicted to occur within the Project Site by the BAM Credit Calculator and the Module for assessing clearing of paddock trees. These comprise the following:

- Barking Owl (*Ninox connivens*);
- Black-breasted Buzzard (*Hamirostra melanosternon*);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*);
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*);
- Brolga (*Grus rubicunda*);
- Diamond Firetail (*Stagonopleura guttata*);
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*);
- Flame Robin (*Petroica phoenicea*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Grey Falcon (*Falco hypoleucos*);
- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*);
- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Hooded Robin (*Melanodryas cucullata cucullata*);
- Koala (*Phascolarctos cinereus*)
- Little Eagle (*Hieraaetus morphnoides*)
- Little Pied Bat (*Chalinolobus pictus*);
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)
- Masked Owl (*Tyto novaehollandiae*)
- Painted Honeyeater (*Grantiella picta*)
- Scarlet Robin (*Petroica boodang*);
- Speckled Warbler (*Chthonicola sagittata*);
- Spotted Harrier (*Circus assimilis*)
- Superb Parrot (*Polytelis swainsonii*);
- Swift Parrot (*Lathamus discolor*)
- Varied Sittella (*Daphoenositta chrysoptera*);
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

No ecosystem credit species were excluded from the BAM Credit Calculator to determine the offset obligation for removal of native vegetation or paddock trees. The habitat requirements of each 'Predicted Species' are presented in **Appendix D**. Additionally, a 'Predicted Threatened Species Report' derived from the BAM Credit Calculator is provided in **Appendix F** (vegetation removal) and **Appendix G** (paddock tree removal).

3.5.6 Candidate Species (BAM Credit Calculator) Summary

A total of four candidate species credit species (three flora and one fauna species) are determined to be relevant to the Project Site according to the BAM Credit Calculator. These comprise the following:

Flora

- *Leptorhynchos orientalis* (Lanky Buttons);
- *Swainsona murrayana* (Slender Darling Pea); and
- *Swainsona sericea* (Silky Swainson-pea).

Fauna

- Koala (*Phascolarctos cinereus*).

No candidate species credit species were recorded during the field surveys. Importantly, field surveys coincided with the detectability of all candidate species and best practice methods were used during targeted surveys (see **Section 2.3**). The habitat requirements of each candidate species is presented in **Appendix D**. A 'Candidate Threatened Species Report' derived from the BAM Credit Calculator is provided in **Appendix F** (vegetation removal) and **Appendix G** (paddock tree removal). Both BAM reports confirm that surveys coincided with the recommended survey times for all relevant candidate threatened species.

3.5.7 Threatened Species Polygons

In accordance with Section 6.4.1.33 of the BAM (OEH, 2017b), species polygons must be mapped for each species credit species identified within the Project Site. No species credit species were recorded on the Project Site and therefore no species polygons have been mapped for the assessment.

3.5.8 Prescribed Biodiversity Values

With reference to Section 6.7 of the BAM, the Project Site does not contain any of the 'prescribed biodiversity values' identified in that section, as follows:

- Karst, caves, crevices and cliffs;
- Occurrences of rock;
- Human made structures (deemed to be habitat for a threatened species or ecological community);
- Watercourses or hydrological processes that interact with rivers and streams; and
- The proposed development is not for a wind farm.

3.6 EPBC Act Protected Matters

A search of the Protected Matters Search Tool revealed that a total of three threatened ecological communities, 22 threatened species and 11 migratory species (and/or their habitats) listed under the EPBC Act are predicted to occur within a 10 kilometre radius of the Project Site (**Appendix E**).

Two EPBC listed TECs were identified:

- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*; and
- *Weeping Myall Woodland*s.

Potential impacts on these TECs are discussed in **Section 4**.

One EPBC Act listed threatened species was detected during the assessment: the Painted Honeyeater (*Grantiella picta*). The location of where this species was detected during the assessment is presented in **Figure 10**. Potential impacts to this species are discussed in **Section 4**. No other matters of national environmental significance listed under the EPBC Act are relevant to the Project Site.

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MYERS LANE

LEGEND

Watercourse
Project site boundary
Cable easement
Cadastre

Endangered Ecological Community (EEC)

Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion CEEC

Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC

Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions EEC

Threatened Fauna Species

Grantiella picta (Painted Honeyeater)

Pomatostomus temporalis temporalis (Grey-crowned Babbler)

Vespadelus baverstocki (Inland Forest Bat)

N

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Threatened Biota

FIGURE 10

4 Impact Assessment

4.1 Habitat Tree Removal

A total of 163 habitat trees were identified within the Project Site. It is estimated that these trees contain approximately 241 hollows. A total of 11 habitat trees containing 16 hollows will be removed by the proposed development. The habitat trees are considered to be suitable for a range of fauna species including arboreal fauna and threatened species such as the Inland Forest Bat (*Vespadelus baverstocki*). Mitigation measures are presented in **Section 5** to reduce potential direct and indirect impacts.

4.2 Paddock Tree Removal

A total of 205 paddock trees were identified within the Project Site. The proposed development will require the removal of 32 Paddock trees comprising the following species:

- 12 *Casuarina cristata* (Belah);
- Three *Eucalyptus microcarpa* (Grey Box); and
- 17 *Eucalyptus behriana* (Bull Mallee).

The *Module for assessing clearing of paddock trees* was used to determine the offset obligation for impacts to paddock trees (see **Section 4.8**).

4.3 Impacts on Native Vegetation and Habitat

4.3.1 Impacts on PCTs and Vegetation Zones

Approximately 1.83 ha of native vegetation will require removal for the proposed development. All of this vegetation lies within the Myers Lane road reserve in the south-east corner of the Project Site. This vegetation removal is required to establish a connection with the powerline to the north (see **Figure 3**).

The Bushfire and Fire Response Assessment (SLR, 2018) determined that "*The conceptual design allows for a 15 m fire break between the solar panels and the site boundary which is inclusive of a six meter, sealed perimeter access road. The 15 m firebreak satisfies the requirement of an 11 m APZ calculated for the adjacent bushfire hazard resulting in no additional vegetation being required for APZs in this area*". Hence there is no requirement for additional vegetation removal to establish complaint APZs within the Project Site.

A summary of the impacts of vegetation removal for each vegetation zone is presented in **Table 22**.

Table 22 Native Vegetation Zones Impact Summary

Native Vegetation Zones	Area to be retained (ha)	Area to be modified (ha)
PCT 177/ Zone 1: Moderate/ Good Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	7.66	0.00
PCT 177/ Zone 2: Low Condition Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	7.59	0.00
PCT 55/ Zone 1: Moderate/ Good Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	7.07	0.80
PCT 55/ Zone 2: Low Condition Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	7.50	0.00
PCT 76/ Zone 1: Low Condition Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	0.46	0.00
PCT 185/ Zone 1: Low Condition Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion	1.23	0.00
PCT 26/ Zone 1: Low Condition Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	5.77	1.03
Total	**44.14**	**1.83**

The BAM credit calculator was used to determine the offset obligation for removal of vegetation from the vegetation zones identified **in Table 22**. Native vegetation zones are also presented in **Figure 11**.

4.3.2 Impacts on Threatened Ecological Communities

A summary of the impacts of vegetation removal of each TEC is presented in **Table 22**.

Table 23 Threatened Ecological Community Impact Summary

Threatened Ecological Community	Area to be retained (ha)	Area to be modified (ha)
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	15.25	0.00
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.46	0.00
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	5.77	1.03
Total	**21.48**	**1.03**

528000
529000
530000
531000
6262000
6261000
6260000
6259000
6258000
6257000
GORDONS LANE
BLANDS LANE
MYERS LANE

LEGEND

- Watercourse
- Project site boundary
- Cable easement
- Development footprint
- Cadastre
- Zone 2 - PCT 55_Low (Offset required)
- Zone 1 - PCT 26_Low (Offset required)

0 200 400 600 800 m

Scale: 1:16,000
GDA 1994 MGA Zone 55

20-Dec-2018
610.18343

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Impacts on Native Vegetation Zones

FIGURE 11

4.4 Impacts on Threatened Species (BC Act)

4.4.1 Threatened Flora

No threatened flora were detected within the Project Site, therefore no direct impacts to such species are anticipated. Indirect impacts on threatened flora are discussed in **Section 4.7**.

4.4.2 Threatened Fauna

Two threatened bird species were detected within the Project Site; the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and the Painted Honeyeater (*Grantiella picta*). All woodland areas are considered to constitute habitat for these species in addition to the predicted threatened species previously described in **Section 3.5.5**.

One threatened microbat species was also detected: Inland Forest Bat (*Vespadelus baverstocki*). This species is identified by the BAM as an ecosystem credit species.

The Inland Forest Bat utilises hollow-bearing trees (habitat trees) as part of its habitat. Therefore, the removal of 11 habitat trees constitutes a loss of habitat for this species. Additionally, all woodland areas constitute foraging habitat for the species. The majority of this habitat will be retained by the proposed development (see **Table 22**).

Mitigation measures are presented in **Section 5** to further reduce potential impacts to threatened fauna species.

4.5 Impacts on EPBC Act Protected Matters

4.5.1 Threatened Ecological Communities

Two EPBC listed TECs were identified within the Project Site:

- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*; and
- *Weeping Myall Woodlands*.

A total of 1.03 hectares of *Weeping Myall Woodland* will be removed for the proposed development (see **Section 4.3**). Given that this vegetation type appears to be poorly represented in the locality, an EPBC referral is recommended.

4.5.2 Threatened Species

One EPBC listed threatened bird species was detected within the Project Site: the Painted Honeyeater (*Grantiella picta*). All woodland areas are considered to constitute habitat for this species. Approximately 1.83 hectares of habitat will be removed by the proposed development.

4.6 Serious and Irreversible Impacts

According to the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH, 2017c), the vegetation within the Project Site known as *Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion* is identified as a serious and irreversible impact (SAII) Entity. This is based on principles 1 and 2 as set out in clause 6.7 of the *Biodiversity Conservation Regulation 2016*, which are as follows:

- Principle 1 – species or ecological community currently in a rapid state of decline; and
- Principle 2 – species or ecological communities with very small population size.

The assessment criteria for threatened communities set out in subsection 10.2.2.1 of the BAM to assess the potential for serious and irreversible impacts on *Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion* are addressed in **Table 24**.

Table 24 Serious and Irreversible Impacts Assessment

Serious and Irreversible Impacts Assessment for Weeping Myall open woodland	
a)	*The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII*
	Avoidance measures have been implemented which result in 5.77 ha of the community being retained within the Project Site. This was achieved by modifying the layout of the proposed solar panels to avoid areas where the most intact remnants of the community occur. These areas also have the greatest vegetation integrity (as calculated using the BAM).
b)	*The area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone*
	Approximately 1.03 ha of the community with a vegetation integrity score of 48.4 will be removed by the proposal (See **Table 18**). No other patches of the CEEC will be indirectly affected.
c)	*A description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact*
	No thresholds have been defined for the community in the in the current draft of *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH, 2017c).
d)	*The extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint*
	The regional vegetation mapping (OEH, 1999) does not identify this vegetation type within an area of 1000ha, or 10,000ha surrounding the proposed development footprint. This is likely to be due to inaccurate mapping (note that the community has similarities with Belah Woodland, which is mapped extensively in the locality). The overall condition of the community outside the Project Site has not been examined as part of this assessment.
e)	*An estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration*
	The Bionet Vegetation Information System (OEH 2018b) estimates that the pre-European extent of the community within the NSW South Western Slopes Bioregion was 1600,000 ha. The current extent is estimated to be 160,000 ha. The proposed development would result in the removal of 1.03 ha of this vegetation type. This constitutes a removal of 0.00064% of the community within the bioregion.
f)	*An estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion*

Serious and Irreversible Impacts Assessment for Weeping Myall open woodland	
	The Bionet Vegetation Information System (OEH 2018b) does not provide specific figures for reserve system or the IBRA subregion; however, the community is estimated to be 90% cleared in the landscape.
g)	*The development, clearing or biodiversity certification proposal's impact on:*
i.	*abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns*
	Due to the minor scale of vegetation clearing proposed (i.e. 1.03 ha), impacts to abiotic factors are likely to be negligible. The Project Site is relatively flat and contains no wetlands or obvious drainage channels. Additionally, the proposal will not result in an alteration of topography or hydrology.
ii.	*Characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants*
	Due to the minor scale of vegetation clearing proposed (i.e. 1.03 ha), impacts to characteristic and functionally important species such as *Acacia pendula* (Weeping Myall) are likely to be negligible.
iii.	*The quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC*
	The proposed development will remove approximately 1.03 ha of the community from the Project Site. Approximately 5.77 ha of the community will be retained within the Project Site (84.86%). Given that the vegetation to be retained is already highly fragmented, it is unlikely that edge effects would be greater than currently experienced. The proposed development is therefore unlikely to assist invasive species. Mitigation measures are presented for weed, erosion control, dust control and chemical spill control are recommended.
h)	*Direct or indirect fragmentation and isolation of an important area of the potential TEC*
	Given that the vegetation community within the Project Site is already isolated and fragmented in the landscape, the removal of 1.03 ha of the community is unlikely to cause significant further habitat fragmentation.
i)	*The measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.*
	Avoidance measures and mitigation measures to reduce potential impacts to the community that the will be retained within the Project Site include the following: • Erosion control; • Dust control • Chemical spill control • Vegetation clearing protocols; and • Weed management. Plant species that are commensurate with the community have been selected for planting within the Landscape Management Plan. These include species such as *Acacia pendula* (Weeping Myall) and *Acacia oswaldii* (Umbrella Wattle). Recommendations for vegetation integrity monitoring are also presented to ensure that grazing impacts do not have adverse effects on the community during the operational phase.
	Conclusion Given the highly modified nature of the vegetation within the Project and the small area proposed to be cleared (i.e. 1.03 hectares), it is unlikely that the direct removal of this vegetation would constitute a serious and irreversible impact as defined by the BC Regulation.

4.7 Indirect Impacts on Biodiversity Values

In accordance with Section 9.1.4 of the BAM, an assessment of potential indirect impacts on native vegetation and habitat is provided in this section.

4.7.1 Vegetation and Habitat

Potential indirect impacts to native vegetation and habitat may occur during the construction and operational phase of the project. Such impacts may include the following:

- Increased traffic and visitation within the Project Site may facilitate the spread of weeds that could further degrade native vegetation;
- Pollution such as chemical spills from construction machinery may have adverse effects on native vegetation, fauna;
- Introduction of weeds and feral animals that could degrade and modify the habitat to be retained within the Project Site;
- Ground disturbance by machinery during the construction phase may create dust and facilitate the movement of water-borne sediment. Sedimentation could adversely affect the surrounding vegetation.

Mitigation measures are presented in **Section 5** to reduce the potential for these impacts.

4.7.2 Fauna Species

Potential indirect impacts on locally occurring fauna and their habitats (including threatened biota) may occur during the construction and operational phase of the project. Such impacts may include the following:

- The construction of solar panels and security perimeter fencing within the Project Site may obstruct the movement of fauna species through the landscape and may trap fauna within the Project Site;
- Security fences may obstruct the movement of larger terrestrial species such as kangaroos, wallabies, emus and other fauna species (Peachey, Linke, & Jones, 2007). If such species cannot freely leave the Project Site, they may exhaust their food resources and water supply. Ultimately this could cause animal deaths.
- Accidentally fencing in populations of large herbivores and creating a captive population of species such as kangaroos could result in degradation of retained native vegetation (Leigh, Wood, Holgate, Slee, & Stanger, 1989).
- Light spill from artificial lighting within the Project Site may adversely affect the natural behaviour of nocturnal fauna species such as arboreal mammals, large forest owls and foraging microbats;
- Increased traffic within the Project Site may facilitate the encroachment of plant weeds that could further degrade the retained areas of native woodland; and
- Increased visitation of the Project Site may disturb resident fauna and disrupt their natural behaviour.

Mitigation measures are presented in **Section 5** to reduce the potential for these impacts.

4.8 Offset Requirements

4.8.1 Impacts not requiring an offset

Areas within the Project Site mapped as 'Non-native/ Disturbed/ Developed Areas' do not contain native vegetation. As noted in Section 10.4.1 of the BAM, the assessor is not required to assess areas of land on the Project Site "without native vegetation", but must still assess these areas for the potential presence of threatened species. This has been discussed in **Section 3.5**. The extent of areas not requiring offsets is presented in **Figure 8**.

4.8.2 Impacts Requiring an Offset

The BAM Calculator was used on 18 December 2018 to determine the offset obligation for the removal of native vegetation within Myers Lane (Case No 00013377). Additionally, the module for assessing clearing of paddock trees was used to calculate the offset obligation for the removal of paddock trees throughout the Project Site (Case No 00013425).

The offset calculations determined that the purchase and retirement of 68 ecosystem credits would be required to meet the offset obligation, as presented in **Table 25** (vegetation removal) and **Table 26** (paddock tree removal). Purchase and retirement of ecosystem credits for the development must be conducted in accordance with the '*Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits'* (OEH 2017a). A variations options report is presented in **Appendix F** and **Appendix G**.

Offset obligations can also be met by purchase and retirement of the credits listed in direct payment of $188,143.67 into the Biodiversity Conservation Fund. Calculations to determine this final credit price are based on ecosystem credits required for removal of native vegetation within the Myers Lane road reserve (**Table 27**) and the removal of paddock trees throughout the Project Site (**Table 28**).

Table 25 Ecosystem credits for plant community types (PCT), ecological communities & threatened species habitat (Vegetation Removal))

Zone	Vegetation Zone Name	Vegetation Integrity Loss	Area (hectares)	Constant	Species sensitivity to gain class	Biodiversity Risk weighting	Candidate SAII	Ecosystem Credits
Zone 2	PCT 55_Moderate	51.2	0.8	0.25	High	2.00	N/A	20
Zone 1	PCT 26_Moderate	46.8	1.03	0.25	High	2.00	True	24
								Total: 44 Ecosystem Credits

Table 26 Paddock Tree Credit Requirement

Class	Contains Hollows	Number of Trees	Ecosystem Credits
Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions (PCT 55)			
2	True	12	9
			9
Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion (PCT 177)			
2	True	17	13
			13
Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT 76)			
2	True	3	2
			Total: 24 Ecosystem Credits

Table 27 Biodiversity Payment Summary: Ecosystem Credits and Credit Pricing (Vegetation Removal)

Plant Community Type	Baseline Price	Risk Premium	Administrative Cost	Method Adjustment Factor	Price per Credit	No. Ecosystem Credits	Final credit price
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	$1,998.31	24.87%	$20.00	1.0000	$2,515.29	24	$60,366.95
Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	$1,998.31	24.87%	$20.00	1.0000	$2,515.29	20	$50,305.79
							Subtotal excluding GST: $110,672.74
							GST: $11,067.27
							Subtotal Including GST: $121,740.01

Table 28 Biodiversity Payment Summary: Ecosystem Credits and Credit Pricing – Paddock Trees

Plant Community Type	Baseline Price	Risk Premium	Administrative Cost	Method Adjustment Factor	Price per Credit	No. Ecosystem Credits	Final credit price
Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	$1,998.31	24.87%	$20.00	1.0000	$2,515.29	9	$22,637.61
Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	$1,998.31	24.87%	$20.00	1.0000	$2,515.29	13	$32,698.77
Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	$1,998.31	24.87%	$20.00	1.0000	$2,515.29	2	$5,030.58
							Subtotal excluding GST: $60,366.96
							GST: $6,036.70
							Subtotal Including GST: $66,403.66

5 Management of Impacts on Biodiversity

5.1 Avoidance Measures

Avoidance measures to reduce potential impacts to biodiversity values within the Project Site include modifying the layout of solar panels to avoid areas of woodland habitat. These areas have the highest vegetation integrity (as identified by the BAM), comprise two threatened ecological communities and constitute the better quality habitat for threatened species such as the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), Painted Honeyeater (*Grantiella picta*); and the Inland Forest Bat (*Vespadelus baverstocki*).

5.2 Mitigation Measures – Construction Phase

The proposal will directly remove/ modify 1.83 hectares of woodland habitat and 32 paddock trees. There is also potential to impact on habitats outside the Project Site indirectly through sedimentation during construction. The following prescribed mitigation measures are recommended to minimise such impacts.

5.2.1 Erosion Control

Mitigation measures to reduce soil erosion and pollutant run-off during construction activities should include:

- Installation of erosion and sediment control measures prior to any works;
- Regular inspection of erosion and sediment control measures, particularly following rainfall events, to ensure their ongoing functionality; and
- The immediate removal offsite of excavated materials.

5.2.2 Stockpiling

Mitigation measures that should be adopted during stockpiling of materials should include:

- Avoid stockpiling of materials adjacent to native vegetation, but instead use areas that are already cleared/ disturbed; and
- Undertake maintenance of silt fences and other mitigation measures to isolate runoff.

5.2.3 Dust Control

Specific measures to minimise the generation of dust and associated impacts on adjacent natural environments should include:

- Setting maximum speed limits for all traffic within the study area to limit dust generation;
- Use of a water tanker or similar to spray unpaved access tracks during the construction phase where required; and
- Application of dust suppressants or covers on soil stockpiles.

5.2.4 Chemical Spill Control

Specific measures to minimise the potential for chemical spills and associated impacts on adjacent natural environments should include the following:

- All chemicals must be kept in clearly marked bunded areas.
- Regularly inspect vehicles and mechanical plant for leakage of fuel or oil.
- No re-fuelling of vehicles, washing of vehicles or maintenance of vehicles and plant to be undertaken within 20 m of natural drainage lines.

5.2.5 Pre-clearance Surveys

Pre-clearing surveys are be undertaken by a Project Ecologist prior to commencement of any vegetation clearing activities within the Project Site. The Project Ecologist will conduct pre-clearing surveys to identify:

- Fauna species likely to be encountered during construction and potential impacts to fauna during vegetation clearing;
- Potential fauna habitat in the Project Site; and
- Preferred locations to relocate fauna species and habitat features that can be retained following construction.

Pre-clearing surveys will take place 1-2 weeks prior to the commencement of vegetation clearing. The Project Ecologist will mark all potential fauna habitat (e.g. habitat trees, nest trees, burrows, etc.) in the development footprint with high visibility tape (e.g. trees, large woody debris and nests).

5.2.6 Vegetation Clearing Protocols

The following vegetation clearing protocols are to be implemented during vegetation clearing:

- A Project Ecologist is to be present on site during all vegetation clearing operations;
- Areas of vegetation outside the development footprint are to be clearly demarcated with high visibility tape to prevent accidental clearing during the construction phase;
- Vegetation should be cleared in a way that will allow fauna species living in or near the clearing site enough time to move out of the area without additional human intervention;
- No clearing should occur during the early evening or at night, as this is when fauna species are most likely to be on the move and are more vulnerable to injury;
- Habitat links must be maintained during clearing to allow fauna species to move safely from the site to adjacent areas;
- Clearing should begin in the area that is furthest from vegetation to be retained;
- The direction of clearing should also ensure that fauna species are directed away from threats such as roads, developed areas or disturbed areas; and
- Sequential clearing should not create an ‘island’ of habitat that is isolated from adjoining habitat by roads or cleared and disturbed areas.

5.2.7 Habitat Tree Removal Protocols

Habitat trees shall be carefully felled under the supervision of the Project Ecologist. The following recommendations have been developed in consideration of best practise guidelines:

- All habitat trees to be cleared are to be surveyed and marked with high visibility tape prior to clearing;

- Clearing should be undertaken in the Spring period to facilitate survival of displaced animals;
- Habitat trees are to be mechanically shaken or agitated prior to felling to encourage any remaining animals to either leave the tree or show themselves and subsequently be removed by the Project Ecologist prior to felling;
- Felling will involve gently pushing the tree and lowering or felling using a forestry harvester to avoid sudden falling as this is likely to injure wildlife;
- Following felling, habitat trees will be systematically checked from the ground by the Project Ecologist for any remaining fauna;
- Felled habitat trees will be left overnight (i.e. in an adjacent habitat area if required) to allow any undetected fauna further opportunity to escape; and
- If any hollow-bearing tree is found or suspected to contain any threatened species, the tree should be left in place for a minimum of two days and, if possible, be reinspected no more than two hours prior to felling.

5.2.8 Management of Displaced Fauna

The following recommendations apply to the management of any displaced fauna species during vegetation clearing activities:

- All handling of fauna species should be conducted by the Project Ecologist;
- In the event that arboreal animals do not move or they cannot be captured because the tree hollow to be removed is too large, too high or its recovery would breach OH&S requirements then the tree will be felled (i.e. in the direction of other tree debris if possible) and animals recovered and relocated to suitable adjacent habitat;
- Animals are to be removed and relocated to the adjacent bushland/nest boxes within the Western Offset Area prior to felling or the tree shall be sectioned and dismantled under the supervision of the Project Ecologist before relocating the animals;
- Nocturnal fauna species, such as microbats, are to be 'soft released' using bat boxes placed in adjacent habitat;
- Nocturnal fauna species, such as gliders and possums, are to secured in suitable enclosures and kept in a quiet, dark and cool environment until they can be released into suitable habitat after dark; and
- If any injured fauna species are found during the construction period, construction must stop immediately so that the injured animal can be taken to a vet or wildlife carer.

5.2.9 Weed Management

High threat weed species were identified within the Project Site (see **Section 3.2.6**). Measures to prevent the spread of weeds should include the following weed hygiene procedures:

- Induction materials containing detailed information pertaining to the identification of high threat weeds should be prepared by a suitably trained ecologist or bush regenerator. These materials should be provided to contractors who will carry out construction works within the Project Site.
- All vehicles, equipment, footwear and clothing should be clean and free of weed propagules prior to entering the Project Site.

- Any weeds that are removed during the construction phase should be disposed of via an appropriate waste facility.

5.3 Mitigation Measures – Operational Phase

5.3.1 Fencing Retained Vegetation

To reduce the potential for adverse grazing impacts to threatened ecological communities (TECs) to be retained within the Project Site, it is recommended that livestock should be excluded from these areas. Suitable fences should be erected to prevent livestock from grazing areas containing TECs.

5.3.2 Fauna Monitoring

To reduce the potential for impacts to mobile fauna species such as the Inland Forest Bat (*Vespadelus baverstocki*) it is recommended that no barbed wire is used during fence construction. Additionally, it is recommended that the security perimeter fence is inspected annually as part of a fauna monitoring project. The entirety of the security perimeter fence should be inspected by a suitably trained fauna ecologist to look for signs of adverse impacts to fauna (injury or mortality). Monitoring should be conducted annually for one to three years following project construction. A brief report should be prepared for the proponent following each survey.

5.3.3 Nest-box Installation

To reduce the potential for impacts to arboreal fauna species including the Inland Forest Bat (*Vespadelus baverstocki*), it is recommended that the removal of habitat trees is offset by the installation of nest-boxes in the road corridors adjacent to the Project Site. Nest-boxes suitable for a range of fauna species should be installed at a 1:1 ratio if possible (available area). It is important that the density of nest-boxes is no greater than the natural density of hollows in better quality habitats. The success of the nest-box should be monitored for one to three years following completion of the construction phase. Any damaged nest-boxes should be replaced during this time. A brief report should be prepared for the proponent following each survey.

5.4 Adaptive Management

Section 9.4 of the BAM states that adaptive management such as monitoring programs are required for projects where uncertain impacts such as impacts to karst, caves, crevices, cliffs, subsidence or wind turbine strikes may occur. No uncertain impacts have been identified for the proposed development that would require implementation of an adaptive management strategy.

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7 Definitions

The following terms are defined for the purposes of the Biodiversity Assessment Method (OEH, 2017b):

Accredited person: has the same meaning as in the BC Act, referred to in the Biodiversity Assessment Method as 'assessor'.

Ancillary rules: has the same meaning as set out in clause 6.5 of the NSW *Biodiversity Conservation Regulation 2017*.

Annual probability of decline in vegetation and habitat condition: an estimate of the average probability of decline of each attribute through clearing, stochastic factors or ongoing degrading actions (firewood removal, weed invasion, livestock grazing).

Areas of geological significance: geological features such as karst, caves, crevices, cliffs.

Assessment area surrounding the subject land: the area of land in the 1500m buffer zone around a development site, or land to be biodiversity certified or a biodiversity stewardship site, that is determined in accordance with Subsection 4.3.2 of the Biodiversity Assessment Method.

Assessor: the person accredited under the NSW *Biodiversity Conservation Act 2016* referred to in Subsection 2.1.2 of the Biodiversity Assessment Method and who has been engaged by the proponent.

Averted loss: the gain in vegetation and habitat condition that arises from managing the proposed land as an offset compared to the probable future vegetation condition if the land was to be left unmanaged (see *Annual probability of decline*).

Avoid: measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the development to completely avoid impacts on biodiversity values, or certain areas of biodiversity. Refer to the Biodiversity Assessment Method for operational guidance.

BAM: the Biodiversity Assessment Method.

BC Act: the NSW *Biodiversity Conservation Act 2016*.

BC Regulation: the NSW *Biodiversity Conservation Regulation 2017*.

Benchmark data: for a PCT, vegetation class or vegetation formation benchmark data is contained in the BioNet Vegetation Classification. A local reference site may also be used to establish benchmark data for a PCT that may be used in a BAM assessment.

Benchmarks: the quantitative measures that represent the 'best-attainable' condition, which acknowledges that native vegetation within the contemporary landscape has been subject to both natural and human-induced disturbance. Benchmarks are defined for specified variables for each PCT. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or overabundant native herbivores, minimal soil disturbance, minimal canopy dieback, no evidence of recent fire or flood, is not subject to high frequency burning, and has evidence of recruitment of native species.

Biodiversity Assessment Method (BAM): is established under section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act) The BAM is established for the purpose of assessing certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act, *Local Land Services Act 2013* (LLS Act) or the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017).*

Biodiversity certification: has the same meaning as in the NSW *Biodiversity Conservation Act 2016*.

Biodiversity Certification Assessment Report (BCAR): has the same meaning as in the NSW *Biodiversity Conservation Act 2016*.

Biodiversity credit report: the report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.

Biodiversity Development Assessment Report (BDAR): has the same meaning as in the BC Act. Biodiversity offsets: management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.

Biodiversity stewardship agreement: has the same meaning as in the NSW *Biodiversity Conservation Act 2016*.

Biodiversity stewardship site: has the same meaning as in the NSW *Biodiversity Conservation Act 2016*.

Biodiversity Stewardship Site Assessment Report (BSSAR): the report that must be prepared in accordance with the Biodiversity Assessment Method and submitted as part of an application for a biodiversity stewardship agreement.

Biodiversity values: has the same meaning as clause 1.5(2) of the NSW *Biodiversity Conservation Act 2016*.

Biodiversity values map: is established according to clause 7.3 of the NSW *Biodiversity Conservation Regulation 2017*. Development within an area identified on the map requires assessment using the BAM.

BioNet Atlas: the OEH database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the TSC Act) and some fish.

Bionet Vegetation Classification: the master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by OEH and available at www.environment.nsw.gov.au/research/Visclassification.htm.

Broad condition state: areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.

Certified more appropriate local data: has the same meaning as set out in Subsection 2.2.2 of the Biodiversity Assessment Method.

Change in vegetation integrity score for a biodiversity stewardship site: the difference (gain) between the estimated vegetation integrity score without management at a biodiversity stewardship site and the predicted future vegetation integrity score with management at a biodiversity stewardship site.

Class of biodiversity credit: as defined in Section 11.3 of the Biodiversity Assessment Method.

Clearing site: the site proposed to be cleared of native vegetation where approval is sought under Part 5A of the *Local Land Services Act 2013* or the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.*

Clonal species: flora species that propagate asexually at a site or have a limited degree of sexual reproduction, either within or between sites. Modes of asexual reproduction will include vegetative reproduction such as by rhizomes, root suckers or bulb replication.

Connectivity: the measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.

Credit Calculator: the computer program that provides decision support to assessors and proponents by applying the BAM, in particular by using the data required to be entered and the equations in Appendix 6 and Appendix 9 of the Biodiversity Assessment Method to calculate the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.

Critically endangered ecological community (CEEC): an ecological community specified as critically endangered in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Crown cover: the vertical projection of the periphery of tree crowns within a designated area.

Derived vegetation: PCTs that have changed to an alternative stable state as a consequence of land management practices since European settlement. Derived communities can have one or more structural components of the vegetation entirely removed or severely reduced (e.g. over-storey of grassy woodland), or have developed new structural components where they were previously absent (e.g. shrubby mid-storey in an open woodland system).

Development site: an area of land that is subject to a proposed development application, application for approval, or activity within the meaning of Part 5 of the EP&A Act. The term development is also taken to include clearing, except where the reference is to a small area development or a major project development.

Development footprint: the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term development footprint is also taken to include clearing footprint except where the reference is to a small area development or a major project development.

Development site: an area of land that is subject to a proposed development that is under the EP&A Act. The term development site is also taken to include clearing site except where the reference is to a small area development or a major project development.

Ecosystem credits: a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.

Endangered ecological community (EEC): an ecological community specified as endangered in Schedule 2 of the BC Act, or listed under the EPBC Act.

Environment Agency Head: has the same meaning as in the BC Act.

EP&A Act: the NSW Environmental Planning and Assessment Act 1979.

EPBC Act: the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Ephemeral flora species: flora species where the abundance of the species above ground fluctuates in response to the plant life history in combination with environmental conditions and/or disturbance regimes. Fluctuations in abundance may be short-term (seasonal) or long-term (yearly to decadal). Many ephemeral species persist underground through unfavourable conditions via soil seed banks or dormant vegetative organs (bulbs, tubers, rootstocks).

Estuarine area: a semi-enclosed body of water having an open or intermittently open connection with the ocean, in which water levels do not vary with the ocean tide (when closed to the sea) or vary in a predictable, periodic way in response to the ocean tide at the entrance (when open to the sea).

Expert: a person who has the relevant experience and/or qualifications to provide expert opinion in relation to the biodiversity values to which an expert report relates.

Foliage cover: the percentage of a plot area that would be covered by a vertical projection of the foliage and branches and trunk of a plant, or plants or a growth form group. Foliage cover can also be referred to as percent foliage cover.

Gain: the gain in biodiversity values at a biodiversity stewardship site, over time from undertaking management actions at a biodiversity stewardship site. Gain in biodiversity values is the basis for creating biodiversity credits at the biodiversity stewardship site.

Grassland: native vegetation classified in the vegetation formation ‘Grasslands’ in Keith (2004)2. Grasslands are generally dominated by large perennial tussock grasses, lack of woody plants, the presence of broad-leaved herbs in inter-tussock spaces, and their ecological association with fertile, heavy clay soils on flat topography in regions with low to moderate rainfall.

Growth form: the form that is characteristic of a particular flora species at maturity. Growth forms are set out in Appendix 4.

Habitat: an area or areas occupied, or periodically or occasionally occupied, by a species or ecological community, including any biotic or abiotic component.

Habitat component: the component of habitat that is used by a threatened species for either breeding, foraging or shelter.

Habitat surrogates: measures of habitat that predict the occurrence of threatened species and communities: IBRA subregion, PCT, percent vegetation cover and vegetation condition.

Herbfield: native vegetation which predominantly does not contain an over-storey or midstorey and where the ground cover is dominated by non-grass species.

High threat exotic plant cover: plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species. Also referred to as high threat weeds.

Hollow bearing tree: a living or dead tree that has at least one hollow. A tree is considered to contain a hollow if:

(a) the entrance can be seen;

(b) the entrance width is at least 5cm;

(c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance);

(d) the hollow is at least 1m above the ground. Trees must be examined from all angles.

IBRA region: a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system3, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.

IBRA subregion: a subregion of a bioregion identified under the IBRA system.

Impact assessment: an assessment of the impact or likely impact of a development on biodiversity values which is prepared in accordance with the BAM.

Impacts on biodiversity values: loss in biodiversity values from direct or indirect impacts of development in accordance with Chapters 8, 1 and 10.

Important wetland means: a wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) from time to time, and the actual location on the ground that corresponds to a SEPP 14 Coastal wetland.

Individual: in relation to organisms, a single, mature organism that is a threatened species, or any additional threatened species listed under Part 13 of the EPBC Act.

Intact vegetation: vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present.

Intrinsic rate of increase (ir): an estimate of the rate of gain for an attribute at a biodiversity stewardship site from actions undertaken as part of the management plan. The intrinsic rate of increase is specified for an attribute according to the formation of the PCT being assessed (see Appendix 8).

Landscape attributes: in relation to a development site or a biodiversity stewardship site, native vegetation cover, vegetation connectivity, patch size and the strategic location of a biodiversity stewardship site.

Large tree benchmark: is the largest stem size class for a PCT as determined by the benchmark for the PCT.

Life cycle: the series of stages of reproduction, growth, development, aging and death of an organism.

Life form: the form that is characteristic of a particular species at maturity. In the BAM, life form has the same meaning as growth form for flora species.

Linear shaped development: development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length.

Litter cover: the percentage ground cover of all plant material that has detached from a living plant, including leaves, seeds, twigs, branchlets and branches (<10cm in diameter).

Local population: the population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.

Local wetland: any wetland that is not identified as an important wetland (refer to definition of Important wetland).

Loss of biodiversity: the loss of biodiversity values from a development site, native vegetation clearing site or land where biodiversity certification is conferred.

Major project: State Significant Development and State Significant Infrastructure.

Minimise: a process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of development on biodiversity values.

Mitchell landscape: landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Multiple fragmentation impact development: developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines.

Native ground cover: all native vegetation below 1m in height, including all such species native to NSW (i.e. not confined to species indigenous to the area).

Native ground cover (grasses): native ground cover composed specifically of native grasses.

Native ground cover (other): native ground cover composed specifically of non-woody native vegetation (vascular plants only) <1m in height that is not grass (e.g. herbs, ferns).

Native ground cover (shrubs): native ground cover composed specifically of native woody vegetation <1m in height.

Native mid-storey cover: all vegetation between the over-storey stratum and a height of 1m (typically tall shrubs, under-storey trees and tree regeneration) and including all species native to NSW (i.e. native species not local to the area can contribute to mid-storey structure).

Native over-storey cover: the tallest woody stratum present (including emergent) above 1m and including all species native to NSW (i.e. native species not local to the area can contribute to over-storey structure). In a woodland community, the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum.

Native plant species richness: the number of different native vascular plant species that are characteristic of a PCT.

Native vegetation: has the same meaning as in section 1.6 of the BC Act.

Native vegetation cover: the percentage of native vegetation cover on the subject land and the surrounding buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, taking into account vegetation condition and extent. Native over-storey vegetation is used to determine the percent cover in woody vegetation types, and native ground cover is used to assess cover in non-woody vegetation types.

Number of trees with hollows: a count of the number of living and dead trees that are hollow bearing.

Offset rules: are those established by the BC Regulation.

Onsite measures: measures and strategies that are taken, or are proposed to be taken at a development site to avoid and minimise the direct and indirect impacts of the development on biodiversity values.

Operational Manual: the Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM.

Patch size: an area of intact native vegetation that:

a) occurs on the development site or biodiversity stewardship site, and

b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.

PCT classification system: the system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification.

Percent cleared value: the percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification.

Plant community type (PCT): a NSW plant community type identified using the PCT classification system.

Plot: an area within a vegetation zone in which site attributes are assessed.

Population: a group of organisms, all of the same species, occupying a particular area.

Probability of reaching benchmark: the probability of a specific attribute or growth form group reaching benchmark conditions in the vegetation zone at the end of the management timeframe.

Proponent: a person who intends to apply for consent or approval to carry out development, clearing, biodiversity certification or for approval for infrastructure.

Reference sites: the relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.

Regeneration: the proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5cm within a vegetation zone.

Residual impact: an impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.

Retirement of credits: the retirement of biodiversity credits from a biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.

Riparian buffer: an area of land determined according to Appendix 3.

Risk of extinction: the likelihood that the local population or CEEC or EEC will become extinct either in the short term or in the long term as a result of direct or indirect impacts on the viability of that population or CEEC or EEC.

SAII Entity: candidate species and communities that are sensitive to serious and irreversible impacts.

SEPP 14 Coastal wetland: a wetland to which State Environmental Planning Policy No 14 – Coastal Wetlands applies or an area that is identified as a coastal wetland within the meaning of the term coastal wetlands and littoral rainforests area for the purposes of Coastal Management Act 2016.

Site attributes: the matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.

Site-based development: a development other than a linear shaped development, or a multiple fragmentation impact development.

Site context: the value given to landscape attributes of a development site or biodiversity stewardship site after an assessment undertaken in accordance with Section 4.3.

Species credit species: are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits.

Species credits: the class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.

State Significant Development: has the meaning given by Division 4.1 of Part 4 of the EP&A Act.

State Significant Infrastructure: has the meaning given by Part 5.1 of the EP&A Act.

Stream order: has the same meaning as in Appendix 3.

Subject land: is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.

Threat status class: the extent to which a species or ecological community is threatened with extinction, or the extent to which a PCT is estimated to have been cleared (see Percent cleared value).

Threatened Biodiversity Data Collection: part of the BioNet database, published by OEH and accessible from the BioNet website at www.bionet.nsw.gov.au.

Threatened ecological community (TEC): means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.

Threatened species: critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.

Threatened species survey: a targeted survey for threatened species undertaken in accordance with Section 6.5.

Threatened species survey guidelines: survey methods or guidelines published by OEH from time to time at www.environment.nsw.gov.au/topics/animals-and-plants/threatenedspecies/about-threatened-species/surveys-and-assessments.

Total length of fallen logs: the total length of logs present in a vegetation zone that are at least 10cm in diameter and at least 0.5m long.

Transect: a line or narrow belt along which environmental data is collected.

Upland Swamp Policy: the document entitled Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence as in force on the day when the BAM is published until such time as the Environment Agency Head publishes any further document for the purpose of it being adopted by the BAM as the Upland Swamp Policy.

Vegetation Benchmarks Database: a database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification. It is available at www.environment.nsw.gov.au/research/Visclassification.htm.

Vegetation class: a level of classification of vegetation communities defined in Keith (2004)4. There are 99 vegetation classes in NSW.

Vegetation formation: a broad level of vegetation classification as defined in Keith (2004)4. There are 16 vegetation formations and sub-formations in NSW.

Vegetation integrity: the condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.

Vegetation integrity score: the quantitative measure of vegetation condition calculated in accordance with Equation 15 or Equation 16.

Vegetation zone: a relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.

Viability: the capacity of a species to successfully complete each stage of its life cycle under normal conditions so as to retain long-term population densities.

Vulnerable ecological community (VEC): an ecological community specified as vulnerable in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the EPBC Act.

Wetland: an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water (see also *Important wetland* and *Local wetland*).

Woody native vegetation: native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs.

APPENDIX A

Flora Data

Growth Form (OEH)	Species	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Chenopod	*Atriplex semibaccata* (Creeping Saltbush)			0.1	1			5	100	2	50	0.5	20	1	100			2	20			0	2	3	500		
Chenopod	*Atriplex suberecta* (Sprawling Saltbush)	5	100																								
Chenopod	*Einadia nutans subsp. nutans*(Climbing saltbush)	2	30	2	50					2	50			0.1	1					5	1000	0.1	10				
Chenopod	*Einadia polygonoides*																			2	50						
Chenopod	*Einadia trigonos* (Fishweed)																	1	20								
Chenopod	*Enchylaena tomentosa*(Ruby Saltbush)	2	100	1	20	1	100	5	100			0.5	20	1	50	2	50	1	20	2	100			5	50		
Chenopod	*Maireana microphylla*															2	50										
Chenopod	*Salsola australis* (Buckbush)																										
Chenopod	*Sclerolaena birchii*(Galvanised Burr)	2	50	2	20	2	20	20	500									2	20					10	500		
Chenopod	*Sclerolaena muricata* (Black Roly Poly)			1	20																						
Epiphyte	*Amyema cambagei*																							2	2		
Epiphyte	*Amyema miquelii*									1	2	1	5														
Epiphyte	*Amyema quandang* var. *bancroftii*																										
Exotic	*Alternanthera pungens* (Khaki Weed)																										
Exotic	*Amsinckia intermedia*(Common Fiddleneck*)*																										
Exotic	*Arctotheca calendula* (Cape Daisy)																									0.1	1
Exotic	*Avena sativa* (Oats)					1	100			30	1000																
Exotic	*Brassica napus* (Rapeseed)									5	200																
Exotic	*Brassica rapa* (Field Mustard)					0.1	10			5	200																
Exotic	*Brassica* sp.									5	200																
Exotic	*Brassica tournefourtia* (Mediterranean Turnip)																			1	20	0.1	5				
Exotic	*Capsella bursa-pastoralis* (Shepherds Purse)																										
Exotic	*Cirsium vulgare* (Spear Thistle)					0.1	1																				
Exotic	*Citrus lanatus* (Wild Melon)																										
Exotic	*Cucumis myriocarpus subsp. leptodermis* (Paddy Melon)																	1	10								
Exotic	*Dysphania pumilio* (Small Crumbweed)																										
Exotic	*Echium plantagineum* (Paterson's Curse)																										
Exotic	*Eragrostis cilianensis* (Stink Grass)															0.1	1										
Exotic	*Gamochaeta sp.* (Cudweed Species)																										

Growth Form (OEH)	Species	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Exotic	*Holcus lanatus* (Yorkshire Fog)																					0.1	1				
Exotic	*Hordeum leporinum* (Barley Grass)					5	1000	10	300									95	1000								
Exotic	*Hordeum vulgare* (Barley)			0.5	50					20	1000																
Exotic	*Lactuca serriola* (Prickly Lettuce)			0.5	50											0.5	20										
Exotic	*Lepidium bonariense*					0.1	1											0.1	1								
Exotic	*Lolium perenne* (Perennial Ryegrass)							10	200									0.1	10	0.1	50	2	500				
Exotic	*Lolium rigidum* (Wimmera Ryegrass)					5	1000									0.5	10										
Exotic	*Malva parviflora* (Small-flowered Mallow)																			2	50						
Exotic	*Marrubium vulgare* (White Hoarhound)																										
Exotic	*Panicum capillare* (Witch Grass)					5	1000	20	1000	5	1000	0.1	10	0.5	50	0.5	20	0.5	20	20	1000						
Exotic	*Polygonum aviculare*(Wire Weed)									1	20																
Exotic	*Sonchus oleraceus*(Common Sowthistle)																	0.1	1	2	50	0.1	5				
Exotic	*Trifolium dubium* (Yellow Suckling Clover)																					0.1	20				
Exotic	*Trifolium globosum* (Globe Clover)																										
Exotic	*Trifolium glomeratum* (Clustered Clover)																										
Exotic	*Trifolium tomentosum*(Woolly Clover)																					0.1	20				
Exotic	*Vulpia bromoides* (Squirrel-tail Fescue)																										
Exotic (SA)	*Eucalyptus cladocalyx*(Sugar Gum)																										
Fern	*Cheilanthes sieberi* (Bristly Cloak Fern) (Poison Rock Fern)																										
Fern	*Marsilea drummondii*(Nardoo)																					10	1000				
Fern	*Rhagodia spinescens* (Spiny Saltbush)																										
Forb	*Asperula conferta* (Common Woodruff)																					0.1	1				
Forb	*Boerhavia dominii* (Tarvine)																										
Forb	*Brachyscome ciliaris* (Variable Daisy)					0.1	2					0.1	20	0.5	20	0.5	10					0.1	5				
Forb	*Brachyscome dentata*																										
Forb	*Calotis lappulacea* (Yellow Burr-daisy)																										
Forb	*Centipeda cunninghamii* (Sneezeweed)																										
Forb	*Chrysocephalum apiculatum* (Yellow Buttons)							20	500			5	100	0.5	100	1	50			0.1	5						
Forb	*Chrysocephalum semipapposum* (Clustered Everlasting)																										
Forb	*Crinum flaccidum* (darling Lily)																										
Forb	*Dianella* sp.																									1	20
Forb	*Goodenia cycloptera*					0.5	50																				
Forb	*Goodenia glauca*																										
Forb	*Goodenia pinnatifida*																										

Growth Form (OEH)	Species	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Forb	*Lobelia concolor* (Poison Pratia)																										
Forb	*Oxalis perennans*					0.1	1																	0.1	5		
Forb	*Pseudognaphalium luteoalbum* (Jersey Cudweed)																										
Forb	*Pycnosorus chrysanthes*															1	20					0.1	5				
Forb	*Rhodanthe corymbifolia* (Small White Sunray)																										
Forb	*Sida corrugate* (Corrugated Sida)																	0.5	50								
Forb	*Sida trichopoda* (High Sida)																										
Forb	*Solanum esuriale*(Quena)																										
Forb	*Solenogyne bellioides*													0.5	50												
Forb	*Vittadinia cuneata* var. *cuneata* (Fuzzweed)																										
Forb	*Zygophyllum glaucum* (Pale Twinleaf)											0.1	5	1	5												
Grass	*Anthosachne scabra* (Common Wheatgrass)																										
Grass	*Austrostipa aristiglumis* (Plains Grass)					30	1000									10	100										
Grass	*Austrostipa nodosa* (A Speargrass)																										
Grass	*Austrostipa scabra* (A Speargrass)																									5	1000
Grass	*Austrostipa sp.*(A Speargrass)	2	100									1	500														
Grass	*Austrostipa verticillata* (Slender Bamboo Grass)																										
Grass	*Chloris truncata*(Windmill Grass)	1	50	0.1	10	0.5	50	1	50			0.5	50							0.1	5			2	100		
Grass	*Enneapogon* sp.													0.5	100												
Grass	*Panicum effusum*	1	20	0.1	10			0.5	10															5	1000	20	1000
Grass	*Rhytidosperma caespitosum* (Ringed Wallaby Grass)																										
Grass	*Rhytidosperma fulvum* (Wallaby Grass)			0.1	10	5	100	30	100			0.5	20											5	2000	5	1000
Grass	*Rhytidosperma* sp.																					70	1000				
Grass	*Sporobolus caroli* (Fairy Grass)																										
High Threat Exotic	*Asparagus asparagoides* (Bridle Creeper)																									0.5	3
High Threat Exotic	*Lycium ferocissimum* (African Box-thorn)	1	4	0.5	1							1	5					0.5	1								
High Threat Exotic	*Xanthium spinosum*(Bathurst Burr)															0.1	1			0.1	1						
Mallee Tree	*Eucalyptus behriana* (Bull Mallee)					30	10	20	8			60	10							5	1			40	20		
Mallee Tree	*Eucalyptus dumosa*(White Mallee)																			20	5			10	5		
Mallee Tree	*Eucalyptus viridis* (Green Mallee)																										
Rush	*Juncus ingens* (Giant Rush)					0.5	10															0.1	1				
Rush	*Juncus subglaucus*																					0.1	20				

Growth Form (OEH)	Species	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Shrub	*Acacia ligulata* (Small Cooba)													0.5	1												
Shrub	*Acacia microcarpa* (Manna Wattle)											2	5														
Shrub	*Acacia oswaldii* (Umbrella Wattle)							1	4					5	8	0.5	1					0.25	1				
Shrub	*Acacia pendula* (Weeping Myall or Boree)													5	4	50	30					30	50				
Shrub	*Acacia rigens* (Needle Wattle)																										
Shrub	*Acacia salicina* (Sally Wattle)			5	2							2	1														
Shrub	*Acacia trineura* (Three-nerve Wattle)											0.5	2														
Shrub	*Cassinia laevis* (Cough Bush)																									2	5
Shrub	*Choretrum glomeratum* (Berry Broom-bush)											5	5														
Shrub	*Dodonaea viscosa* (Sticky Hop-bush)																									5	20
Shrub	*Duma florulenta*(Lignum)													0.5	1												
Shrub	*Eremophila debilis*(Winter Apple)																										
Shrub	*Eremophila mitchelli*(False Sandalwood)											1	10														
Shrub	*Eutaxia diffusa*																										
Shrub	*Exocarpos aphyllus* (Leafless Ballart)																										
Shrub	*Geijera parviflora* (Wilga)																							12	15		
Shrub	*Leptospermum divaricatum*																										
Shrub	*Melaleuca lanceolata* (Black Teatree)											10	2														
Shrub	*Melaleuca uncinata* (Broombush)																							2	1	10	5
Shrub	*Myoporum montanum* (Western Boobialla)											2	10	2	10									2	5	2	5
Shrub	*Senna artemisioides* subsp. *zygophylla*											2	10	2	10									2	10	2	5
Tree	*Alectryon oleifolius subsp. elongatus* (Western Rosewood)																										
Tree	*Brachychiton populneus* (Kurrajong)																										
Tree	*Callitris glaucophylla* (White Cypress)																									50	6
Tree	*Casuarina cristata* (Belah)	70	30	70	30							1	1	40	6	10	10					0.25	1			2	1
Tree	*Eucalyptus dwyeri*(Dwyer's Redgum)																	15	4								
Tree	*Eucalyptus microcarpa* (Inland Grey Box)									40	5									5	1						
Tree	*Eucalyptus sideroxylon*(Mugga Ironbark)																										

APPENDIX B

Fauna Data

Class	Species Name	Common Name
Amphibian	*Crinia parinsignifera*	Eastern Sign-bearing Froglet
Ave	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater
Ave	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill
Ave	*Acanthiza nana*	Yellow Thornbill
Ave	*Acanthiza uropygialis*	Chestnut-rumped Thornbill
Ave	*Accipiter fasciatus*	Brown Goshawk
Ave	*Anas superciliosa*	Pacific Black Duck
Ave	*Aquila audax*	Wedge-tailed Eagle
Ave	*Barnardius zonarius barnardi*	Mallee Ringneck
Ave	*Cacatua galerita*	Sulphur-crested Cockatoo
Ave	*Caligavis chrysops*	Yellow-faced Honeyeater
Ave	*Chalcites lucidus*	Shining Bronze-Cuckoo
Ave	*Cincloramphus mathewsi*	Rufous Songlark
Ave	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
Ave	*Corcorax melanorhamphos*	White-winged Chough
Ave	*Corvus coronoides*	Australian Raven
Ave	*Cracticus tibicen*	Australian Magpie
Ave	*Cracticus torquatus*	Grey Butcherbird
Ave	*Dacelo novaeguineae*	Laughing Kookaburra
Ave	*Entomyzon cyanotis*	Blue-faced Honeyeater
Ave	*Eolophus roseicapillus*	Galah
Ave	*Falco cenchroides*	Nankeen Kestrel
Ave	*Gavicalis virescens*	Singing Honeyeater
Ave	*Gerygone fusca*	Western Gerygone
Ave	*Grallina cyanoleuca*	Magpie-lark
Ave	*Grantiella picta*	Painted Honeyeater
Ave	*Hirundo neoxena*	Welcome Swallow
Ave	*Lalage sueurii*	White-winged Triller
Ave	*Malurus lamberti*	Variegated Fairy-wren
Ave	*Manorina flavigula*	Yellow-throated Miner
Ave	*Manorina melanocephala*	Noisy Miner
Ave	*Melithreptus brevirostris*	Brown-headed Honeyeater
Ave	*Microcarbo melanoleucos*	Little Pied Cormorant
Ave	*Northiella haematogaster*	Blue Bonnet
Ave	*Nymphicus hollandicus*	Cockatiel

Class	Species Name	Common Name
Ave	*Ocyphaps lophotes*	Crested Pigeon
Ave	*Pachycephala rufiventris*	Rufous Whistler
Ave	*Pardalotus punctatus*	Spotted Pardalote
Ave	*Pardalotus striatus*	Striated Pardalote
Ave	*Petroica goodenovii*	Red-capped Robin
Ave	*Phaps chalcoptera*	Common Bronzewing
Ave	*Philemon corniculatus*	Noisy Friarbird
Ave	*Platycercus eximius*	Eastern Rosella
Ave	*Plectorhyncha lanceolata*	Striped Honeyeater
Ave	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Ave	*Psephotus haematonotus*	Red-rumped Parrot
Ave	*Ptilotula penicillatus*	White-plumed Honeyeater
Ave	*Rhipidura albiscapa*	Grey Fantail
Ave	*Rhipidura leucophrys*	Willie Wagtail
Ave	*Strepera graculina*	Pied Currawong
Ave	*Struthidea cinerea*	Apostlebird
Ave	*Sturnus vulgaris*	Common Starling*
Ave	*Tachybaptus novaehollandiae*	Australasian Grebe
Ave	*Taeniopygia guttata*	Zebra Finch
Mammal	*Austronomus australis*	White-striped free-tailed bat
Mammal	*Chalinolobus gouldii*	Gould's Wattled Bat
Mammal	*Chalinolobus morio*	Chocolate Wattled Bat
Mammal	*Felis catus*	Feral Cat *
Mammal	*Macropus giganteus*	Eastern Grey Kangaroo
Mammal	*Macropus rufus*	Western Red Kangaroo
Mammal	*Mormopterus planiceps*	Southern free-tailed bat
Mammal	*Mus musculus*	House Mouse *
Mammal	*Nyctophilus geoffroyi*	Lesser Long-eared Bat
Mammal	*Nyctophilus* sp.	Unidentified Long-eared Bat
Mammal	*Oryctolagus cuniculus*	Feral Rabbit *
Mammal	*Scotorepens balstoni*	Western broad-nosed bat
Mammal	*Scotorepens greyii*	Little broad-nosed bat
Mammal	*Sus scrofa*	Feral Pig *
Mammal	*Tachyglossus aculeatus*	Short-beaked Echidna
Mammal	*Vespadelus baverstocki*	Inland Forest Bat
Mammal	*Vespadelus regulus*	Southern forest bat
Mammal	*Vespadelus vulturnus*	Little Forest Bat
Mammal	*Vulpes vulpes*	Feral Fox *

Class	Species Name	Common Name
Reptile	*Chelodina longicollis*	Eastern Long-necked Turtle
Reptile	*Cryptoblepharus australis*	Inland snake-eyed Skink
Reptile	*Lerista timida*	Timid Slider
Reptile	*Menetia greyii*	Common Dwarf Skink
Reptile	*Morethia boulengeri*	Boulenger's Skink
Reptile	*Pogona barbata*	Eastern Bearded Dragon
Reptile	*Pseudechis guttatus*	Blue-bellied Black Snake
Reptile	*Tiliqua rugosa*	Shingleback Lizard

APPENDIX C

Tree Survey Data

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
Trees to be retained								
1	*Eucalyptus behriana* (Bull Mallee)	No	Yes		1	-	-	-
2	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1		-	-	-
3	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
4	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
5	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
6	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	Cockatiel nesting
7	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
8	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
9	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-		1	-
10	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
11	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
12	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1		-	-	-
13	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	-	-	-
14	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1		-	-	-
15	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	-	-	-
16	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Magpie nesting
17	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Yellow-throated Miner nesting
18	*Eucalyptus behriana* (Bull Mallee)	No	Yes		1	-	-	-
19	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1		-	-	-
20	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	2	-	-	-
21	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	2	-	-	-
22	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	1		

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
23	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	2	-	-	-
24	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
25	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
26	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
27	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	-	-	-
28	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
29	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	3	1		
30	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	1	-	-
31	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
32	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	1	-	-
33	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	1	-	-
34	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
35	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
36	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
37	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	-
38	*Casuarina cristata* (Belah)	No	Yes		1	-	-	-
39	*Eucalyptus microcarpa* (Grey Box)	No	Yes	1	1	-	-	Bee hive (*Apis mellifera*)
40	*Eucalyptus microcarpa* (Grey Box)	No	Yes	1	-	-	-	-
41	*Eucalyptus microcarpa* (Grey Box)	No	Yes		1	-	-	-
42	*Eucalyptus microcarpa* (Grey Box)	No	Yes	1	1	1	-	-
43	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	1	1	-	-
44	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	-	1	-	-
45	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	1	-	-	-
46	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	-	1	-	-
47	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	1	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
48	*Eucalyptus microcarpa* (Grey Box)	No	Yes	2	-	-	-	-
49	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	1	-	-	-
50	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	2	-	-	-
51	*Eucalyptus microcarpa* (Grey Box)	No	Yes	1	-	-	-	-
52	*Eucalyptus microcarpa* (Grey Box)	No	Yes	2	-	1	-	-
53	*Eucalyptus behriana* (Bull Mallee)	No	Yes	2	-	-	-	-
54	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
55	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
56	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
57	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
58	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Magpie-lark nesting
59	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
60	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
61	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
62	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
63	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
64	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	2	-	-	-
65	Dead Stag	No	Yes	1	-	-	-	-
66	Dead Stag	No	Yes	--	5	-	-	-
67	*Casuarina cristata* (Belah)	No	Yes	-	-	-	1	Magpie-lark nesting
68	*Casuarina cristata* (Belah)	No	Yes	1	-	-	-	-
69	*Eucalyptus behriana* (Bull Mallee)	No	Yes	2	-	-	-	-
70	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
71	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
72	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	-
73	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
74	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
75	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
76	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
77	*Casuarina cristata* (Belah)	No	Yes		1	-	-	-
78	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1		-	-	-
79	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
80	*Eucalyptus behriana* (Bull Mallee)	No	Yes		1	-	-	-
81	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	1	-	-	-
82	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	1	-	-	-
83	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
84	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
85	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
86	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
87	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
88	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
89	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
90	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
91	*Eucalyptus behriana* (Bull Mallee)	No	Yes		1	-	-	-
92	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-		
93	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
94	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
95	*Eucalyptus behriana* (Bull Mallee)	No	Yes	2	-	-	-	-
96	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
97	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
98	*Eucalyptus behriana* (Bull Mallee)	No	Yes		1	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
99	*Eucalyptus behriana* (Bull Mallee)	No	Yes	1	-	-	-	-
100	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Yellow-throated miner nesting
101	*Eucalyptus behriana* (Bull Mallee)	No	Yes	-	-	-	1	Grey-crowned Babbler nest
102	*Eucalyptus sideroxylon* (Mugga Ironbark)	No	Yes	-	1	-	-	-
103	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	-	1	-	-	-
104	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1		-	-	-
105	Dead Stag	No	Yes	1	1	-	-	-
106	Dead Stag	No	Yes	1	1	-	-	-
107	Dead Stag	No	Yes	1		-	-	-
108	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	-	1	-	-	-
109	Dead Stag	No	Yes	-	3	-	-	-
110	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	-	-	-	-
111	Dead Stag	No	Yes	1	1	-	1	-
112	Dead Stag	No	Yes	-	2	-	-	-
113	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	2	5	-	-	-
114	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	-	-	-	-
115	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	1	-	-	-
116	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	3	3	-	-	-
117	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	-	-	-	-
118	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	1	-	-	-
119	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	3	3	-	-	-
120	Dead Stag	No	Yes	3	4	-	-	-
121	*Eucalyptus dwyeri* (Dwyer's Redgum)	No	Yes	-	1	-	-	-
122	Dead Stag	No	Yes	1	1	-	-	-
123	Dead Stag	No	Yes	2	-	-	-	-
124	Dead Stag	No	Yes	1	2	-	-	-
125	Dead Stag	No	Yes	2	3	-	-	-
126	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	2	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
127	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes		2	-	-	-
128	Dead Stag	No	Yes	1	1	-	-	-
129	Dead Stag	No	Yes	-	1	-	-	-
130	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	-	1	-	-	-
131	Dead Stag	No	Yes	1	-	-	-	-
132	Dead Stag	No	Yes	1	-	-	-	-
133	Dead Stag	No	Yes	2	-	-	-	-
134	Dead Stag	No	Yes	1	3	-	-	-
135	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	-	-	-	-
136	Dead Stag	No	Yes	1	1	-	-	-
137	Dead Stag	No	Yes	2	-	-	-	-
138	Dead Stag	No	Yes	2	-	-	-	-
139	Dead Stag	No	Yes	1	1	-	-	-
140	Dead Stag	No	Yes	-	2	-	-	-
141	Dead Stag	No	Yes	-	2	2	-	-
142	Dead Stag	No	Yes	-	-	1	-	-
143	Dead Stag	No	Yes	1	1	-	-	-
144	Dead Stag	No	Yes	1	-	-	-	-
145	Dead Stag	No	Yes	3	1	-	-	-
146	Dead Hollow Stump	No	Yes	-	-	1	-	-
147	*Casuarina cristata* (Belah)	No	Yes	-	-	-	2	Magpie nests
148	*Eucalyptus microcarpa* (Grey Box)	No	Yes	1	1	-		-
149	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	-	-	-	1	-
150	*Eucalyptus cladocalyx* (Sugar Gum)	No	Yes	1	1	-		-
151	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	1	-	1	-
152	*Eucalyptus microcarpa* (Grey Box)	No	Yes	-	-	-	1	-
153	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
154	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
155	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
156	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
157	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
158	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
159	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
160	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
161	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
162	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
163	*Casuarina cristata* (Belah)	No	No	-	-	-	-	-
164	*Callitris glaucophylla* (White Cypress)	No	No	-	-	-	-	-
165	*Callitris glaucophylla* (White Cypress)	No	No	-	-	-	-	-
166	*Callitris glaucophylla* (White Cypress)	No	No	-	-	-	-	-
167	*Eucalyptus sideroxylon (Mugga Ironbark)*	No	No	-	-	-	-	-
168	*Eucalyptus sideroxylon (Mugga Ironbark)*	No	No	-	-	-	-	-
169	*Eucalyptus sideroxylon (Mugga Ironbark)*	No	No	-	-	-	-	-
170	*Eucalyptus sideroxylon (Mugga Ironbark)*	No	No	-	-	-	-	-
171	*Eucalyptus behriana* (Bull Mallee)	No	No	-	-	-	-	-
172	*Eucalyptus behriana* (Bull Mallee)	No	No	-	-	-	-	-
173	*Eucalyptus behriana* (Bull Mallee)	No	No	-	-	-	-	-
Trees to be removed								
174	*Eucalyptus microcarpa* (Grey Box)	Yes	Yes	-	1	-	-	-
175	*Eucalyptus microcarpa* (Grey Box)	Yes	Yes	2		-	1	-
176	*Eucalyptus microcarpa* (Grey Box)	Yes	Yes	1	-	-	-	-
177	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	-	-	1	-	-
178	*Casuarina cristata* (Belah)	Yes	Yes	-	1	-	-	-
179	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	1	-	-	-	-
180	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	-	-	-	1	Butcherbird nesting
181	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	-	1	-	-	-
182	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	3	3	-	-	-
183	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes		1	-	-	-
184	*Eucalyptus behriana* (Bull Mallee)	Yes	Yes	1	-	-	-	-
185	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-

No.	Tree species	Removal	Habitat Tree	Small Hollow (<5cm)	Medium Hollow (5-15cm)	Large Hollow (>20cm	Nests	Fauna Species Present
186	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
187	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
188	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
189	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
190	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
191	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
192	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
193	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
194	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
195	*Casuarina cristata* (Belah)	Yes	No	-	-	-	-	-
196	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
197	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
198	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
199	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
200	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
201	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
202	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
203	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
204	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-
205	*Eucalyptus behriana* (Bull Mallee)	Yes	No	-	-	-	-	-

APPENDIX D

Biodiversity Data Collection - Likelihood of Occurrence

KEY	
Status	The "threatened species" or "endangered ecological community" listing in the *Biodiversity Conservation Act 2016*
V	Species listed as "Vulnerable"
E1	Species listed as "Endangered"
E4A	Species listed as "Critically Endangered"
E2	An "endangered population"
E	An EEC listed as "endangered"
CE	An EEC listed as "critically endangered"
PE	Presumed Extinct
Status	The "threatened species" or "endangered ecological community" listing under *the Environment Protection and Biodiversity Conservation Act 1999*
V	Species listed as "Vulnerable"
E	Species listed as "Endangered"
CE	Species listed as "Critically Endangered"
M	Species listed as "Migratory""
MR	Species listed as "Marine"
On site	Yes/No
LoO	Likelihood or Occurrence - the probability of a threatened species occurring on the site
P	Present or recorded on the Project Site
H	High likelihood of occurrence
M	Moderate likelihood of occurrence
L	Low likelihood of occurrence
N	No potential relevance
Source	Data Source
BAM	Sourced from the BAM tool (Candidate threatened species)
Bionet	Sourced from OEH Wildlife Atlas
PMST	Sourced from Protected Matters Search Tool
SLR	Sourced from SLR field data and reports

- The table below contains data from the Biodiversity Data Collection, retrieved from the BAM Credit Calculator and data obtained from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -33.76 West: 147.28 East: 147.38 South: -33.86] returned a total of11 records of 5 species.
- Migratory wetland species and listed marine species have been excluded given that these are not relevant to the assessment (lack of available habitat within the Project Site).
- Report generated on 22/11/2018 13:33 AM.

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Plants					
A spear-grass *Austrostipa wakoolica*	E1	E	Densely tufted perennial growing to 1 m that is often found growing on grey, silty clay or sandy loam soils. The species is confined to the floodplains of the Murray River tributaries of central-western and south-western NSW. The leaves of the species are flattened or rolled and densely hairy. The ideal survey time is October to December.	L – Project Site lacks suitable habitat.	BAM BioNet (6 records) PMST (Predicted)
Austral Pillwort *Pilularia novae-hollandiae*	E		Semi-aquatic fern with thread like fronds growing to 8 cm. The populations at Lake Cowal and Oolambeyan NP are the only known extant populations in NSW, although the species is obscure and has possibly been overlooked elsewhere. The species grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous.	L – Project Site lacks suitable habitat.	BAM (based on occurrence of vegetation outside the development footprint.
Austrostipa metatoris	V	V	Grows in sandy areas of the Murray Valley; habitats include sand hills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	M – Marginal habitat present, but not detected during surveys.	PMST (Predicted)
Lanky Buttons *Leptorhynchos orientalis*	E	-	Erect annual forb to 30 cm high the species has been recorded from several Hay Plain and southern Riverina localities. Grows in woodland or grassland, sometimes on the margins of swamps. The species flowers from August to October.	L – Project Site lacks suitable habitat.	BAM (Candidate Species)
Mossgiel Daisy *Brachyscome papillosa*	V		Multi-stemmed perennial herb to 40 cm tall that is endemic to NSW. Chiefly occurs within the Riverina Bioregion, from Mossgiel in the north, Murrumbidgee Valley (Yanga) National Park in the south west to Urana in the south east. Recorded primarily in clay soils on Bladder Saltbush (*Atriplex vesicaria*) and Leafless Bluebush (*Maireana aphylla*) plains, but also in grassland and in Inland Grey Box (*Eucalyptus microcarpa*) - Cypress Pine (*Callitris spp.*) woodland. Known to inhabit Black Box Lignum woodland, Black Box grassy open woodland. Ideal survey time is when the mauve flower heads appear between June and December.	M – Marginal habitat present, but not detected during surveys.	BAM (based on occurrence of vegetation outside the development footprint.

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Pine Donkey Orchid *Diuris tricolor*	V	-	Tuberous, deciduous terrestrial orchid species sporadically distributed on the western slopes of NSW extending of Narrandera to the north of NSW growing on sandy soils either on flats or small rises. The species is commonly recorded in disturbed habitats. Flower stalk of the species is between 20 and 40 cm and has 2-6 flowers. Ideal; survey time is between early September to late October when the species produces pleasant, sweet smelling bright yellow to orange flowers.	M – Marginal habitat present, but not detected during surveys.	BAM (based on occurrence of vegetation outside the development footprint.
Philotheca ericifolia	-	V	Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Sand-hill Spider Orchid *Caladenia arenaria*	E	E	Typical spider orchid characterised by five long, spreading petals and sepals around a broad down-curled labellum. The species is currently only known to occur in the Riverina between Urana and Narrandera and occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (*Callitris glaucophylla*). Ideal survey time is typically when the species is in flower for a few weeks from late August to early October.	M – Habitat present, but not detected during surveys.	BAM (based on occurrence of vegetation outside the development footprint.
Silky Swainson-pea *Swainsona sericea*	V	-	Low prostrate herb occurring in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It can sometimes found in association with cypress-pine *Callitris* spp. Ideal survey time is spring to autumn where it can be identified by its foliage as well as the purple flowers that appear from spring to summer.	M – Habitat present, but not detected during surveys.	BAM (Candidate Species)
Slender Darling-pea *Swainsona murrayana*	V	V	Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Small Purple-pea *Swainsona recta*	E	E	Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx*.	L – Project Site lacks suitable habitat.	BAM (Candidate Species)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Spike-Rush *Eleocharis obicis*	V	V	Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands.	L – Project Site lacks suitable habitat.	BAM (based on occurrence of vegetation outside the development footprint.
Spiny Pepper-cress *Lepidium aschersonii*	V	V	Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (Casuarina cristata), Buloke (*Allocasuarina luehmannii*) and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (*Eucalyptus behriana*). Often the understorey is dominated by introduced plants.	M – Habitat present, but not detected during surveys.	Bionet (1 record)
Tylophora linearis	V	E	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla and Allocasuarina luehmannii.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Winged Peppercress *Lepidium monoplocoides*	E	E	Erect annual herb or perennial forb, 15-20 cm high the species is widespread in the semi-arid western plains regions of NSW. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland. The species flowers from August to October.	M – Habitat present, but not detected during surveys.	BAM (based on occurrence of vegetation outside the development footprint.
Woolly Ragwort *Senecio garlandii*	V	-	This daisy is found between Temora, Bethungra and Albury and possibly Burrinjuck near Yass. The largest populations are at The Rock and Mt Tabletop (and surrounds). There is a single population in Victoria at Chiltern. Woolly Ragwort occurs on sheltered slopes of rocky outcrops.	L – Project Site lacks suitable habitat.	BAM (based on occurrence of vegetation outside the development footprint.
Amphibians					

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Sloane's Froglet *Crinia sloanei*	V	-	Small, ground-dwelling easily distinguished by its call and the mustard yellow or greyish back with large patches of darker pigment over the body. The species has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin. It is typically associated with areas in woodland, grassland or disturbed habitats that are periodically inundated with water. Ideal survey period March to November after rain. Calling appears from to be from mid-winter to early spring.	L – Project Site lacks suitable habitat.	BAM (based on occurrence of vegetation outside the development footprint.
Aves					
Australasian Bittern *Botaurus poiciloptilus*	E	E	Stocky bird with a long, thick neck and a straight, brownish-yellow bill. The species upper surface is mottled brown and its under-surface is buff with dark brown stripes. It has yellow eyes and a pale eyebrow. The species is widespread by uncommon over south-eastern Australia favouring permanent freshwater wetlands with tall, dense vegetation. Breeding occurs in summer from October to January with nests built in secluded places such as densely vegetated wetlands on a reed platform.	L – Project Site lacks suitable habitat.	PMST (Predicted)
Australian Painted Snipe *Rostratula australis*	E1	E	Small wader with brown-grey patterned plumage, white band around the eye and white underside. Inhabits the edges of swamps, marshes and dams with a cover of grass, shrubs or timber. Forages at night in shallow water or on mudflats. Distributed throughout Australia, more commonly found in the south than north particularly the Murray-Darling region. Breeding is often in response to local conditions generally occurring between September and December with the species nesting on the ground among tall vegetation.	L – Project Site lacks suitable habitat.	PMST (Predicted)
Barking Owl *Ninox connivens*	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas.	M – Hunting habitat present, but not detected during surveys.	BAM (Predicted Species)
Black-breasted Buzzard *Hamirostra melanosternon*	V	-	The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat.	L – Project Site lacks suitable habitat.	BAM (Predicted Species)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V	-	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis).	M – Habitat present, but not detected during surveys	BAM (Predicted Species)
Brolga *Grus rubicunda*	V	-	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are mainly dependent on wetlands, especially shallow swamps, where they will forage with their head entirely submerged.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	V	-	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; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	M – Habitat present, but not detected during surveys	BAM (Predicted Species)
Curlew Sandpiper *Calidris ferruginea*	E	CE	Small, highly gregarious migratory shorebird with a medium length, down-curved bill and longish black legs. The species is usually identified by its non-breeding plumage while in Australia, which is mottled grey above and paler below. Occurs along most of the Australian coastline and sometimes in freshwater estuaries in the Murray-Darling Basin. Inland records are likely to be birds passing during migration.	L – Project Site lacks suitable habitat.	PMST (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Diamond Firetail Stagonopleura guttata	V	-	Widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Cental and South Western Slopes and the North West Plains and Riverina. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Known to inhabit Black Box Lignum woodland, Black Box grassy open woodland. Groups separate into small colonies to breed between August and January.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Dusky Woodswallow *Artamus cyanopterus cyanopterus*	V	-	Medium sized bird with dark grey-brown feathering merging to black on the longish tail. The species has a blueish bill with a black tip. The upper-wings are blue-grey with a white leading edge. Widespread in the eastern, southern and south-western Australia, occurring throughout most of NSW. Primarily inhabit dry, open eucalypt forests and woodlands with and open or sparse understory. Most of the species breeding activity occurs on the western slopes of the Great Dividing Range.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Eastern Curlew *Numenius madagascariensis*	-	CE	Large wader with a very long, down-curved black bill which is pink at the base. The feathering is a streaky dark brown buff above. The chin and throat of the species is whitish with a prominent white eye-ring. Primarily a coastal species they are found Australia wide. In NSW the species is mainly found in estuaries, inlets, bays and coastal lakes.	L – Project Site lacks suitable habitat.	PMST (Predicted)
Flame Robin *Petroica phoenicea*	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Fork-tailed Swift *Apus pacificus*	-	M	The nominate subspecies breeds in eastern Asia from the Ob River northeast to Kamchatka and east to the Kuril Islands, Sakhalin and Japan. It is strongly migratory, wintering in southern Indonesia, Melanesia and Australia, including Tasmania. It is a common migrant through coastal Malaysia, Sumatra and Java with "vast numbers" crossing the Strait of Malacca	L – Project Site lacks suitable habitat.	PMST (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Gilbert's Whistler *Pachycephala inornata*	V	-	Distributed over much of the arid and semi-arid zone of inland southern Australia, from the western slopes of NSW to the Western Australian wheat belt. Often recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests with a dense shrub layer. Forages on or near the ground in shrub thickets and in tops of small trees. Breeding takes place between August and November with the species laying 2-4 eggs.	M – Habitat present, but not detected during surveys.	BioNet (1 record)
Glossy Black-Cockatoo *Calyptorhynchus lathami*	V	-	Small brown-black with a massive, bulbous bill and a short crest. Males have a distinctive red tail panel while the female's tail panel is yellow to orange. The female commonly has irregular pale-yellow markings on the head and neck. The species is widespread in suitable woodland and forest and forest habitat however the species is uncommon. The species is dependent on large hollow-bearing *Eucalypts* for breeding. An egg is laid between March and May.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species) PMST (Predicted)
Grey-crowned Babbler *Pomatostomus temporalis temporalis*	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	P – Family groups observed foraging and breeding within the Project Site.	BAM (Predicted Species)
Grey Falcon *Falco hypoleucos*	V	-	Medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. The species is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	M – Hunting habitat present, but not detected during surveys.	BAM (Predicted Species)
Hooded Robin *Melanodryas cucullata cucullata*	V	-	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. The south-eastern form (subspecies cucullata) is found from Brisbane to Adelaide and throughout much of inland NSW. 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. Known to inhabit Black Box grassy open woodland, Black Box Lignum woodland. Breeding occurs anytime between July and November.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Little Eagle *Hieraaetus morphnoides*	V	-	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	M – Hunting habitat present, but not detected during surveys.	BAM (Predicted Species)
Major Mitchell's Cockatoo *Lophochroa leadbeateri*	V	-	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres. Distributed throughout interior Australia, found across the arid and semi-arid inland. Known to inhabit Black Box Lignum woodland, Black Box grassy open woodland.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Malleefowl *Leipoa ocellata*	V	V	Distinctive ground-dwelling bird identifiable by its robust, powerful legs, short bill and flattish head while the wings are short, broad and rounded at the tip. The head and neck are greyish above topped with black. The species has a distinctive central black stripe down the throat and chest. Predominately inhabit mallee communities preferring tall, dense and floristically rich habitats preferring areas of light sandy to sandy loam soils. Breed year round laying up to 34 eggs in a year.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Masked Owl *Tyto Novaehollandiae*	V	-	Prefers dry eucalypt forests and woodlands from sea level to 1100 m. Often hunts along the edges of forests, including roadsides.	M – Hunting habitat present, but not detected during surveys.	BAM (Predicted Species)
Night Parrot *Pezoporus occidentalis*	PE	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt.	L – Project Site lacks suitable habitat.	PMST (Predicted)
Painted Honeyeater *Grantiella picta*	V	V	Nomadic. Greatest concentrations and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on the fruits of mistletoes growing on woodland eucalypts and acacias. Nests from spring to autumn in outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches. Known to inhabit Black Box Lignum woodland, Black Box grassy open woodland.	P – Identified foraging on Mistletoes.	BAM (Predicted Species) BioNet (1 record) PMST (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Regent Honeyeater *Anthochaera phrygia*	E4A	CE	Occurs in dry open forest and woodland, including Box-Ironbark woodland and riparian River Sheoak forests. Woodlands favoured have high species richness of birds, high number of mature trees and abundance of mistletoes Forages on a wide range of eucalypts and mistletoes as well as insects. Range occurs between north-east Victoria and south-east Queensland. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Satin Flycatcher *Myiagra cyanoleuca*	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	L – Project Site lacks suitable habitat.	PMST (Predicted)
Scarlet Robin Petroica boodang	V	-	Small Australian robin with a black head and upperparts with a distinctive white forehead patch, white wings stripes and white tail edges. The male has a bright scarlet-red chest and white belly. In NSW the species occurs from the coast to inland slopes inhabiting mature and regrowth eucalypt woodlands and forests with open grassy understory. Habitat usually has abundant logs and fallen timber. Ideal survey time may be in autumn and winter when the Scarlet Robin moves in open woodlands and grasslands or grazed paddocks with scattered trees. Breeding generally occurs between the months of July and January	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Speckled Warbler *Chthonicola sagittata*	V		Small, well camouflaged and heavily streaked ground-dwelling species. The back, wings and tail are grey-brown with soft, dark streaks and the crown is distinctively black streaked with a buff. The species is patchily distributed throughout the eastern half of NSW inhabiting a wide range of *Eucalyptus* dominated communities that have a grassy understory. Large, relatively undisturbed areas are required for the species to persist. The species lays a clutch of 3-4 eggs between August and January.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species) BioNet (2 records)
Spotted Harrier *Circus assimilis*	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.	M – Hunting habitat present, but not detected during surveys.	BAM (Predicted Species)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Superb Parrot *Polytelis swainsonii*	V	V	Distinctive large, bright green parrot with red and yellow facial features and a long narrow tail. Occurs in Box-Gum, Box-Cypress pine and Boree Woodland and River Red Gum Forest. Forages in trees, shrubs and on the ground. Distribution is throughout eastern inland NSW. Breeding occurs from September to January. In the Riverina, nests in hollows of large trees in riparian River Red Gum forest or woodland. The Riverina region is considered to hold important breeding sites.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Swift Parrot *Lathamus discolor*	E	CE	Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerps, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. *Eucalyptus robusta, Corymbia maculata* and *C. gummifera* dominated coastal forests are also important habitat.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species). PMST (Predicted)
White-bellied Sea-Eagle *Haliaeetus leucogaster*	V	-	Large eagle with long, broad wings and a short, wedge-shaped tail. The feathering on the legs, head, breast and belly is white while back and the upper surfaces of the wings are grey. The tail has a distinctive white tip. Ideal survey time during the eggs laying period between June and September.	L – Project Site lacks suitable habitat.	BAM (Predicted Species)
White-throated Needletail *Hirundapus caudacutus*	-	M	White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Yellow Wagtail *Motacilla flava*	-	M	This insectivorous bird inhabits open country near water, such as wet meadows. It nests in tussocks,	L – Project Site lacks suitable habitat.	PMST (Predicted)
Mammals					
Corben's Long-eared Bat *Nyctophilus corbeni*	V	V	Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina luehmannii* 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.	M – Foraging habitat present, but not detected during surveys.	PMST (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	Australia's largest bat species, it has dark grey fur on the body, lighter grey fur on the head and russet collar encircling the neck. It can be distinguished from other flying-foxes by the leg fur which extends to the ankle. The species is usually found within 200 km of the eastern coast in sub-tropical and temperate rainforests, tall sclerophyll forests and woodlands, heathland swamps as well as urban areas. The species roosts in camps that are commonly located within 20 km of a food source. The caps are usually located in gullies close to water in vegetation with a thick canopy. Annual mating commences from January with conception usually in April or May.	M – Foraging habitat present, but not detected during surveys.	BAM (Predicted Species) PMST (Predicted)
Koala *Phascolarctos cinereus*	V	V	Arboreal marsupial with white-brown above and white below. It has distinctive large, furry ears, a prominent black nose and no tail. The species is known to inhabit eucalypt forests as woodlands spending most of its time in trees. Koala browse on most eucalypt species however in localised areas they have been known to select preferred browsing species. Ideal survey time after dusk as the species is generally inactive during the day, feeding and moving mostly at night.	L – Project Site lacks suitable habitat (no Koala feed trees)	BAM (Predicted and Candidate Species) PMST (Predicted)
Little Pied Bat Chalinolobus picatus	V	-	The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. It occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands.	M – Foraging habitat present, but not detected during surveys.	BAM (Predicted Species)
Spotted-tailed Quoll *Dasyurus maculatus*	V	E	Around the size of a domestic cat however the species has noticeably shorter legs and a pointed face. It has rich-rust to dark-brown fur above with irregular white spots on the back and a pale belly. The species spotted tail distinguishes it from all other mammals. Recorded in a variety of habitats using hollow-bearing trees, fallen logs, small caves, rocky outcrops and rocky cliff faces as den sites. The species presence in an area can be indicated by the use of communal latrine sites, often on flat rocks among boulder fields, on cliff faces or along rocky stream beds. Mostly nocturnal species, ideal survey period after dusk. Breeds year round.	M – Habitat present, but not detected during surveys.	PMST (Predicted)
Squirrel Glider *Petaurus norfolcensis*	V	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	M – Habitat present, but not detected during surveys.	BAM (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	M – Habitat present, but not detected during surveys.	BAM (Predicted Species)
Fish					
Macquarie Perch *Macquaria australasica*	E	E	Moderate-sized freshwater fish that occurs in waters with lots of cover such as aquatic vegetation, snags, boulders and overhanging banks. They can tolerate relatively cold water temperatures but require a temperature rise in spring to at least 160C for spawning to occur. Spawning occurs above riffles (shallow running water),	N – Project Site lacks suitable aquatic habitat.	PMST (Predicted)
Reptiles					
Aprasia parapulchella Pink-tailed Worm-lizard	V	V	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (Themeda australis). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black Ants and Termites.	L – Project Site lacks suitable habitat.	BAM (Predicted) PMST (Predicted)
Threatened Ecological Communities					
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E3	-	Alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes.	N – Not identified during assessment.	Bionet
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3	E	Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375-800 mm pa and the mean maximum annual temperature is 22- 26°C.	P – one patch (0.46 ha total)	Bionet PMST (Predicted)

Species Name	BC Act	EPBC Act	Habitat Requirements	LoO	Source
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	CE	-	The variant of the community dominated by Bull Mallee and White Mallee tends to occur on plains to the east and north of West Wyalong on red earths including the aeolian soil known as parna.	P – several patches in various condition (15.24 ha total)	Bionet
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3	E	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. The community is also known as Boree particularly in the southern part of its distribution. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall.	P – several patches in various condition (5.77 ha total)	Bionet PMST (Predicted)
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E3	-	Sandhill Pine Woodland typically occupies red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW.	N – Not identified during assessment.	Bionet
White Box Yellow Box Blakely's Red Gum Woodland	E3	CE	Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles.	N – Not identified during assessment.	Bionet PMST (Predicted)

APPENDIX E

PMST Search Report

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.

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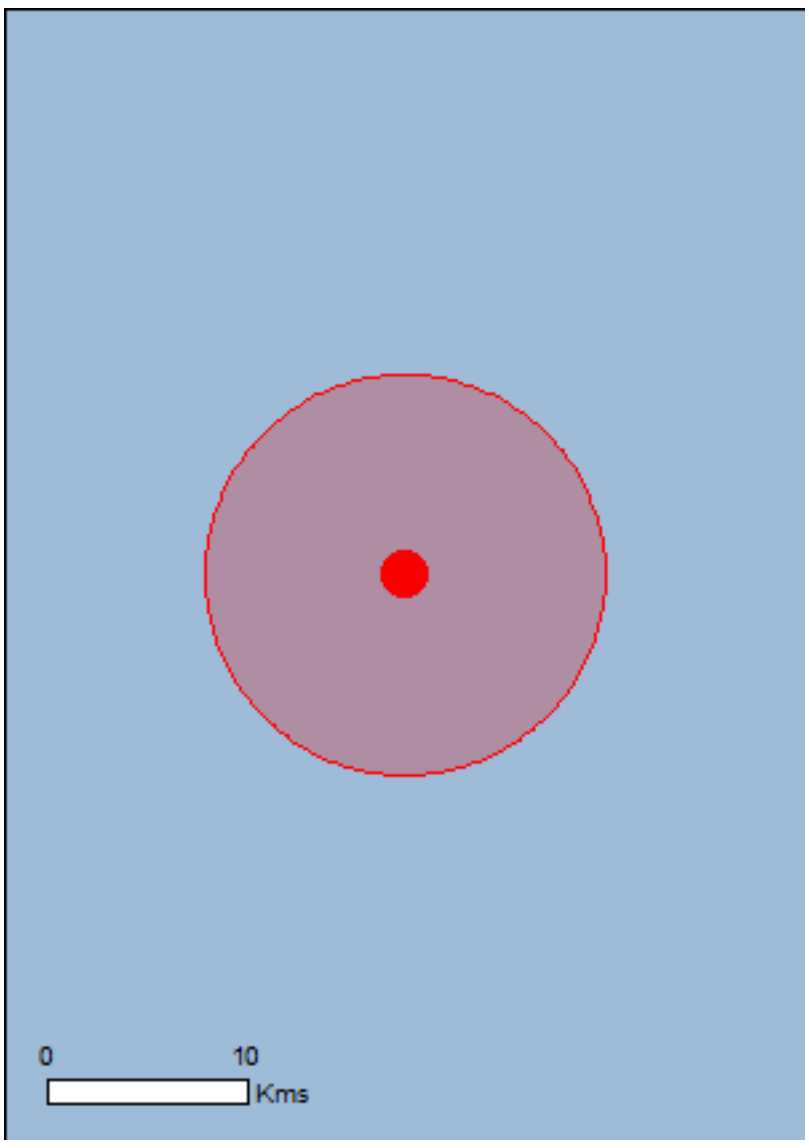

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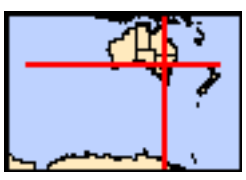

Summary

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:	22
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:	None
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:	1
Regional Forest Agreements:	None
Invasive Species:	18
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	500 - 600km 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
Weeping Myall Woodlands	Endangered	Community likely to 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 may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	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
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Rostratula australis		
Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may 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
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 may occur within area
Plants		
Austrostipa metatoris		
[66704]	Vulnerable	Species or species habitat may occur within area
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat known to occur within area
Lepidium aschersonii		
Spiny Pepper-cress [10976]	Vulnerable	Species or species habitat likely to occur within area
Philotheca ericifolia		
[64942]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Tylophora linearis		
[55231]	Endangered	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 may 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]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may 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 likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[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
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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 likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
[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 area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat may occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely 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 may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
South West Woodland	NSW

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		
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
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
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
Felis catus Cat, House Cat, Domestic Cat [19]		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
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 within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species

Name	Status	Type of Presence
		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

-33.79279 147.32031

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.

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APPENDIX F

BAM Calculation Output Reports (Vegetation Clearing)

BAM Credit Summary Report

Proposal Details

Assessment Id

00013377/BAAS18041/18/00013378

Proposal Name

West Wyalong Solar Farm_Revised

BAM data last updated *

07/11/2018

Assessor Name

Gilbert Whyte

Report Created

04/12/2018

BAM Data version *

4

Assessor Number

BAAS18041

* 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	Candidate SAII	Ecosystem credits
Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.								
2	55_moderate	51.2	0.8	0.25	High Sensitivity to Potential Gain	2.00		20
							Subtotal	**20**

BAM Credit Summary Report

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion								
1	26_moderate	46.8	1.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	24
							Subtotal	**24**
							Total	**44**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00013377/BAAS18041/18/00013378

Proposal Name
West Wyalong Solar Farm_Revised

BAM data last updated *
07/11/2018

Assessor Name
Gilbert Whyte

Assessor Number
BAAS18041

BAM Data version *
4

Proponent Names

Report Created
04/12/2018

* 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.

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

No Changes

Ecosystem Credit Summary

PCT	TEC	Area	Credits
26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	1.0	24.00
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	0.8	20.00

Credit classes for 26

Like-for-like options

Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (including PCT's 26, 27, 37, 43, 49, 55, 145, 159, 1766)	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Credit classes for 55	Like-for-like options			
	Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
	North-west Floodplain Woodlands (including PCT's 55)	North-west Floodplain Woodlands - ≥ 70% - <90% cleared group (including Tier 4 or higher).	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00013377/BAAS18041/18/00013378

Proposal Name
West Wyalong Solar Farm_Revised

BAM data last updated *
07/11/2018

Assessor Name
Gilbert Whyte

Assessor Number
BAAS18041

BAM Data version *
4

Proponent Name(s)

Report Created
04/12/2018

* 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.

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Variations)

No Changes

Ecosystem Credit Summary

PCT	TEC	Area	Credits
26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	1.0	24.00
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	0.8	20.00

Credit classes for 26

Like-for-like options

Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (including PCT's 26, 27, 37, 43, 49, 55, 145, 159, 1766)	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions

	Semi-arid Woodlands (Grassy sub-formation)	Tier 2 or higher	Yes (including artificial)	IBRA Region: NSW South Western Slopes, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Credit classes for 55	**Like-for-like options**			
	Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
	North-west Floodplain Woodlands (including PCT's 55)	North-west Floodplain Woodlands - ≥ 70% - <90% cleared group (including Tier 4 or higher).	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions
	Semi-arid Woodlands (Grassy sub-formation)	Tier 4 or higher	Yes (including artificial)	IBRA Region: NSW South Western Slopes, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Species Credit Summary

No Species Credit Data

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00013377/BAAS18041/18/00013378	41	0	04/12/2018

PCT list

Include	PCT common name	Credits
Yes	**26 -** Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	24
Yes	**55 -** Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	20

Species list

Include	Species	Credits

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

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
Lower Slopes	**26 -** Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion **Warning: This PCT has NO trades recorded**	$1,998.31			24.87%	$20.00	1.0000	$2,515.29	24	$60,366.95

Biodiversity payment summary report

Lower Slopes	**55 -** Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. **Warning: This PCT has NO trades recorded**	$1,998.31		24.87%	$20.00	1.0000	$2,515.29	20	$50,305.79

Subtotal (excl. GST)	**$110,672.74**
GST	**$11,067.27**
Total ecosystem credits (incl. GST)	**$121,740.01**

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

No species available

Grand total	**$121,740.01**

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00013377/BAAS18041/18/00013378

Assessment name
West Wyalong Solar Farm_Revised

BAM data last updated *
07/11/2018

Assessor Name
Gilbert Whyte

Report Created
04/12/2018

BAM Data version *
4

Assessor Number
BAAS18041

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	26_moderate	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	moderate	1.03	1	

2	55_moderate	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	moderate	0.8	1	

BAM Candidate Species Report

Proposal Details

Assessment Id 00013377/BAAS18041/18/00013378	Proposal Name West Wyalong Solar Farm_Revised	BAM data last updated * 07/11/2018
Assessor Name Gilbert Whyte	Report Created 04/12/2018	BAM Data version * 4
Assessor Number BAAS18041	* 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.	

List of Species Requiring Survey

Name	Presence	Survey Months
Leptorhynchos orientalis Lanky Buttons	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug **Sep Oct Nov** Dec
Phascolarctos cinereus Koala	No (surveyed)	**Jan Feb Mar Apr May Jun** **Jul Aug Sep Oct Nov Dec**
Swainsona murrayana Slender Darling Pea	No (surveyed)	**Jan Feb** Mar Apr May Jun Jul Aug **Sep Oct Nov Dec**
Swainsona sericea Silky Swainson-pea	No (surveyed)	**Jan Feb** Mar Apr May Jun Jul Aug **Sep Oct Nov Dec**

List of Species Not On Site

Name
Austrostipa wakoolica A spear-grass
Lophochroa leadbeateri Major Mitchell's Cockatoo
Calyptorhynchus lathami Glossy Black-Cockatoo
Hamirostra melanosternon Black-breasted Buzzard
Lepidium aschersonii Spiny Peppercress
Lepidium monoplocoides Winged Peppercress

Pilularia novae-hollandiae Austral Pillwort
Polytelis swainsonii Superb Parrot
Pteropus poliocephalus Grey-headed Flying-fox
Haliaeetus leucogaster White-bellied Sea-Eagle

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013377/BAAS18041/18/00013378	West Wyalong Solar Farm_Revised	07/11/2018
Assessor Name	**Report Created**	**BAM Data version ***
Gilbert Whyte	04/12/2018	4
Assessor Number	* 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.	
BAAS18041		

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

Common Name	Scientific Name	Vegetation Types(s)
Black-breasted Buzzard	Hamirostra melanosternon	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Brolga	Grus rubicunda	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
Diamond Firetail	Stagonopleura guttata	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Dusky Woodswallow	Artamus cyanopterus cyanopterus	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Glossy Black-Cockatoo	Calyptorhynchus lathami	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Grey Falcon	Falco hypoleucos	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Grey-headed Flying-fox	Pteropus poliocephalus	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.

Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Koala	Phascolarctos cinereus	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Major Mitchell's Cockatoo	Lophochroa leadbeateri	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Scarlet Robin	Petroica boodang	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
Speckled Warbler	Chthonicola sagittata	55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
Superb Parrot	Polytelis swainsonii	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.
White-bellied Sea-Eagle	Haliaeetus leucogaster	26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
		55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.

APPENDIX G

BAM Calculation Output Reports (Paddock Tree Removal)

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013425/BAAS18041/18/00013426	West Wyalong Solar Farm_Paddock Tree Removal	07/11/2018

Assessor Name	Report Created	BAM Data version *
Gilbert Whyte	18/12/2018	4

Assessor Number

BAAS18041

* 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.

Paddock Trees Credit Requirement

Class	Contains hollows	Number of trees	Ecosystem credits
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.			
2	True	12.0	9
			9
177-Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion			
2	True	17.0	13
			13
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions			
2	True	3.0	2
			2
			24

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00013425/BAAS18041/18/00013426

Proposal Name
West Wyalong Solar Farm_Paddock Tree Removal

BAM data last updated *
07/11/2018

Assessor Name
Gilbert Whyte

Assessor Number
BAAS18041

BAM Data version *
4

Proponent Names

Report Created
18/12/2018

* 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.

Candidate Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Ecosystem Credit Summary

BAM Biodiversity Credit Report (Like for like)

PCT	TEC	Credits
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	9.00
177-Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	13.00
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	2.00

Credit classes for 55

Like-for-like options

Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
North-west Floodplain Woodlands	North-west Floodplain Woodlands - ≥ 70% - <90% cleared group	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Credit classes for 76

Like-for-like options

Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Credit classes for 177	**Like-for-like options**		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00013425/BAAS18041/18/00013426	41	0	18/12/2018

PCT list

Include	PCT common name	Credits
Yes	**55 -** Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	9
Yes	**177 -** Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	13
Yes	**76 -** Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	2

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

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
Lower Slopes	**55 -** Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions. **Warning: This PCT has NO trades recorded**	$1,998.31			24.87%	$20.00	1.0000	$2,515.29	9	$22,637.61

Biodiversity payment summary report

Lower Slopes	**177 -** Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion **Warning: This PCT has NO trades recorded**	$1,998.31		24.87%	$20.00	1.0000	$2,515.29	13	$32,698.77
Lower Slopes	**76 -** Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions **Warning: This PCT has NO trades recorded**	$1,998.31		24.87%	$20.00	1.0000	$2,515.29	2	$5,030.58

Subtotal (excl. GST)	**$60,366.96**
GST	**$6,036.70**
Total credits (incl. GST)	**$66,403.66**

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00013425/BAAS18041/18/00013426

Proposal Name
West Wyalong Solar Farm_Paddock Tree Removal

BAM data last updated *
07/11/2018

Assessor Name
Gilbert Whyte

Assessor Number
BAAS18041

BAM Data version *
4

Proponent Name(s)

Report Created
18/12/2018

* 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.

Candidate Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Ecosystem Credit Summary

BAM Biodiversity Credit Report (Variations)

PCT	TEC	Credits
55-Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	Not a TEC	9.00
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	2.00
177-Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	13.00

Credit classes for 55

Like-for-like options

Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
North-west Floodplain Woodlands	North-west Floodplain Woodlands - ≥ 70% - <90% cleared group	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions

	Semi-arid Woodlands (Grassy sub-formation)	Tier 4	Yes (including artificial)	
Credit classes for 76	**Like-for-like options**			
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions	
	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	
	Variation options			
	Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions
	Grassy Woodlands	Tier 2	Yes (including artificial)	
Credit classes for 177	**Like-for-like options**			
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions	

	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	Yes	Lower Slopes,Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Paddock Tree Report

Proposal Details

Assessment Id

00013425/BAAS18041/18/00013426

Assessment name

West Wyalong Solar Farm_Paddock Tree Removal

BAM data last updated *

07/11/2018

Assessor Name

Gilbert Whyte

Report Created

18/12/2018

BAM Data version *

4

Assessor Number

BAAS18041

* 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.

Paddock Trees

PCT code	PCT name	No. of trees	Species	DBHOB Category	Contain hollows	Class	Assessment required
55	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions.	12	Casuarina cristata	>= 20cm and <30cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	3	Eucalyptus microcarpa	>= 20cm and <50cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

Paddock Tree Report

177	Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion	17	Eucalyptus behriana	>= 20cm and <30cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013425/BAAS18041/18/00013426	West Wyalong Solar Farm_Paddock Tree Removal	07/11/2018

Assessor Name	Report Created	BAM Data version *
Gilbert Whyte	18/12/2018	4

Assessor Number

BAAS18041

* 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.

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

Common Name	Scientific Name
Barking Owl	Ninox connivens
Black-breasted Buzzard	Hamirostra melanosternon
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae
Dusky Woodswallow	Artamus cyanopterus cyanopterus
Flame Robin	Petroica phoenicea
Glossy Black-Cockatoo	Calyptorhynchus lathami
Grey Falcon	Falco hypoleucos
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata
Koala	Phascolarctos cinereus
Little Eagle	Hieraaetus morphnoides
Little Pied Bat	Chalinolobus picatus
Major Mitchell's Cockatoo	Lophochroa leadbeateri
Masked Owl	Tyto novaehollandiae
Painted Honeyeater	Grantiella picta
Scarlet Robin	Petroica boodang
Speckled Warbler	Chthonicola sagittata
Spotted Harrier	Circus assimilis
Superb Parrot	Polytelis swainsonii

Swift Parrot	Lathamus discolor
Varied Sittella	Daphoenositta chrysoptera
White-bellied Sea-Eagle	Haliaeetus leucogaster
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris

APPENDIX H

Field Datasheets (BAM)

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	25/09/18	W WYALONG	1	GILBERT WHYTE			
Zone 56	Datum GDA 94	Plot ID	P 1	Plot dimensions	400 m^2	Photo #	✓
Easting 33 808960	Northing 147 324849	IBRA region	SWS m	Midline bearing from 0 m	044°	Magnetic °	
Vegetation Class		NORTH – WEST FLOODPLAIN WOODLANDS				Confidence: (H) M L	
Plant Community Type		RIVERINA WOODLAND ALLUVIAL P (PCT 55)		EEC: NO		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	3
	Forbs	0
	Ferns	0
	Other	4
Sum of Cover of native vascular plants by growth form group	Trees	70
	Shrubs	0
	Grasses etc.	4
	Forbs	0
	Ferns	0
	Other	11
High Threat Weed cover		1

BAM Attribute (1000 m^2 plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	III	
20 – 29 cm	IIII IIII I	
10 – 19 cm	III	
5 – 9 cm		
< 5 cm	NO REGEN.	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	IIII IIII	Tally space 10.

NO HOLLOWS

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	100					0					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	FLOODPLAIN	Microrelief	
Lithology		Soil Surface Texture		Soil Colour	RED CLAY	Soil Depth	
Slope		Aspect	FLAT	Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			– YES – FIREWOOD
Cultivation (inc. pasture)			– CROPPING ADJACENT
Soil erosion			– LOW
Firewood / CWD removal			SOME ABOVE
Grazing (identify native/stock)			– NO
Fire damage			– NO
Storm damage			– NO
Weediness			– LOW
Other			– LOW DIVERSITY (SHADY CANOPY)

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 25/09/18	W WYMONG	P1	GILBERT WHYTE

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 CASUARINA CRISTATA	N	70	30	C	
—	2 LYCIUM FEROCISSIMUM	HTE	1	4	M	
C	3 SCLEROLAENA BIRCHII	N	2	50	G	
G	4 CHLORIS TRUNCATA	N	1	50	G	
G	5 AUSTROSTIPA SP. (DRY)	N	2	100	G	
G	6 PANICUM EFFUSUM	N	1	20	G	
C	7 ATRIPLEX		5	100	G	
C	8 ENCHYLAENA TOMENTOSA	N	2	100	G	
C	9 EINADIA NUTANS	N	2	30		
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	11					
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	40					

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 201

Survey Name	Zone ID	Recorders
W WYMLOM	1	GILBERT WHYTE

Date	25/09/18			Plot dimensions	400 m	Photo #	✓
Zone	Datum	Plot ID	P 2				
56	GDA 94						
Easting	Northing	IBRA region	SWS m	Midline bearing from 0 m	041°	Magnetic °	
33.80847	147.32543						

Vegetation Class	NORTH-WEST-FLOODPLAIN WOODLANDS	Confidence: (H) M L
Plant Community Type	BELAH WOODLAND PCT 55 EEC: NO	Confidence: (H) M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	3
	Forbs	0
	Ferns	0
	Other	5
Sum of Cover of native vascular plants by growth form group	Trees	75
	Shrubs	0
	Grasses etc.	0.3
	Forbs	0
	Ferns	0
	Other	6.1
High Threat Weed cover		0.5

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm	11 11 <10	NO HOLLOWS.
10 – 19 cm	11 11 <10	
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	11 11 11 Tally space – 12m.	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	100					0					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope	SAME AS PREVIOUS	Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			SAME AS PREVIOUS PLOT (SAME VEG PLOT 1)
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 25/09/18	W WYMONG	PZ	GILBERT WHYTE.

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	CASUARINA CRISTATA	N	70	30	C	
T	2	ACACIA SALICINA	N	5	2	C	
C	3	SCLEROLAENA BIRCHII	N	2	20	G	
—	4	LYCIUM FEROCISSIMUM	HTE	0.5	1	S	
C	5	ATRIPLEX SEMIBACCATA	N	0.1	1	G	
G	6	RHYTIDOSPERMA SP.	N	0.1	10	G	
G	7	CHLORIS TRUNCATA	N	0.1	10	G	
C	8	SCLEROLAENA MURICATA	N	1	20	G	
C	9	KENTROPHYLLAENA TOMENTOSA	N	1	20	G	
C	10	EINADIA NUTANS	N	2	50	G	
—	11	HORDEUM VULGARE	E	0.5	50	G	
—	12	LACTUCA SERRIOLA	E	0.5	50	G	
G	13	PANICUM EFFUSUM	N	0.1	10	G	
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	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code if 'top 3'.**

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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BAM Site – Field Survey Form

Site Sheet no: 3 of

		Survey Name	Zone ID	Recorders			
Date	25/09/18	W WYALONG	1	GILBERT WHYTE			
Zone 56	Datum GDA 94	Plot ID	P3	Plot dimensions	400m²	Photo #	✓
Easting 33.80813	Northing 147.32408	IBRA region	S W Slopes	Midline bearing from 0 m	338°		Magnetic °
Vegetation Class		INLAND ROCKY HILL WOODLANDS					Confidence: (H) M L
Plant Community Type		BULL MALLEE (PCT 177)			EEC: YES		Confidence: (H) M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	3
	Forbs	3
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	30
	Shrubs	0
	Grasses etc.	35.5
	Forbs	0.7
	Ferns	0
	Other	3.5
High Threat Weed cover		0

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		NO HOLLOWS
50 – 79 cm	15 + MALLEE	
30 – 49 cm	ROOTSTOCK (750cm)	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm	~~IIII~~ ~~IIII~~ ~~IIII~~	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ I – 26m (Tally space)	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	50	60	40	20	50	30	20	10	10	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	44					16					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	FLOODPLAIN	Microrelief	FLAT
Lithology		Soil Surface Texture	SMOOTH	Soil Colour	RED/BROWN	Soil Depth	DEEP
Slope	0°	Aspect	N/A	Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			- RECENT FIRE - BULL MALLEE
Soil erosion			
Firewood / CWD removal			REGENERATING
Grazing (identify native/stock)			
Fire damage			
Storm damage			EDGE EFFECTS HIGH - EXOTICS.
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 25/09/18	W WYALONG	P3	GILBERT WHYTE

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 EUCALYPTUS BEHRIANA	N	30	10		
C	2 SCLEROLAENA BIRCHII	N	2	20		
F	3 OXALIS PERRENANS	N	0.1	1		
G	4 AN STROSTIPA ARISTICLUMIS	N	30	1000		
F	5 BRACHYCOME	N	0.1	2		
F	6 GOODENIA	N	0.5	50		
G	7 RHYTIDOSPERMA	N	5	1000		
R	8 JUNCUS		0.5	10		
—	9 LEPIDIUM	E	0.1	1		
—	10 PANICUM CAPILLARE	E	5	1000		
—	11 HORDEUM LEPORINUM	E	5	1000		
G	12 LOLIUM RIGIDUM	N	5	1000		
—	13 AVENA SATIVA	E	1	100		
C	14 ENCHYLAENA TOMENTOSA	N	1	100		
—	15 BRASSICA RAPA	E	0.1	10		
G	16 CHLORIS TRUNCATA	N	0.5	50		
—	17 CIRSIUM VULGARE	HTE	0.1	1		
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	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

Survey Name	Zone ID	Recorders
W WYALONG	1	GILBERT WHITE

Date	25/02/18	Plot ID	P4	Plot dimensions	400 m^2	Photo #	✓
Zone 56	Datum GDA94	IBRA region	SWS (in m	Midline bearing from 0 m	41°	Magnetic °	
Easting 33.80513	Northing 147.72084						
Vegetation Class	INLAND ROCKY HILLS WOODLAND					Confidence: (H) M L	
Plant Community Type	BULL MALLEE (PCT 177)			EEC: YES		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	3
	Forbs	1
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	20
	Shrubs	1
	Grasses etc.	31.5
	Forbs	20
	Ferns	0
	Other	30
High Threat Weed cover		0.0

BAM Attribute (1000 m^2 plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm	1||| REGEN MALLEE	NO HOLLOWS
30 – 49 cm		
20 – 29 cm	111	
10 – 19 cm		
5 – 9 cm	1|||	
< 5 cm	1|||	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	11	Tally space 2m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	40	30	30	30	20	10	10	5	5	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	32					10					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology	SAME P4.	Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			SAME PLOT 3 – INFORMATION SAME.
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 25/09/18	W WYALONG	P	GILBERT WHYTE

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	EUCALYPTUS BEHRIANA	N	20	8		
C	2	SCLEROLAENA BIRCHII	N	20	500		
F	3	CHRYSOCEPHALUM	N	20	500		
—	4	HORDEUM LEPORINUM	E	10	300		
C	5	ENCHYLAENA TOMENTOSA	N	5	100		
G	6	LOLIUM PERRENE	N	10	200		
G	7	CHLORIS TRUNCATA	N	1	50		
G	8	RHYTIDOSPERMA	N	30	1000		
C	9	ATRIPLEX SEMIBACCATA	N	5	100		
—	10	PANICUM CAPILLARE	E	20	1000		
S	11	ACACIA OSWALDII	N	1	4		
G	12	PANICUM EFFUSUM	N	0.5	10		
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	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code if 'top 3'.**

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of

Survey Name	Zone ID	Recorders
W WYALONG	1	GILBERT WHYTE

Date	25/09/18	Plot ID	P5	Plot dimensions	400 m^2	Photo #	✓
Zone 56	Datum GDA 94	IBRA region	SWS rn	Midline bearing from 0 m	199°	Magnetic °	
Easting 33.81151	Northing 147.32339						
Vegetation Class	FLOODPLAIN TRANSITION WOODLAND					Confidence: (H) M L	
Plant Community Type	INLAND GREY BOX (PCT 76)			EEC: YES		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	0
	Forbs	0
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	40
	Shrubs	0
	Grasses etc.	0
	Forbs	0
	Ferns	0
	Other	5
High Threat Weed cover		0.0

BAM Attribute (1000 m^2 plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	111	11
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1111 111 Tally space	8m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	60	40	30	30	20	10	10	10	10	0	0	0	0	0	0	0	0	0	be
Average of the 5 subplots	38					12					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			SEE PREVIOUS PLOT INFO.
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 25/09/18	W WYALONG	P5	GILBERT WHYTE

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 EUCALYPTUS MICROCARPA	N	40	5		
	2 AMYLEMA MIQUELII	N	1	2		
—	3 PANICUM CAPILLARE	E	5	1000		
—	4 AVENA SATIVA	E	30	1000		
C	5 ATRIPLEX SEMIBACCATA	N	2	50		
C	6 BINADIA NUTANS SUBSP. 2YGO	N	2	50		
—	7 POLYGONUM AVICULARE	E	1	20		
—	8 BRASSICA (DIVARIO L)	E	5	200		
—	9 BRASSICA OLERACEA	E	5	200		
—	10 HORDEUM VULGARE	E	20	1000		
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
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	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code if 'top 3'.**

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	26/09/18	W WYMONG	2	GILBERT WHYTE			
Zone: 56	Datum: WGS 84	Plot ID	P6	Plot dimensions	400 m^2	Photo #	✓
Easting: 33.81864	Northing: 147.32336	IBRA region	SWS In m	Midline bearing from 0 m	42°	Magnetic °	
Vegetation Class		INLAND ROCKY HILLS WOODLAND				Confidence: H M L	
Plant Community Type		BULL MALLEE (PCT 177)		EEC: YES		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	8
	Grasses etc.	3
	Forbs	3
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	61
	Shrubs	24.5
	Grasses etc.	2
	Forbs	5.2
	Ferns	0
	Other	2
High Threat Weed cover		1.0

BAM Attribute (1000 m^2 plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	1	1
20 – 29 cm	1111 111	1
10 – 19 cm	1111 111	
5 – 9 cm	1111 1111 1111 11	
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1111 1111 1111 hilly spine – 17M	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	90	100	80	60	0	0	0	5	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	86					5					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour	RED LOAM	Soil Depth	DEEP
Slope	0°	Aspect		Site Drainage		Distance to nearest water and type	UNKNOWN

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			~~ROADSIDE~~ ENHANCEMENT – CLEARED ROADSIDE
Soil erosion			
Firewood / CWD removal			– MINOR INFESTATION AFRICAN BOX THORN
Grazing (identify native/stock)			– RABBITS BURROWING / GRAZING.
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 26/09/18	LS HYALONG	P 6	GILBERT WAYNE

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	EUCALYPTUS BOSISTIANA	N	60	10		
S	2	MELALEUCA LANCEOLATATA	N	10	2		
S	3	ACACIA SALICINA	N	2	1		
S	4	CHORETRUM GLOMERATUM	N	5	5		
S	5	ACACIA MICROCARPA	N	2	5		
S	6	MYOPORUM MONTANUM	N	2	10		
S	7	SENNA ARTEMISIOIDES	N	2	10		
—	8	LYCIUM FEROCISSIMUM	HTE	1	5		
	9	AMYEMA MIQUELII	N	1	5		
F	10	CHRYSOCEPHALUM APICULATUM	N	5	100		
G	11	ANSROSTIPA SP.	N	1	500		
T	12	CASUARINA CRISTATA	N	1	1		
G	13	RHYTIDOSPERMA	N	0.5	20		
G	14	CHLORIS TRUNCATA	N	0.5	80		
S	15	EREMOPHILA MITCHELLI	N	1	10		
F	16	ZYGOPHYLLUM GLAUCUM	N	0.1	5		
S	17	ACACIA TRINEURA	N	0.5	2		
E	18	ATRIPLEX SEMIBACCATA	N	0.5	20		
F	19	BRACHYCOME	N	0.1	20		
C	20	ENCHYLAENA TOMENTOSA	N	0.5	20		
—	21	PANICUM CAPILLARE	E	0.1	10		
	22						
	23						
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	26/09/18	W WYALONG	2	GILBERT WHYTE			
Zone	Datum	Plot ID	P 7	Plot dimensions	409m²	Photo #	✓
Easting	Northing	IBRA region	SWS In m	Midline bearing from 0 m	61°	Magnetic °	
Vegetation Class		NORTH-WEST FLOODPLAIN WOODLANDS				Confidence: H M L	
Plant Community Type		RIVERINA WOODLAND (PCT 55)		EEC: NO		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	6
	Grasses etc.	1
	Forbs	4
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	40
	Shrubs	15
	Grasses etc.	0.5
	Forbs	2.5
	Ferns	0
	Other	2.1
High Threat Weed cover		0.0

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm	1	1
30 – 49 cm	1	
20 – 29 cm	III	
10 – 19 cm	IIII	
5 – 9 cm	III	
< 5 cm	IIII IIII IIII IIII	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	IIII IIII IIII Tally space – 16m	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	40	40	50	40	20	30	30	40	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	40					30					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			SOME PREVIOUS PLOT - MOST
Soil erosion			
Firewood / CWD removal			IN RESERVE (REGROWTH).
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 26/05/18		P7	GILBERT WHYTE

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 CASUARINA CRISTATA	N	40	6		
T	2 ACACIA PENDULA	N	5	4		
S	3 ACACIA OSWALDII	N	8	8		
S	4 SENNA ARTEMISIOIDES	N	2	10		
S	5 MYOPORUM MONTANUM	N	2	10		
S	6 DUMA FLORULENTA	N	0.5	1		
C	7 ENCHYLAENA TOMENTOSA	N	1	50		
C	8 ATRIPLEX SEMIBACCATA	N	1	100		
—	9 PANICUM CAPILLARE	N	0.5	50		
G	10 ENEAPOGON SP.	N	0.5	100		
F	11 BRACHYCOME	N	0.5	20		
S	12 ACACIA LIGULATA	N	0.5	1		
F	13 SELAGINE BELLIOIDES	N	0.5	50		
F	14 CHRYSOCEPHALUM APICULATUM	N	0.5	100		
F	15 ZYGOPHYLLUM GLAUCUM	N	1	5		
C	16 EINADIA NUTANS	N	0.1	1		
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
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	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	26/09/18	W WYRONG	1	GILBERT WHYTE			
Zone	Datum	Plot ID	P 8	Plot dimensions	400 m^2	Photo #	✓
56	WGS84						
Easting	Northing	IBRA region	SWS m	Midline bearing from 0 m	244	Magnetic °	
33.80767	147.34094						
Vegetation Class		RIVERINE PLAIN WOODLAND				Confidence: (H) M L	
Plant Community Type		WEEPING MYALL OPEN W (PCT 26)		EEC: Y/(N)		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	1
	Forbs	3
	Ferns	0
	Other	2
Sum of Cover of native vascular plants by growth form group	Trees	10
	Shrubs	50.5
	Grasses etc.	10
	Forbs	2.5
	Ferns	0
	Other	4
High Threat Weed cover		0.1

BAM Attribute (1000 m^2 plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm	IIII	1
10 – 19 cm	IIII IIII I	
5 – 9 cm	I	
< 5 cm	30	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	30m. Tally space	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	60	40	60	60	60	5	10	10	5	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	56					8					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			SEE PREVIOUS PLOTS
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			EVIDENCE OF RECENT FIRE
Fire damage			
Storm damage			RABBIT BURROWS
Weediness			
Other			FALLEN TREES / MINOR EROSION.

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 26/09/18	W WYALONG	P 8	GILBERT WHYTE

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	ACACIA PENDULA	N	50	30		
T	2	CASUARINA CRISTATA	N	10	10		
S	3	ACACIA OSWALDII	N	0.5	1		
G	4	AUSTROSTIPA	N	10	100		
F	5	PYCNOSORUS	N	1	20		
C	6	MAIREANA MICROPHYLLA	N	2	50		
C	7	ENCHYLAENA TOMENTOSA	N	2	50		
Gr	8	LOLIUM RIGIDUM	N	0.5	10		
—	9	PANICUM CAPILLARE	E	0.5	20		
F	10	CLEMATOCEPHALUM APICULATUM	N	1	50		
F	11	BRACHYSCOME	N	0.5	10		
—	12	XANTHIUM SPINOSUM	HTE	0.1	1		
G	13	ERAGROSTIS SP.	N	0.1	1		
—	14	LACTUCA SERRIOLA	E	0.5	20		
	15						
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	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form | Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	27/09/18			GILBERT WHITE			
Zone 56	Datum WGS84	Plot ID	P09	Plot dimensions	400m²	Photo #	✓
Easting 33.79734	Northing 147.31456	IBRA region	SWS m	Midline bearing from 0 m	149°		Magnetic °
Vegetation Class		INLAND ROCKY HILL WOODLANDS					Confidence: (H) M L
Plant Community Type		DWYER'S REDGUM PCT 185			EEC: NO		Confidence: (H) M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	0
	Forbs	1
	Ferns	0
	Other	4
Sum of Cover of native vascular plants by growth form group	Trees	15
	Shrubs	0
	Grasses etc.	0
	Forbs	0.5
	Ferns	0
	Other	6
High Threat Weed cover		0.5

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	II	II
20 – 29 cm	II	
10 – 19 cm		
5 – 9 cm		
< 5 cm	NO REGEN.	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	IIXI III Tally space 8m.	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	10	5	5	5	20	30	40	50	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	6					32					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology	SEE OPTIONAL	Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			DISTURBED AREA AROUND HOUSE
Cultivation (inc. pasture)			
Soil erosion			SEVERAL PLANTED SUGAR GUMS
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			YES – FIRE IN LAST 12 MONTHS.
Storm damage			
Weediness			– EXOTIC PASTURE SPECIES – HORDEUM
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 27/09/18	W WYALONG	P 9	GILBERT WHYTE

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	EUCALYPTUS DWYERI	N	15	4		
—	2	LYCIUM FEROCISSIMUM	HTE	0.5	1		
C	3	ATRIPLEX SP.	N	2	20		
C	4	SCLEROLAENA BIRCHII	N	2	20		
—	5	HORDEUM LEPORINUM	E	95	1000		
—	6	CITRULLUS LANATUS	E	1	10		
C	7	ENCHYLAENA TOMENTOSA	N	1	20		
C	8	ENCHYLAENA TOMENTOSA	N	1	20		
—	9	PANICUM CAPILLARE	E	0.5	20		
—	10	LEPIDIUM BONARIENSE	E	0.1	1		
F	11	SIDA CORNUTA	N	0.5	50		
—	12	SONCHUS OLERACEUS	E	0.1	1		
N	13	LOLIUM PERENNE	N	0.1	10		
	14						
	15						
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	17						
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	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of

Survey Name	Zone ID	Recorders
W WYALONG	1	GILBERT WHYTE

Date	Zone	Datum	Plot ID	Plot dimensions	Photo #
27/09/18	56	GDA 94	P 10	400 m²	✓

Easting	Northing	IBRA region	Midline bearing from 0 m	
33.81091	147.32277	SWS in m	245	Magnetic °

		Confidence:
Vegetation Class	INLAND ROCKY HILLS WOODLAND	(H) M L
Plant Community Type	WHITE BOX WOODLAND (PCT 177) EEC: Y/N	Confidence: (H) M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	0
	Grasses etc.	1
	Forbs	1
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	30
	Shrubs	0
	Grasses etc.	0.1
	Forbs	0.1
	Ferns	0
	Other	9
High Threat Weed cover		0.1

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		HOLLOWS
20 – 29 cm	1	NIL
10 – 19 cm	11 11 11	
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1 1	Tally space 6m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	50	40	30	20	20	5	20	2	2	2	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	0					0					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			SEE PREVIOUS PLOT INFO.
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 27/09/18	W WYALONG	P 10	GILBERT WHYTE

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	EUCALYPTUS MICROCARPA	N	5	1		
T	2	EUCALYPTUS DUMOSA	N	20	5		
T	3	EUCALYPTUS BEHRIANA	N	5	1		
—	4	PANICUM CAPILLARE	E	20	1000		
C	5	ELYMUS POLYGONOIDES	N	2	50		
C	6	ENCHYLAENA TOMENTOSA	N	2	100		
—	7	BRASSICA TOURNEFORTII	E	1	20		
—	8	SONCHUS OLERACEUS	E	2	50		
—	9	MALVA PARVIFLORA	E	2	50		
C	10	ELYMUS NUTANS	N	5	1000		
—	11	XANTHIUM SPINOSUM	E	0.1	1		
G	12	CHLORIS TRUNCATA	N	0.1	5		
F	13	CHRYSOCEPHALUM APICULATUM	N	0.1	5		
G	14	LOLIUM PERRENE	N	0.1	50		
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GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	27/09/18	W WYALONG	1	GILBERT WHYTE			
Zone 56	Datum WGS 84	Plot ID	P 11	Plot dimensions	400m²	Photo #	✓
Easting 33.80806	Northing 147.33668	IBRA region	SWS	Midline bearing from 0 m	326°	Magnetic °	
Vegetation Class		RIVERINE PLAIN WOODLAND				Confidence: (H) M L	
Plant Community Type		WALL WOODLAND (PCT 26)			EEC: YES	Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	1
	Grasses etc.	2
	Forbs	0
	Ferns	1
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	32.5
	Shrubs	0.25
	Grasses etc.	72
	Forbs	0
	Ferns	10
	Other	0.3
High Threat Weed cover		—

BAM Attribute (1000 m² plot) DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	||/|		
20 – 29 cm	||/||	
10 – 19 cm	|||	
5 – 9 cm	||	
< 5 cm	||/ ||/ ||| (100)	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space ||/| ||/| ||/ ||/| ||/ ||/ ||/ 35m	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	20	50	90	50	3	40	10	5	40	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	43.					19.6					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element	FLOODPLAIN	Landform Pattern		Microrelief	
Lithology		Soil Surface Texture	HARD SET	Soil Colour	RED CLAY	Soil Depth	DEEP.
Slope	FLAT	Aspect		Site Drainage		Distance to nearest water and type	UNKNOWN

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			ROAD RESERVE - NOT CLEARING
Cultivation (inc. pasture)			NO.
Soil erosion			LOW
Firewood / CWD removal			NO
Grazing (identify native/stock)			NATIVE AND RABBITS
Fire damage			NO
Storm damage			NO
Weediness			LOW.
Other			—

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 27/09/18	W WYLONG	P 11	GILBERT.

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	CASUARINA CRISTATA	N	0.25	1	C	
T	2	ACACIA PENDULA	N	30	59	C	
S	3	ACACIA OSWALDII	N	0.25	1	M	
G	4	LOLIUM PERENNE	N	2	500	G	
F	5	HYPARRHENIA DRUMMONDII	N	10	1000	G	
—	6	SONCHUS OLERACEUS	E	0.1	5	G	
—	7	HOLCUS LANATUS	E	0.1	1	G	
—	8	TRIFOLIUM DUBIUM	E	0.1	20	G	
—	9	TRIFOLIUM TOMENTOSUM	E	0.1	20	G	
R	10	JUNCUS	N	0.1	20	G	
G	11	ANARTHRIA	N	70	1000	G	
C	12	ELYMUS NUTANS	N	0.1	10	G	
C	13	ATRIPLEX SEMIBACCATA	N	0.1	2	G	
R	14	JUNCUS INGENS	N	0.1	1	G	
F	15	ASPERULA CONFERTA	N	0.1	1	G	
F	16	PYCNOSORUS CHRYSANTHES	N	0.1	5	G	
F	17	BRACHYSCOME CILIARIS	N	0.1	5	G	
—	18	BRASSICA TOURNEFORTII	E	0.1	5	G	
	19						
	20						
	21						
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	24						
	25						
	26						
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	28						
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	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code if 'top 3'.**

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	28/09/18	W WYALONG	2	GILBERT WHYTE			
Zone 56	Datum WGS84	Plot ID	P12	Plot dimensions	400m²	Photo #	✓
Easting 337.79122	Northing 147.32140	IBRA region	SWS [illegible]	Midline bearing from 0 m	143°	Magnetic °	
Vegetation Class		INLAND ROCKY HILLS WOODLAND				Confidence: (H) M L	
Plant Community Type		WALLEROO WOODLAND (PCT 177)		EEC: YES		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	4
	Grasses etc.	3
	Forbs	1
	Ferns	0
	Other	4
Sum of Cover of native vascular plants by growth form group	Trees	50
	Shrubs	18
	Grasses etc.	12
	Forbs	0.1
	Ferns	0
	Other	20
High Threat Weed cover		0.0

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm	1	
10 – 19 cm	1111 1111 1111	
5 – 9 cm	1111 1111 1111 1111 1111	
< 5 cm	11	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1111 1111	Tally space 9m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	40	30	40	40	60	30	20	5	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	34					25					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			SEE NARROW PLOTS.
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 29/09/18	W HYALONG	P 12	GILBERT WHYTE

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 EUCALYPTUS BLAKELYANA	N	40	20		
T	2 EUCALYPTUS DUMOSA	N	10	5		
	3 UNKNOWN SHRUB =	N	2	5		
S	4 GEIJERA PARVIFLORA	N	12	15		
S	5 MELALEUCA UNCINATA	N	2	1		
G	6 CHLORIS TRUNCATA	N	2	100		
G	7 RHYTIDOSPERMA	N	5	2000		
S	8 SENNA ARTEMISIOIDES S	N	2	10		
G	9 PANICUM EFFUSUM	N	5	1000		
C	10 ATRIPLEX	N	30	500		
C	11 ENCHYLAENA TOMENTOSA	N	5	50		
F	12 OXALIS PERRENNANS	N	0.1	5		
S	13 MYOPORUM MONTANUM	N	2	5		
	14 ANNUFNA	N	2	2		
C	15 SCLEROLAENA BIRCHII	N	10	500		
	16					
	17					
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GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 12 / 12

Survey Name	Zone ID	Recorders
W WYALONG	1	GILBERT WHYTE

Date	Zone	Datum	Plot ID	Plot dimensions	Photo #
29/09/18	56	WGS84	P 13	400m	

Easting	Northing	IBRA region	Midline bearing from 0 m	
33.79517	147.71011	SWS m	56°	Magnetic °

		Confidence
Vegetation Class	INLAND ROCKY HILLS WOODLAND	(H) M L
Plant Community Type	WHITE CYPRUS (PCT 185) EEC: NO	Confidence: (H) M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	5
	Grasses etc.	3
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	52
	Shrubs	21
	Grasses etc.	30
	Forbs	1
	Ferns	0
	Other	0
High Threat Weed cover		0.5

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm	11	NO HOLLOWS
10 – 19 cm	1111 1	
5 – 9 cm	11	
< 5 cm	1111 1111	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space 2M	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	0	50	50	50	0	100	50	20	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	50					36					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			ROADSIDE VEG DOMINATED BY
Firewood / CWD removal			CALLITRIS & BROOM BUSH.
Grazing (identify native/stock)			
Fire damage			
Storm damage			MODIFIED PCT 185?
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 29/08/18	H WYALONG	P 13	GILBERT WHYTE

GF Code		Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1	CASUARINA CRISTATA	N	2	1		
T	2	CALLITRIS GLAUCOPHYLLA	N	50	6		
S	3	MELALEUCA UNCINATA	N	10	5		
S	4	DODONAEA VISCOSA	N	5	20		
F	5	DIANELLA	N	1	20		
S	6	MYOPORUM MONTANUM	N	2	5		
S	7	CASSINIA	N	2	5		
—	8	ASPARAGUS ASPARAGOIDES	HTE	0.5	3		
G	9	PANICUM EFFUSUM	N	20	1000		
—	10	ARCTOTHECA CALENDULA	E	0.1	1		
S	11	SENNA ARTEMISIOIDES	N	2	5		
G	12	ANTHOSACNE SCABRA	N	5	1000		
G	13	RYTIDOSPERMA	N	5	1000		
	14						
	15						
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GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF** – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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