



BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Yarren Hut Solar Farm

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Project Number: 19-754



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ACRONYMS AND ABBREVIATIONS

AC	Alternating current
AEP	annual exceedance probability
BAM	Biodiversity Assessment Methodology
BAM-C	BAM Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCD	Biodiversity Conservation Division of DPIE
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
cm	centimetres
Cwth	Commonwealth
DBH	Diameter at breast height
DAWE	Department of Water Agriculture and the Environment (Commonwealth)
DoEE	Department of the Environment and Energy (Commonwealth, former name)
DPIE	Department of Planning, Industry and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwth)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
GHG	greenhouse gas
GIS	geographical information systems
ha	hectares
HBT	Hollow-bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
ID	Identification

km	kilometres
kV	kilovolts
LEP	Local Environment Plan
LLS Act	Local Land Services Act 2016 (NSW)
LGA	Local government area
LRET	Large-scale Renewable Energy Target
m	metres
MNES	Matters of National environmental significance under the EPBC Act
MW	megawatt
NVR	Native vegetation regulatory
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water (now BCD within DPIE)
PCT	Plant community type
PV	Photovoltaic
REAP	Renewable Energy Action Plan
SAII	Serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
sp/spp	Species/multiple species
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TfNSW	Transport for NSW (formerly Roads and Maritime Services RMS)
VIS	Vegetation Integrity Score

EXECUTIVE SUMMARY

BayWa r.e. Projects Australia Pty Ltd (herein 'BayWa r.e.' or 'proponent') is proposing to develop a solar farm at a property on the Mitchell Highway approximately 17 km northwest of Nyngan, central New South Wales (the proposal). The 28 megawatt (MW) alternating current (AC) solar farm would occupy around 92 ha of the 1205 ha lot. The lot is rural land, currently used for primary production (mixed cropping and grazing).

This Biodiversity Development Assessment Report (BDAR) has been prepared by NGH Environmental on behalf of the proponent, BayWa r.e.

The aim of this BDAR is to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) and to address the requirements of the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act). This BDAR forms part of an Environmental Impact Statement (EIS) for the State Significant Development (SSD), prepared under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Biodiversity Assessment Methodology (BAM) is the required assessment methodology for SSDs that trigger the New South Wales (NSW) Biodiversity Offsets Scheme under the BC Act. This report follows the field work methodologies and assessment required by the BAM.

Mapping and field surveys were completed in accordance with the requirements of the BAM. Approximately 92 ha of the development site is comprised of exotic pastures and crops. A Land Category Assessment was conducted which confirmed that these areas can be considered Category 1 – Exempt Land.

Native vegetation within the development site comprises around 0.54 ha of woodland within the road reserve of Mitchell Hwy and three paddock trees within the main development site. This native vegetation was found to represent PCT 98: Poplar Box – White Cypress Pine – Wilga – Ironwood shrubby woodland on red sandyloam soils of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, which is not a listed threatened ecological community (TEC) under either the BC Act or EBPC Act.

Consideration has been given to avoiding and minimising impacts to native vegetation throughout each phase of the proposal. Site design options have been assessed against key environmental, social and economic criteria. Mitigation and management measures would be put in place to adequately address impacts associated with the proposal, both direct and indirect.

For biodiversity impacts that are unavoidable, the proposal would require the removal of:

 0.08 ha of PCT 98 - Poplar Box – White Cypress Pine – Wilga – Ironwood shrubby woodland on red sandy-loam soils of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion – generating 1 credit.

The removal of 3 paddock trees generated the following credits:

 PCT 98 – White Cypress Pine – Wilga – Ironwood shrubby woodland on red sandy-loam soils of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion – generating 1 credit.

One ecosystem species was detected during the site surveys, Little Pied Bat *Chalinolobus picatus*. The presence of Little Pied Bat has been accounted for in the ecosystem credits above.

The proposal does not generate a requirement to offset species credit species.

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or

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- b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
- c) Funding a biodiversity action that benefits the threaten entity(ies) impacted by the development.

1. INTRODUCTION

The Yarren Hut Solar Farm proposal is classified as State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP) and therefore a 'major project'. This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Yarren Hut Solar Farm (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. NGH Environmental has prepared this report on behalf of the proponent, BayWa r.e.

The following terms are used in this document:

- **The proposal** The entire solar farm, including auxiliary construction infrastructure, fencing, access etc.
- **Development footprint** The area of land that would be directly impacted by the proposal, including the solar array, perimeter fence, access roads, powerline footprint and stockpile areas. For this proposal, the development footprint covers approximately 92.2 ha.
- **Development site** The area of land that subject to the proposal, which the comprises the leased area, approximately 92.7 ha.
- **Subject land** The land to which the BAM has been applied for this BDAR, equivalent to the development site above.

See Figure 1-1 and Figure 1-2 for areas defined as development site, subject land and development footprint.

1.1. THE PROPOSAL

The proposal involves the construction of a ground-mounted photovoltaic solar farm which would generate approximately 28 MW (AC) of renewable energy.

The proposal would include the following elements:

- Single-axis tracker photovoltaic (PV) solar panels mounted on steel frames (approximately 84,000 PV solar panels).
- Underground electrical conduits and cabling to connect the arrays and the inverters and transformers.
- Inverters, transformers and electrical conduits.
- Onsite substation.
- 66 kV electrical powerline to connect the proposal to the existing Essential Energy 66 kV feeder.
- Site office, site compound, vehicle parking areas, access tracks and perimeter fencing.
- Site access treatment which involves widening of Mitchell Highway.

The construction phase of the proposal is planned to commence at end of 2021 and would be a 10 month construction with peak construction expected to take 5 months. The proposal is expected to operate for 50 years. After the initial operating period, the solar farm would either be decommissioned, removing all above-ground infrastructure and returning the site to its existing land capability, or upgraded with new PV equipment.

1.2. THE DEVELOPMENT SITE

1.2.1. Development site location

The proposed location of Yarren Hut Solar Farm would be within the Bogan Shire Local Government Area (LGA), approximately 17 km northwest of the Nyngan townsite as shown in Figure 1-1. The subject land is comprised of one Lot, 21 DP 704061 as shown in Figure 1-2.

1.2.2. Development site description

The Yarren Hut Solar Farm is located approximately 170 km Northwest of Dubbo, central NSW, within the Bogan Shire LGA. It is accessed from a private access track directly from Mitchell Highway approximately 17 km northwest of the Nyngan townsite. Mitchell Highway is an arterial road managed and maintained by Transport for NSW (TfNSW).

As a state highway, Mitchell Highway connects central and southwestern Queensland with the northern and central regions of NSW. The southern section of Mitchell Highway runs from Sydney to Adelaide via Dubbo and Broken Hill. As part of the shortest route between Darwin and Sydney, Mitchell Highway is an important national freight road link. Pertinent to the development site, Mitchell Highway passes through the regional towns of Nyngan, Nevertire, Narromine and Dubbo.

The site is not located in the immediate vicinity of any water courses, nor is it located within any floodplains. The closest river is the Bogan River that runs through the town of Nyngan, 17 km to the south east. The closest point of the Bogan River to the project site is approximately 10 km east of the site, the floodplain of which is contained within the eastern side of the Mitchell Highway.



Figure 1-1 Location of the development site





Figure 1-2 Proposed development footprint

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1.3. THE STUDY AIMS

This BDAR has been prepared by NGH Environmental on behalf of BayWa r.e.

The aim of this BDAR is to address the requirements of the BAM, as required in the SEARs.

1.4. SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in this BDAR:

- Proposal layers, construction methodology and concept designs provided by BayWa r.
 e. Australian Government's Species Profiles and Threats (SPRAT) database <u>http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl</u>.
- OEH profiles of threatened species, population, and ecological communities.
- Commonwealth Department of Agriculture Water and the Environment Protected Matters Search Tool Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool.
- Australia's IBRA Bioregions and Sub-bioregions. Accessed online at http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps.
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2.
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (<u>http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx</u>).
- NSW OEH's BioNet threatened biodiversity database Accessed online via login at <u>http://www.bionet.nsw.gov.au/.</u>
- NSW OEH Threatened Species Profiles
 <u>http://www.environment.nsw.gov.au/threatenedSpeciesApp/</u> and
 <u>www.environment.nsw.gov.au/AtlasApp/UI_Modules/</u>.
- OEH BioNet Vegetation Classification Database (OEH 2017) Accessed online via login at <u>http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx.</u>
- OEH VIS Mapping Accessed online at <u>http://www.environment.nsw.gov.au/research/VISmap.htm</u>.
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method.
- NSW Government SEED Mapping https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU.
- NSW Biodiversity Values Map <u>https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap.</u>

2. LANDSCAPE FEATURES

2.1. IBRA BIOREGIONS AND SUBREGIONS

Interim Biogeographic regionalisation for Australia (IBRA) Bioregions are geographically distinct bioregions based on common climates, geology, landforms, and native vegetation (Thackaway and Creswell, 1995) There are 89 IBRA bioregions within Australia. The development site falls within the Cobar Peneplain IBRA Bioregion. The Cobar Peneplain lies in central NSW west of the Great Dividing Range. The bioregion extends from just south of Bourke to north of Griffith, has a total area of 7,334,664 hectares, and occupies 9.2 per cent of the state. The bioregion lies wholly within the Murray-Darling Basin and includes the Barwon, Macquarie, Yanda, Darling, Lachlan and Murrumbidgee catchments.

The development site occurs within the IBRA subregion Canbelego Downs. This was entered into the BAM Calculator (BAM-C) for the proposal.

The Canbelego Downs Subregion is characterised by an undulating plateau with low stony ridges and stony rises; long low angle slopes and wide (>500 m) valley; some central sandy channels; a few swamps. The geology of the Canbelego Downs comprises fine grained Ordovician and Silurian metasedimentary and sedimentary rocks, such as phyllite, slate and chert.

Vegetation communities within the subregion occupy suitable landscapes, such as:

- Mulga with Green Mallee
- Red Box and numerous woody shrubs on ridges and slopes
- Poplar Box, White Cypress Pine, Yarran shrubs and grasses in the valley
- River Red Gum and Polar Box with sedges, lignum and nardoo in swamps and larger creeks.

2.2. NSW LANDSCAPE REGIONS AND AREA

The development site falls across one Mitchell Landscape. This is:

• Pangee Alluvial Plains

An alluvial plain is a large flat landform that is created from the deposition of sediment or debris over a long period by rivers from the highlands. Sediments are brought about by weathering and erosion then water and wind transport the debris along. Once the deposited sediments increase, they form alluvial soil. The process of transporting the sediment by water is called fluvial process. Sediments are formed when there are floods which carry debris along the way. When the waters of the river subside, the sediments are deposited and with time an alluvial plain emerges.

This was entered into the BAM-C.

2.3. NATIVE VEGETATION

An assessment of native vegetation in the 1500 m buffer area was undertaken using aerial imagery, State Vegetation Mapping (DPIE, 2015) and field assessments see Table 3-2. Approximately 417.2 ha of native vegetation occurs in the surrounding 1500 m buffer area. This vegetation, in the landscape surrounding the development site is predominantly shrubby woodland. Common species include Poplar Box *Eucalyptus populnea* subsp. *bimbil*, Ironwood *Acacia excelsa*, Wilga *Geijera parviflora* and Budda *Eremophila mitchellii*.

Thus, the Percent Native Vegetation Cover within the 1500 m buffer area surrounding the development site was calculated to be 27.9%. This was entered into the BAM-C for this assessment.

2.4. CLEARED AREAS

An assessment of cleared areas in the 1500 m buffer area was undertaken using aerial imagery, State Vegetation Mapping (DPIE, 2015), NSW Landuse Mapping (OEH, 2017) and field assessments. Approximately 1076.2 ha occurs as cleared areas within the 1500 m buffer around the development site. These cleared areas are primarily agricultural lands used for cropping and modified pastures.



Figure 2-1 Example of cleared areas within the development site

2.5. RIVERS AND STREAMS

The development site is not located in the immediate vicinity of any water courses, nor is it located within any floodplains. The closest river is the Bogan River which runs through Nyngan approximately 17km south east of the development site. The closest part of Bogan River is directly 10 km east of the site.

Six man-made dams exist within Lot 21 DP 704061 that comprises the development site. However, none are within the development footprint (see Figure 2-5) and thus are not proposed to be impacted by the proposal.



Figure 2-2 Farm dam directly south of the development site

2.6. WETLANDS

An Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters search completed on 22 November 2019 identified three wetlands of international importance. The closest of these were Banrock Station Wetland complex and Riverland, located between 600-700 km upstream. The EPBC Protected Matters search did not identify any nationally important wetlands.

The nearest unnamed wetland to development site is located of the other side of Nyngan, approximately 23 km to the south east. This is shown in Figure 2-3 from the Bogan Local Environmental Plan 2011 (LEP).

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Figure 2-3 Wetlands identified in the Bogan LEP (Lot, 21 DP 704061 outlined in red)

2.7. CONNECTIVITY FEATURES

The 1500 m buffer area is largely cleared. There is a vegetation corridor along Mitchell Highway adjacent to the development site see Figure 2-5. Some trees within the development site are in close proximity to and aligned with this corridor. The majority of the development site does not form part of a noteworthy connectivity feature as it has been cleared for agriculture.

2.8. AREAS OF GEOLOGICAL SIGNIFICANCE

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the development site.

2.9. AREAS OF OUTSTANDING BIODIVERSITY VALUE

Areas of Outstanding Biodiversity Value (AOBV) are special areas declared by the Minister that contain irreplaceable biodiversity values that are important to the whole of NSW, Australia or globally. Presently there are only four listings of AOBV being Goud's Petrel critical habitat, the Little Penguin population in North Sydney, Mitchells Rainforest Snail in Stotts Island Nature Reserve and the Wollomi Pine critical habitat. These are listed within the Biodiversity Conservation Regulation 2017. No AOBV occur within or surrounding the subject land.

No areas of Biodiversity Values as mapped by DPIE occur within the development site (NSW Biodiversity Values Map Figure 2-4).

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Figure 2-4 Areas listed as high biodiversity value (development site outlined in red)

2.10. SITE CONTEXT COMPONENTS

The proposal conforms to the definition of a *site-based development* under the Biodiversity Assessment Methodology. The site-based development assessment methodology has been used in this BAM assessment. The Percent Native Vegetation was calculated by estimating the percent cover of native vegetation relevant to the benchmark for the Plant Community Type (PCT). A PCT was allocated based on existing vegetation mapping, field inspections and aerial imagery.



Figure 2-5 Vegetation classes in relation to the development site



3. NATIVE VEGETATION WITHIN THE DEVELOPMENT SITE

3.1. NATIVE VEGETATION EXTENT

Native vegetation within the main development site is limited to three paddock trees derived from the PCT that would have once occupied the area. These paddock trees are a combination of Ironwood (one individual) and Poplar Box (two individuals) (Figure 3-1). Paddock trees were identified in accordance with the BAM:

- a tree or a group of up to three trees less than 50 m apart from each other, and
- over an exotic groundcover, and
- more than 50 m away from any other living tree greater than 20 cm diameter at breast height (DBH), and
- on category 2 land surrounded by category 1 land (as defined by the BAM, 2017).*

*The regulatory land mapping has not yet been published under the new *Local Land Service Act* 2016 (LLS Act). During the transitional period, land categories are to be determined in accordance with the definitions of regulated land in the LLS Act. In this case, the paddock trees are surrounded by Category 1 - Exempt Land (see Section 3.3 below).

Paddock trees throughout the development site were assessed under the streamlined assessment module – clearing paddock trees (Appendix 1 of the BAM) and incorporated into this report. They are considered both in terms of ecosystem credits and as habitat for threatened species and any credits generated are additional to those created by applying the full BAM. Details of paddock trees can be found in Section 3.5.2.

A small amount, 0.54 ha, of shrubby woodland is also present within the Mitchell Hwy road reserve portion of the development site. One hollow-bearing tree (HBT) is present within this area.

3.2. EXOTIC VEGETATION

Approximately 92 ha of the development site occurs as cleared agricultural land used for cropping (Figure 3-2). These areas, at the time of assessment, contained no extant vegetation other than the paddock trees described above (shown on Figure 3-1). Historically, depending, on the time of year, the groundcover is likely to have contained an exotic crop. However, as this was not evident during the time of survey, the species and extent remains unknown. Regardless, these cropped areas would be considered to be on Category 1 – Exempt Land (see Section 3.3) and would be excluded from this assessment, with the exception of the consideration of prescribed impacts.

3.3. LAND CATEGORY ASSESSMENT

Until the entire Native Vegetation Regulatory (NVR) map is finalised and released, assessors may establish the categorisation of land for the consent authority to consider by approximating the method used to make the NVR map under the provisions of the BC Act and the LLS Act. That is, for developments occurring on rural land (not including RU5 land), accredited assessors can establish whether land is Category-1 – exempt land. Under the BC Act (S6.8(3)), the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 - exempt land (within the meaning of Part 5A of the Local Land Services Act 2013), other than any impacts prescribed by the regulations under section 6.3 of the BAM. Additionally, with the BAM (S2.3.1.1), biodiversity values associated with the assessment of the impacts of any clearing of native vegetation

and loss of habitat on Category 1-exempt land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation are not required to be assessed. As Category 1 Land regulatory maps are not yet publicly available, an assessment of whether the cleared areas meet the definition of the Category 1 - exempt land was undertaken (Appendix A).

In order to determine and justify land identified as Category 1-exempt land, the following information was analysed via a precautionary approach:

- NSW Land Use mapping (OEH 2017).
- Woody Vegetation layer (OEH 2015).
- Sensitive Regulated Land and Vulnerable Regulated Land Mapping.
- Historic aerial imagery.

Using the above resources, 92 ha was considered to be classed as Category 1 - Exempt Land (Section 3.3). These areas are exempt from further assessment in the BAM with exception to prescribed impacts as stated in Section 6.3 of the BC Act.



Figure 3-1 Native vegetation extent within the development site





Figure 3-2 Example of cropping within the development site showing paddock trees

3.4. PLANT COMMUNITY TYPES (PCTS)

3.4.1. Methods to assess PCTs

Review of existing information

A search was undertaken of BioNet Vegetation Classification database and NSW SEED mapping to access existing vegetation mapping information within the development site. The State Vegetation Type Map for Central West / Lachlan Region Version 1.4. VIS_ID 4468 (DPIE, 2015) was deemed the most relevant. Within 2 km of the development site, the following PCTs are mapped:

- PCT 49 Partly derived Windmill Grass Copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion.
- PCT 98 Poplar Box White Cypress Pine Wilga Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion.
- PCT 250 Derived tussock grassland of the central western plains and lower slopes of NSW.

Floristic survey

The entire development site was surveyed by an accredit BAM Ecologist on 27 February 2020. The aim of this survey was to confirm the PCTs present in the development site and their condition and extent. This included one vegetation integrity plot and survey of all paddock trees present. Data was collected on the composition, structure and function of the vegetation. Data was collected utilising the methodology presented in the BAM 2017.

PCTs were identified from the native species present, landforms, physiography and location in the IBRA subregion using the BioNet Vegetation Classification database. The subject land was then stratified into areas of similar condition class to determine vegetation zones for each PCT.

3.4.2. PCTs identified on the development site

Based on the field surveys, one PCT was identified to occur within the development site (Figure 3-5). This is:

 PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

One vegetation integrity plot confirmed the presence of PCT 98 in the road reserve, where upgraded access to the development site is proposed. This location was deemed the most suitable as the vast majority of the development site itself contains Category 1 – Exempt Land and little native vegetation with which to base PCT selection on. Whereas the adjacent road reserve, intermittingly, contains an over, mid and understory, where reliable data could be collected. The paddock trees within the development site are all species characteristic of PCT 98.

A description of PCT 98 as surveyed follows in Table 3-1.

Penlar Roy White Curress Dine Wilds Ironwood shrubby woodla

Table 3-1 Poplar Box – White Cypress Pine - Wilga – Ironwood shrubby woodland on red sandyloam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion				
Vegetation formation	Semi-arid woodlands (shrubby sub-formation)			
Vegetation class	Western Peneplain Woodlands			
	PCT ID	98		
Vegetation type	Common Community Name	Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion		
Approximate extent within the development site	0.54 ha of this PCT occurs within the road reserve portion of the development site. The canopy is sparse and often associated with a thick midstorey of shrubs. Groundcover is generally present where the shrub layer is absent. Three paddock trees of species characteristic of PCT 98 also occur within the development site.			
	Species name		Relative cover	

Poplar Box - White soils in the Darling	Cypress Pine - Wilga - Ironwood shrubby woodland Riverine Plains Bioregion and Brigalow Belt South E	on red sandy-loam Bioregion				
	Poplar Box Eucalyptus populnea subsp bimbil	5%				
Species relied	Ironwood Acacia excelsa	20%				
upon for PCT	Budda Eremophila mitchellii	25%				
identification	Wilga Geijera parviflora	5				
	White Cypress Pine Callitris glaucophylla	<1%				
Justification of evidence used to identify the PCT	tion of used to he PCT This PCT was identified with a canopy of Poplar Box and tall shrubs/tree including Ironwood, Budda and Wilga. White Cypress occurred minimally the BAM plot but was widely distributed in neighbouring sections of the reserve. Of the likely PCTs present based on relevant vegetation marked pCT 98 has the highest affinity with the species recorded and as successed by the most likely PCT present.					
Threatened ecological community (TEC) Status	IEC) Not listed under either the BC Act or EPBC Act.					
Estimate of percent cleared in NSW	40%					
Examples	Figure 3-3 PCT 98 present within the road reserve port site.	ion of the development				





Figure 3-5 PCT 98 at the development site

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3.5. VEGETATION INTEGRITY ASSESSMENT

3.5.1. Vegetation zones and survey effort

PCT 98 was identified within the development site. This occurs in the road reserve where the existing access will be upgraded for the proposal. As PCT 98 occurs in one condition state only one Zone has been mapped for PCT 98 (Zone 1). The BAM requires that one vegetation integrity plot be conducted for vegetation removal up to 2 ha within a Zone. As the degree of vegetation removal within Zone 1 is 0.08 ha, one vegetation integrity plot is sufficient to satisfy the requirements of the BAM. The single vegetation zone entered into the BAM-C is detailed in Table 3-2 and mapped in Figure 3-6.

Table 3-2 Vegetation zones within the development site

Zone ID	PCT ID	Stratification unit / condition	Area in development site (ha)	Area in development footprint (ha)	Survey effort (# plots)	Patch size (ha)	Example
1	98	Woodland This zone consists of a sparse canopy of Poplar Box, generally associated with a dense midstory of characteristic tall shrubs/trees such as Ironwood, Budda and Wilga. The understory is highly patchy and more prevalent where moisture may collect near the roadside. This PCT and Zone does not form part of a TEC.	0.54 ha	0.08	1	>100 ha	



Figure 3-6 Vegetation zones, paddock tree IDs and BAM plot locations at the development site

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3.5.2. Paddock trees

There are three paddock trees within the development site: two Poplar Box and one Ironwood. Both species are characteristic of PCT 98 and would have once formed part of the wider woodland. Accordingly, PCT 98 was assigned to all three trees.

Threatened species that would use the paddock trees are assumed to be the same threatened species that are returned by the BAM-C for Zone 1. Where targeted fauna surveys were required for the BAM Calculations, paddock trees were also included in the surveys. Assessments of threatened species that would use the paddock trees as habitat has been incorporated into this BDAR under sections 4 and 5.

All paddock trees were mapped in the field using a handheld geographical information system (GIS) Tablet. Trees were identified to genus and species. The DBH of the tree was assessed and assigned a paddock tree class relevant to the large tree benchmark. The large tree benchmark for PCT 98 is 30 cm DBH. The trees were visually assessed from the ground to determine whether any hollows were present. All paddock trees present within the development site are detailed in Table 3-3 below and shown on Figure 3-6.

Tree ID	Class	Species	DBH (cm)	РСТ	Hollows	Photo
1	3	Ironwood Acacia excelsa	31	98	No	<image/>

Table 3-3 Paddock trees present within the development site
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Tree ID Species Hollows Class DBH PCT Photo (cm) Poplar Box 2 1 18 98 No Eucalyptus populnea subsp. bimbil Poplar Box Eucalyptus populnea subsp. bimbil 3 1 19 98 No

3.5.3. Vegetation integrity assessment results

Eighteen plant species were identified within the one vegetation integrity survey plot comprising 15 native species and three exotic species. The results of the plot field data can be found in Appendix B.

The plot data from the vegetation integrity survey plot was entered into the BAM-C by an accredited assessor. The results of the vegetation integrity assessment are provided in Table 3-4

Table 3-4 Current vegetation integrity scores for each vegetation zone within the development site

Zone ID	Zone Description	Patch Size	Composition score	Structure score	Function score	Vegetation Integrity Score
1	PCT 98_Woodland	>100 ha	76.8	90.6	68.5	78.1

4. THREATENED SPECIES

4.1. ECOSYSTEM CREDIT SPECIES

The ecosystem credit species in Table 4-1 were returned by the BAM-C as being associated with PCT 98 present on the development site.

Table 4-1 Ecosystem credit species

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Barking Owl <i>Ninox connivens</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Black-breasted Buzzard Hamirostra melanosternon (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Brolga Grus rubicunda	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Vulnerable
Diamond Firetail <i>Stagonopleura guttata</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Dusky Woodswallow Artamus cyanopterus cyanopterus	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Grey Falcon <i>Falco hypoleucos</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Endangered	Not listed
Grey-crowned Babbler (eastern subspecies) Pomatostomus temporalis temporalis	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Hooded Robin (South- eastern form) <i>Melanodryas cucullata</i> <i>cucullata</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Koala <i>Phascolarctos cinereus</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Vulnerable
Kultarr Antechinomys laniger	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Endangered	Not listed
Little Eagle <i>Hieraaetus morphnoides</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Little Pied Bat <i>Chalinolobus picatus</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Masked Owl <i>Tyto novaehollandiae</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Painted Honeyeater Grantiella picta	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Vulnerable
Pied Honeyeater Certhionyx variegatus	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Spotted Harrier <i>Circus assimilis</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Square-tailed Kite <i>Lophoictinia isura</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
Superb Parrot (Foraging) <i>Polytelis swainsonii</i>	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Vulnerable
Varied Sittella Daphoenositta chrysoptera	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed
White-bellied Sea-Eagle <i>Haliaeetus morphnoides</i> (Foraging)	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed

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Common Name	Associated PCT	NSW Listing Status	National Listing Status
Yellow-bellied Sheathtail Bat Saccolaimus flaviventris	PCT 98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Vulnerable	Not listed

4.1.1. Species excluded from the assessment

No ecosystem credit species were excluded from the assessment; all are assumed to occur and contribute to ecosystem credits.

4.2. SPECIES CREDIT SPECIES

4.2.1. Candidate species to be assessed

The BAM-C predicted the following 13 species credit species to occur at the development site (Table 4-2). A desktop assessment was undertaken for habitat constraints and geographic restrictions to determine which species would be included or excluded in initial targeted surveys. This determined that targeted surveys should be conducted for Bristle-faced Free-tailed Bat *Setirostris eleryi*, Koala *Phascolarctos cinereus* and Shrub Sida *Sida rohlenae* in the first instance. A subsequent onsite habitat assessment, including recording of important habitat features such as hollow-bearing trees, determined that no further targeted surveys would be required as the development site lacked the specific habitat constraints for the remaining candidate species.

Under Section 6.4.1.17 of the BAM, a species credit species can be considered unlikely to occur on a development site (or within specific vegetation zones) if following field assessment it is determined that the habitat is substantially degraded such that the species is unlikely to utilise the development site (or specific vegetation zones).

Table 4-2 Candidate species credit species requiring assessment

Credit species	Habitat and geographic restrictions₁	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Fauna							
Barking Owl <i>Ninox connivens</i> (Breeding)	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	High	Vulnerable	Not listed	Suitable hollow bearing trees not present	Excluded	Habitat constraints not present
Black-breasted Buzzard <i>Hamirostra</i> <i>melanosternon</i> (Breeding)	Land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts. The species is known to breed in sites with cropping, but also requires retained vegetation.	Moderate	Vulnerable	Not listed	No land within 40 m of riparian woodland. Lack of retained vegetation suitable for breeding.	Excluded	Habitat constraints not present
Bristle-faced Free- tailed Bat <i>Setirostris eleryi</i>	Land within 500 m of watercourses or dams surrounded by eucalypts containing hollows.	High	Endangered	Not listed	Development site is within 500 m of a dam	Included	Habitat constraints present though of poor quality.
Bush Stone-curlew Burhinus grallarius	Fallen/standing dead timber including logs.	High	Endangered	Not listed	Lack of fallen/standing dead timber including logs	Excluded	Habitat constraints not present

Credit species	Habitat and geographic restrictions₁	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Koala <i>Phascolarctos</i> <i>cinereus</i> (Breeding)	'Important' habitat (however this is not a mapped important habitat area) is defined by the density of koalas and quality of habitat determined by on-site survey.	High	Vulnerable	Not listed	Survey required to determine if important habitat present. Poplar Box, a secondary feed tree, likely to be present.	Included	Habitat constraints present
Little Eagle <i>Hieraetus</i> <i>morphnoides</i> (Breeding)	Nest trees – live (occasionally dead) large old trees within vegetation. Paddock trees can provide important breeding habitat.	Moderate	Vulnerable	Not listed	One Class 3 and two Class 2 paddock trees present, however, both trees are small (<10m) and unlikely to be utilised by the species	Excluded	Habitat constraints not present
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> (Breeding)	Living or dead tree with hollows greater than 10 cm diameter.	High (breeding)/ Moderate (foraging)	Vulnerable	Not listed	Suitable hollow- bearing trees absent within development site.	Excluded	Habitat constraints not present

Credit species	Habitat and geographic restrictions₁	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Masked Owl <i>Tyto novaehollandiae</i> (Breeding)	Living or dead trees with hollows greater than 20 cm diameter.	High	Vulnerable	Not listed	Suitable hollow- bearing trees absent within development site.	Excluded	Habitat constraints not present
Square-tailed Kite <i>Lophoictinia isura</i> (Breeding)	Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. Is sensitive to disturbance around nests.	Moderate	Vulnerable	Not listed	Development site contains three paddock trees unlikely to be utilised for breeding given this species known preferences for larger trees within patches of vegetation along watercourses. Paddock trees are not known to be important habitat.	Excluded	Habitat constraints not present
Squatter Pigeon (southern subspecies)	Grassy woodlands and plains, preferring sandy areas and usually close to water. Feed on the ground, on seeds of grasses, herbs and shrubs, as well as insects. Nest on the ground.	High	Critically Endangered	Vulnerable	Only potential habitat present is within the within road reserve offering little	Excluded	Potential habitat limited to very thin road reserve which is

Credit species	Habitat and geographic restrictions₁	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Geophaps scripta scripta					foraging resources. Species nests on the ground, road reserve unlikely to be used for breeding.		degraded and unsuitable habitat.
Superb Parrot Polytelis swainsonii (Breeding)	Living or dead <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. albens</i> , <i>E. camaldulensis</i> , <i>E. microcarpa</i> , <i>E. polyanthemos</i> , <i>E. mannifera</i> , <i>E. intertexta</i> with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm.	High (breeding)/ Moderate (foraging	Vulnerable	Vulnerable	One hollow-bearing tree present within road reserve portion of the development site, outside the development footprint. However, this tree does not meet the breeding habitat constraint regarding species of tree.	Excluded	Habitat constraints not present
White-bellied Sea- Eagle <i>Haliaeetus</i> <i>morphnoides</i> (Breeding)	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	High	Vulnerable	Not listed	Species is highly selective of breeding locations preferring large live trees within vegetation near a	Excluded	Habitat constraints not present

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Credit species	Habitat and geographic restrictions₁	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
					viable foraging resource, such as along the Bogan River. No such trees present.		

Flora

Shrub Sida <i>Sida rohlenae</i>	Grows on flood-out areas, creek banks and at the base of rocky hills. NSW specimens have been found along roadsides in hard red loam to sandy- loam soils. The species can become	High	Endangered	Not listed	Potential habitat present within Zone 1. Species can inhabit disturbed areas and has been	Included	Potential habitat present. Survey required.
	locally abundant and is often more common in disturbed sites.				found along roadsides in NSW.		

4.2.2. Inclusions based on habitat features

The BAM- predicted the species credit species listed in to occur at the development site. As per the BAM Operational Manual - Stage 1, an assessor must consider species recorded on or near the subject land even if they are not predicted by the BAM-C. Within 10 km of the development site, BioNet contains records of the following NSW threatened species:

- Grey-crowned Babbler (eastern sub-species).
- Kultarr.
- Hooded Robin (south-eastern form).
- Varied Sittella.
- Superb Parrot.

All of the above species have been assessed in this BDAR as either ecosystem credit species or species credit species. No other species were considered for inclusion.

4.2.3. Candidate species requiring confirmation of presence or absence

The species listed in Table 4-3 are those considered to have habitats present at the development site. Targeted surveys have been used to assess each species as summarised below. Details of the survey methodologies and results are provided for each surveyed species with locations shown on Figure 4-1.

Species credit species	Biodiversity risk rating	Survey period	Assumed to occur/survey/expert report	Present on site?	Species polygon area
Fauna					
Bristle-faced Free- tailed Bat <i>Setirostris eleryi</i>	2	Oct-Mar	Surveyed Feb 2020	No	500 m
Koala <i>Phascolarctos</i> <i>cinereus</i> (Breeding)	2	All year	Surveyed Feb 2020	No	NA

Table 4-3 Summary of species credit species surveyed or assumed present at the development site

Flora

Shrub Sida	2	Sep-Feb	Surveyed Feb 2020	No	NA
Sida rohlenae					

4.3. CANDIDATE SPECIES SURVEY

Targeted surveys were undertaken during February 2020. The weather conditions during targeted surveys is summarised in Table 4-4 below. No data is available from the Nyngan Airport Station (051039), as such, data for the nearest weather station (Girilambone, 051164) has been used where available.

Date	Minimum (°C)	Maximum (°C)	Rainfall (mm)	Max Wind Gust (km/h Direction)
26 February 2020	22.1	35.6	0.2	No data
27 February 2020	19.4	31.4	2.2	No data
28 February 2020	18.0	30.3	0	No data

Table 4-4 Weather conditions during target surveys

Bristle-faced Free-tailed Bat

SURVEY EFFORT

One passive bat detector (Anabat Swift from Titley Scientific) was situated near a farm dam just outside the southern boundary of the development site. A harp trap was also situated in a gap in vegetation at this location that as it was a perceived potential fly-way. Both the Anabat and harp trap were in place across the evenings of 26 and 27 February. Incidental sightings were made at this location each evening for microbats in flight.

SURVEY RESULTS

A total of 12 distinct microbat species were detected (Appendix C) with a total of 733 passes recorded over 2 nights. No bats were caught in the harp trap. Of these 12 species, two are species listed under the BC Act:

- Little Pied Bat Chalinolobus picatus V.
- Bristle-faced Free-tailed Bat Setirostris eleryi V.

Little Pied Bat is an ecosystem credit species already addressed under this assessment; however, Bristlefaced Free-tailed Bat is a species credit species. In accordance with the Bionet Threatened Biodiversity Data Collection (TBDC), the species polygon for Bristle-faced Free-tailed Bat is calculated by mapping a 500 m from the relevant habitat constraint. In this case a farm dam to the south of the development site. This buffer encompasses only Category 1 – Exempt Land within the development site, therefore, no species credits for Bristle-faced Free-tailed Bat are generated (Section 7.1.3). Nevertheless, the species polygon is shown on Figure 4-1.

Koala

SURVEY EFFORT

Spotlighting surveys were undertaken on the evenings of 26 and 27 February 2020. The surveyed area included the entirety of the development site and vegetation associated with a dam outside, but adjacent to the southern boundary of the development site. This area was surveyed each evening for approximately 1.5 person hours. Trees within this area, including two Poplar Box which are secondary feed trees, were searched during the day on 27 February for signs of Koala such as scats and scratches.

SURVEY RESULTS

No Koalas, signs of Koalas, or arboreal mammal activity of any kind was identified during the surveys.

Shrub Sida

SURVEY EFFORT

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Targeted Shrub Sida transects were undertaken on 27 February 2020. The area surveyed included the portion of the development site within the road reserve of Mitchell Hwy. 10 m wide transects were walked in accordance with the NSW Guide to Surveying Threatened Plants (OEH, 2016). Two transect were required and survey for Shrub Sida took approximately 30 mins.

SURVEY RESULTS

No Shrub Sida were detected within the surveyed area.



Figure 4-1 Species credit species targeted survey locations and threatened species polygons



4.4. ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.4.1. Occurrences of karsts, caves, crevices and cliffs

As verified by the field inspection, there are no occurrences of karst, caves, crevices, or cliffs in the development site.

4.4.2. Occurrences of rock

As verified by the field inspection, there are no occurrences of surface rock in the development site.

4.4.3. Occurrences of human made structures and non-native vegetation

As verified by the field inspection, there are no human made structures within the development site that could be utilised by threatened species. Exotic vegetation within the development site is currently used for cropping and pasture. The extent of productive agriculture land in the region is considerable and native animals benefiting from cleared exotic vegetation environments have ample access to suitable habitat in the surrounding areas.

4.4.4. Hydrological processes that sustain and interact with the rivers, streams and wetlands

There are no watercourses in the immediate vicinity of the development site. The closest watercourse is Bogan River which is approximately 10 km east of the site. The tributaries of the Bogan River flow into the main channel south of Nyngan, and the river then flows north to connect with the Darling River. The floodplain (using the extent of the 1% annual exceedance probability (AEP) flood overlay) of Bogan River is contained within the eastern side of the Mitchell Highway. The floodplain extends within 8 km but does not encroach onto the project site.

There is a region that has been identified as vulnerable groundwater nearby, but this area is contained within the floodplain of the Bogan River, and the site is estimated to have no impact on this area. There are no boreholes located on the project site, but borehole data exists for the surrounding region. It shows that the water table sits at around 30 m to 60 m. The risk of encountering or impacting on groundwater in this region is therefore very low.

5. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on the 25 November 2019 (10 km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to Appendix D). Relevant to Biodiversity these include:

- Wetlands of International Importance 3.
- Threatened Ecological Communities 4.
- Threatened species 9.
- Migratory species 7.

The potential for these MNES to occur at the development site are discussed below. A full habitat assessment is included as Appendix E.

5.1. WETLANDS OF INTERNATIONAL IMPORTANCE

Three wetlands of international importance were returned from the protected matters report. The nearest of these (within 600-700 km of the development site) is Banrock station wetland complex and Riverland. The Coorong, and Lakes Alexandrina and Albert wetland are 800-900 km away from the site.

5.2. THREATENED ECOLOGICAL COMMUNITIES

Four threatened ecological communities were returned from the protected matters report. Characteristic tree species for one of these communities are present in the development site. This community is:

• Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box Grassy Woodland)

An assessment was undertaken to determine whether the native vegetation (PCT 98 and derived paddock trees) present within the development site could be considered Poplar Box Grassy Woodland. Reference was made to the approved Conservation Advice (the advice) for the community. Table 1 of the advice lists the state vegetation units (PCTs) that fully or partly correspond with Poplar Box Grassy Woodland (DoEE, 2019). PCT 98 is not listed.

Further consideration was given to Section 3 of the advice that outlines the key diagnostic characteristics and condition thresholds that apply, as well as steps to identify a patch of Poplar Box Grassy Woodland. Step 1 specifies that a patch must contain less than 30% crown cover of shrubs and small trees. Plot data collected within the development site indicates that this key characteristic is not satisfied as >50% cover of shrubs and small trees (including Ironwood as it is <10 m tall) was recorded. In consideration of the plot data available, that PCT 98 is a shrubby woodland and not a grassy woodland, and Table 1 of the advice fails to recognise PCT 98, suggests strongly that PCT 98 does not represent Poplar Box Grassy Woodland on the basis of vegetation formation differences.

In light of the above, Poplar Box Grassy Woodland is not considered to be present within the development site.

5.3. THREATENED SPECIES

Nine threatened species were returned from the protected matters report. Only one bird and two mammals were considered to have potential habitat within the development footprint:

Birds

• Superb Parrot Polytelis swainsonii – V.

As the development footprint (Figure 6-1) contains only three paddock trees without hollows and verging roadside vegetation, habitat for many of the above species is non-existent or of poor quality. The hollow-bearing tree identified along the roadside would not be impacted by the proposal and it not suitable for Superb Parrot. In the case of Superb Parrot, which has two BioNet records within 10 km of the development site, the species is likely to be present at times in the wider area and may visit the development site for traversal or forage infrequently. No breeding habitat for the Superb Parrot is present.

Mammals

- Koala (Phascolarctos cinereus) V.
- Corben's Long Eared Bat (Nyctophilus corbeni) V.

Poplar Box are a secondary feed tree for Koala in the Western Slopes and Plains region. Two Polar Box, occurring as paddock trees, would be removed for the proposal. No signs of Koala were detected, and the development footprint contains no woodland or notable habitat for the species. Visitation by Koala to the development site is likely to be very rare. For context, the development site is not covered by the NSW Koala Habitat Protection SEPP. This suggest the development site and surrounds are unlikely to support Koala.

A Long-eared Bat (*Nyctophilus* sp.) call was recorded by the Anabat. As *Nyctophilus* spp. are unable to be determined between via call recording alone, consideration has been given to whether the *Nyctophilus* call recorded is likely to be of Corben's Long Eared based on known suitable habitat. Given the species is more abundant in extensive stands of vegetation that contain a distinct canopy and a densely cluttered understory (DoE 2016), it is considered unlikely that Corben's Long Eared Bat was the *Nyctophilus* recorded.

Flora

No flora were returned from the protected matters report. No EPBC Act listed flora species were detected within the development footprint.

5.4. MIGRATORY SPECIES

Excluding marine species, six terrestrial migratory species were returned from the protected matters report. None of which were considered to have habitat within the site. See Appendix E for details of the habitat assessment for EPBC listed species.

6. AVOID AND MINIMISE IMPACTS

6.1. AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT

6.1.1. Site selection – consideration of alternative locations/routes

During the development of the proposal, a number of alternatives were considered. These include the 'do nothing option' (not developing the solar farm) and developing different renewable technologies.

During the site selection process for the proposal, the proponent reviewed the solar generation potential of many areas in NSW using a combination of computer modelling and analysis, on the ground surveying and observation, and experience of the proponent. The proposed site was selected because it provides the optimal combination of:

- Low environmental constraints (predominantly cleared cropping and grazing land).
- Low-rise terrain for cost-effective construction.
- High quality solar resource.
- No residential dwellings within 5 km of the development site.
- Suitable planning context.
- Acceptable flood risk.
- Artillery road access.
- Access to the distribution network.
- Sufficient levels of available capacity on the grid distribution system.

The site is of a scale that allows for flexibility in design, allowing the proponent to avoid ecological and other constraints that may be identified during the Environmental Impact Statement (EIS) process. The factors that determine the final design area would be detailed in the EIS.

Photovoltaic solar technology was chosen because it is cost effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology that is readily available for broad scale deployment at the development site.

6.1.2. Proposal components - consideration of alternative modes or technologies

The Australian Government's Large-scale Renewable Energy Target (LRET) and NSW Government's Renewable Energy Action Plan (REAP) outline the commitment by both Australia and NSW more specifically to reducing greenhouse gas (GHG) emissions and have set targets for increasing the supply of renewable energy. Other forms of largescale renewable energy accounted for in the LRET include wind, hydro, biomass, and tidal energy. The feasibility of wind, solar, biomass, hydro and tidal projects depend on the availability of energy resources and grid capacity.

PV solar technology was chosen because it is cost-effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology readily available for broadscale deployment at the site. Unlike wind farms, which are installed on elevated topography, solar energy farms can be effectively screened by vegetation to reduce the impact of visual disturbance, which would also provide additional habitat for local fauna. Solar energy farms also have few moving parts and are less likely to interfere with bird flight patterns.

Suitable solar resources have been identified in NSW, providing excellent opportunities for solar projects.

6.1.3. Proposal planning phase – detailed design

A preliminary constraints analysis was conducted by NGH, which informed the proposed site layout design. Impacts to vegetation constituting the highest ecological constraints was minimised as far as practical by:

- reducing the clearing footprint of the project to avoid impacts to larger patches of remnant woodland where possible.
- Avoiding impacts to vegetation with the highest vegetation integrity score.
- locating ancillary facilities in areas where there are no biodiversity values.
- Avoiding impacts to Back Creek to allow for connectivity to be maintained across the landscape.
- maintaining the landscape to allow surface water to follow existing drainage routes.
- Avoiding impacts to ten farm dams and restoring and rehabilitating these as habitat for wildlife.
- Developing a biodiversity enhancement plan in consultation with local Landcare to make provision for the ecological restoration, rehabilitation and ongoing maintenance of retained native vegetation habitat on the development site.
- Establish plantings of native species to enhance connectivity between the riparian zone and roadside vegetation.

The final site layout and location has not been able to completely avoid all areas of biodiversity value because the length and size of the solar panel infrastructure means it is difficult to avoid isolated paddock trees.

The substation and ancillary infrastructure would be located on a ~1 ha compound located on the north eastern corner of the development site, on previously cropped exotic vegetation with no impact on native vegetation.

Site access would require upgrading access from Mitchell Highway. This would impact approximately 0.08 ha of PCT 98.

The preferred option for the connection of the solar farm into the grid is directly into the existing 66 kV Essential Energy feeder, running along the northern boundary of the development site is on previously cropped exotic vegetation. This option would completely avoid the need to remove native vegetation.

The proposed design footprint is detailed in Figure 6-1.



Figure 6-1 Final project layout



6.2. AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS

The BC Regulation (clause 6.1) identifies actions prescribed as impacts to be assessed under the biodiversity offsets scheme.

How the relevant prescribed impacts have been avoided and minimised by the proposal is detailed below.

6.2.1. Impacts of the development on the habitat of threatened species or ecological communities associated with human made structures or non-native vegetation

The vast majority of the development site contains Category 1 – Exempt Land (Appendix A) where exotic vegetation in the form of crops and pasture would be present during growth periods. Such vegetation may provide some habitat value for threatened species considered to have potential to utilise the development site for foraging purposes such as Superb Parrot. If insects are drawn to the cropped lands then this land may be considered a foraging resource for Bristle-faced Free-tailed Bat. However, these resources are unlikely to be primary to the persistence of either species in the bioregion.

The development is upwards of 99% Category 1 – Exempt Land of minimal habitat value as described above.

6.2.2. Impacts of the development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

Connectivity through the development site generally is extremely poor as only three paddock trees occur within the main development footprint. Connectivity is greatest within the road reserve of Mitchell Hwy where a small impact is proposed to provide adequate access to the development site. Connectivity is this area is in the form of patchy remnants of woodland (primarily PCT 98) that extend north and south along Mitchell Hwy, themselves linking with more significant patches of vegetation in both directions. In what is a highly cleared landscape, such roadside connectivity is important for the movement of threatened species and native species generally. Impacts (vegetation removal) in this area have been avoided and minimised as much as practical such that no wooded vegetation of PCT 98 would be removed. Only groundcover would be removed having little impact, if any, on the connectivity through this area.

The entire development site, outside of the road reserve, would be fenced. As such, threatened species that use the ground to move across their range, such as Koala, would be prevented from moving through the development site. However, free passage would still be possible in the remaining subject land to the west, such that a barrier to movement across their range would not be created. Fencing, whilst not strictly a barrier, would serve as a hazard for arboreal and winged fauna. To minimise this risk, no barbed-wire fencing would be used.

6.2.3. Impacts of the development on movement of threatened species that maintains their lifecycle

As described above, connectivity of wooded areas through the development site is generally poor as only three paddock trees are present. However, connectivity is present in the road reserve where minor impact to the groundcover is proposed to allow for adequate site access. Removal of wooded vegetation where connectivity is present has been avoided.

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Neither the removal of the three paddock trees, removal of small amount of groundcover or fencing of the development site is likely to prevent any threatened species from moving across its range to complete its life cycle.

The fencing that would be required for the proposal would present an impediment to the movement of ground traversing threatened species such as Koala. However, as cleared lands to the west will remain undeveloped, passage would still be possible around the development site to the west and along the road reserve as it is now.

6.2.4. Impacts of the development on water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities

There are no watercourses in the immediate vicinity of the development site. The closest watercourse is Bogan River which is approximately 10 km to the east. The associated floodplain extends within 8 km but does not encroach onto the development site. The Bogan River and floodplain may sustain threatened species and communities but no interaction with the development site is apparent.

The development site is not currently at risk of inundation in rare flood events. If a rare flood did occur and water reached the development site, runoff would migrate north and eventually join the Bogan River stream flow. The development of a solar farm is not likely to have any material impact on the flood regime of the site.

There is a region that has been identified as vulnerable groundwater nearby, but this area is contained within the floodplain of the Bogan River, and the site is estimated to have no impact on this area. Borehole data for the surrounding region shows that the water table sits at around 30 m to 60 m. The risk of encountering or impacting on groundwater is therefore very low.

Of the six dams present within the subject land none are located within the development site. Avoidance of these waterbodies means impacts to species that may be sustained by them are also avoided. No threatened entities reliant on water quality, waterbodies and hydrological processes are thought to be present onsite and therefore will not be impacted by the proposal.

6.2.5. Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

The proposal would result in an increase in traffic during construction along the Mitchell Hwy for vehicles entering and exiting the development site. Avoiding vehicle strikes is action that takes place on a situational basis; however, the risk can be minimised. To increase the likelihood that vehicle strikes are avoided, mitigation measure such as warning signage, speed limits and education of construction personnel would be implemented. This would minimise the risk of vehicle strikes to threatened species such as Superb Parrot and Koala. Further, the development site would be fenced prior to construction to prevent ground traversing species such as Koala from entering harm's way.

7. IMPACTS UNABLE TO BE AVOIDED

7.1. DIRECT IMPACTS

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and existence of infrastructure.

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, powerlines, compound sites, stockpile sites, access tracks)	0.08 ha and three paddock trees	Once	Construction Phase: Short Term	 Direct loss of native flora and fauna habitat Potential over-clearing of habitat outside proposed development footprint Injury and mortality of fauna during clearing of fauna habitat and habitat trees Disturbance to stags, fallen timber, and bush rock
Removal of paddock trees	Three trees	Once	Construction Phase: Short Term	 Injury and mortality of fauna during clearing of fauna habitat and habitat trees Direct Loss of native flora and fauna habitat
Displacement of resident fauna	Unknown	Regular	Construction & Operation Phase: Long Term	 Direct loss of native fauna Decline in local fauna populations
Injury or death of fauna	Unknown	Regular	Construction Phase: Short Term	 Direct loss of native fauna Decline in local fauna populations
Shading by solar infrastructure	51 ha (70% of solar array)	Regular	Operational Phase: Long-term	 Modification of native fauna habitat Potential loss of groundcover resulting in unstable ground surfaces and sedimentation of adjacent waterways.
Existence of permanent solar infrastructure	Total 76 ha (73 ha Solar array)	Regular	Operational Phase: long- term	 Modification of habitat beneath array

Nature of impact	Extent	Frequency	Duration and timing	Consequence
(Fencing, array infrastructure).				 Reduced fauna movements across landscape due to fencing Collision risks to birds and microbats (fencing).

7.1.1. Change in vegetation integrity scores

The changes in vegetation integrity scores as a result of clearing are documented for Zone 1 in Table 7 2. Due to limitations of scale and to aid in PCT/TEC determination, the plot data collected for Zone 1 includes wooded vegetation that would not be impacted by the proposal. To account for this, the future integrity score for Zone 1 has been calculated by assuming all wooded vegetation would remain and only understory species would be removed. This was achieved by reducing all the composition and structure scores for grass and grasslike and forb growth forms to zero. Litter cover, which was minimal (2.2%) was also been reduced to zero.

Table 7-2 Current and future vegetation integrity scores for each vegetation zone within the development site

Zone ID	РСТ	TEC?	Area (ha)	Current vegetation integrity score	Future integrity score
1	98_Roadside	No	0.08	78.1	57.8

7.1.2. Loss of paddock trees

Three living paddock trees were recorded within the development site and would be removed for the proposal (Table 7-3). These paddock trees have been allocated a class (1, 2, or 3) in accordance with the BAM.

Table 7-3 Summary of loss of paddock trees

PCT	Class 1	Class 2	Class 3
98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	2	0	1
TOTAL:			3

7.1.3. Loss of species credit species habitat or individuals

As detailed in Section 4.2, Koala, Bristle-faced Free-tailed Bat and Shrub Sida were the only species credit species considered to have potential habitat within the development site. All were surveyed for and only Bristle-faced Free-tailed Bat was detected, via passive bat detector, during targeted surveys. The species polygon for Bristle-faced Free-tailed Bat is calculated by way of mapping a 500 m buffer from a recognised habitat constraint, in this case a farm dam to the south of the development site. As the species polygon encompasses only Category 1 – Exempt Land, no species credits are generated for Bristle-faced Free-tailed Bat.

Given the above, the proposal is not considered to result in the loss of species credit species habitat.

7.1.4. Loss of hollow-bearing trees

None of the paddock trees that would be removed for the proposal contain hollows. Only groundcover vegetation would require removal where access upgrades are proposed. Therefore, no hollow-bearing trees would be removed.

7.2. INDIRECT IMPACTS

Indirect impacts can occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities or threatened species habitat beyond the development site. Table 7-4 below details the indirect impacts required to be assessed by the BAM.

Table 7-4 Potential impacts on biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timi	ng 1 a	FEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence	
Indirect impacts (thos	Indirect impacts (those listed below are included in the BAM)						
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Phas Short-term	• •	Koala Superb Parrot (foraging)Bristle-faced Free-tailed Bat (foraging) PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland	 Minor direct loss of native flora and fauna habitat Low potential for injury and mortality of fauna during clearing of fauna habitat and habitat trees Minor disturbance to stags, fallen timber, and bush rock Increased edge effects The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence 	
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operational Phas Long-term	se: •	PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland Koala Bristle-faced Free-tailed Bat (foraging) Superb Parrot (foraging)	• Minor loss of native flora and fauna habitat The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence	

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Reduced viability of adjacent habitat due to noise, dust or light spill	Unknown	Rare	Operational Phase: Short-term	 Koala Superb Parrot (foraging) Bristle-faced Free-tailed Bat (foraging) PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland 	 May alter fauna activities and/or movements Minor loss of foraging or breeding habitat The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	 PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland 	• Minor loss of native flora and fauna habitat. The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction & Operational Phase: Long-term	 Koala Superb Parrot (foraging) Bristle-faced Free-tailed Bat (foraging) 	Loss of foraging habitat
Rubbish dumping	Unknown	Regular	Construction & Operational Phase: Long term	 PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland 	Degradation of potential habitat

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Earthworks and mobilisation of sediments	Unknown	Regular	Construction phase Short term	 PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland 	 Erosion and sedimentation and/or pollution of soils, dams and downstream habitats. Potential loss of ground cover resulting in unstable ground surfaces and sedimentation of adjacent waterways.
Increase risk of fire	Unknown	Regular	Operational Phase Long term	 Koala Bristle-faced Free-tailed Bat (foraging) Superb Parrot (foraging) PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland 	 Slight increase in the unlikely event component failure or damage results in a bushfire resulting in biodiversity impacts



Figure 7-1 Estimated zones of indirect impact for the proposal



7.3. INDIRECT IMPACTS

The following prescribed impacts are relevant to the proposal:

- a) Impacts of development on the habitat of threatened species or ecological communities associated with:
 - i. non-native vegetation.
- b) Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.
- c) Impacts of development on movement of threatened species that maintains their life cycle.
- d) Impacts of development on water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining).
- e) Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

The unavoidable aspects of these impacts are discussed below.

7.3.1. Impacts of the development on the habitat of threatened species or ecological communities associated with non-native vegetation

The vast majority of the development site contains Category 1 – Exempt Land where exotic vegetation in the form of crops and pasture would be present during growth periods. Such vegetation may provide some habitat value for the threatened species considered to have potential to utilise the development site for foraging purposes such as Superb Parrot. If insects are drawn to the cropped land then this land may be considered a foraging resource for Bristle-faced Free-tailed Bat. However, these resources are unlikely to be primary to the persistence of either species in the bioregion.

92 ha would be developed upon, an impact unlikely effect to bioregional persistence of any threatened species.

7.3.2. Impacts of the development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

As discussed in section 6.2.2, connectivity within development site is limited to the portion present in the road reserve of Mitchell Hwy. The proposal would have little, if any, detriment to this connectivity. Where three paddock trees would be removed, this would remove the 'steppingstone' effect that these trees have. However, this is unlikely to prevent any threatened species from moving across its range, as the gaps between remnant vegetation in the landscape wouldn't be increased.

It is an unavoidable impact that developments that require fencing generate an impediment to the movement of threatened species. However, given the siting of the proposal, any threatened species that presently may traverse through the development site to access habitat present in the surrounding landscape, would be able to make passage to the west and along the road reserve of Mitchell Hwy as currently possible.

7.3.3. Impacts of vehicle strikes on threatened species or animals that are part of a TEC

Despite the measures that would be in place to minimise this impact, is an unavoidable that an increase in traffic volume would increases the risk of vehicle strike along the Mitchell Hwy. However, this would

be largely confined to construction as operation would require minimal personnel. The development site would be fenced prior to construction commencing, minimising risk of vehicle strike, within the development site however, some small increase in risk would remain, particularly to threatened avifauna such as Superb Parrot.

The Mitchell Hwy poses the greatest risk of vehicle strike. Consideration must be given as to whether the siting of the proposal and fencing would direct or funnel animals traversing the development site and surrounds towards the Mitchell Hwy. As no bottlenecking or funnelling would occur, there is no perceivable increased risk of this process.

7.4. IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

7.4.1. Wetlands of international importance

No wetlands of international importance would be impacted by the proposal.

7.4.2. Threatened ecological communities

No federally listed communities would be impacted by the proposal as none are considered to occur.

7.4.3. Threatened species

No federally listed threated species are considered likely to inhabit the development site on a regular basis or rely on the meagre resources present. For those likely to be present in the greater landscape that may intersect with the development site very rarely, such as Superb Parrot, impacts are limited to the removal of a small amount of foraging habitat. Therefore, further assessment is not deemed necessary. The full habitat assessment is available in Appendix E.

Koala

Habitat for Koalas within the development site is limited to areas of traversal and three Poplar Box which are a secondary feed tree. Two of these feed trees would be removed. Based on such limited habitat availability, is considered highly rare that Koala would utilise the development site.

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 7-5 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala. The assessment in Table 7-5 resulted in a score of 2 and so habitat within the development site is not considered to be critical to the survival of the Koala, and an assessment of significant impact according to the EPBC Act significant impact criteria is not required.

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1	Evidence of one or more koalas within	

Table 7-5 Koala habitat assessment tool for inland areas (DoE 2014)

Attribute	Score	Inland	Applicable to the proposal?
	(medium)	2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓ No records of Koala within 10km of the development site. Koala not detected during site surveys.
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	✓ Groundcover and paddock trees only.
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	✓ Vegetation within the Mitchell Hwy road reserve extends out in places that covers >1000 ha.
	+1 (medium)	Area is part of a contiguous Iandscape < 1000 ha, but ≥ 500 ha.	
	0 (Iow)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that	

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Attribute	Score	Inland	Applicable to the proposal?
		score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	 ✓ High vehicle threat present: - Remnant Vegetation occurs along roadside corridor. High Dog threat present; - Highly fragmented landscape
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of EPBC Koala Referral	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Development site is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	2	Decision: Habitat not critical to the survival of the Koala— assessment of significance not required	

7.4.4. Migratory species

Based on habitat assessment (Appendix E), the development site is not considered to contain meaningful habitat that is likely to be utilised by federally listed migratory species. As such, none are considered likely to be impacted.

7.5. LIMITATIONS TO DATA, ASSUMPTIONS AND PREDICTIONS

The floristic plot is based on a single visit survey. Floristic surveys were undertaken during late summer 2020, so it is possible that not all plant species were detected that may be present at the site due to seasonal and climatic constraints. Inconspicuous or geophytic species which flower outside the surveyed period may not have been recorded.

The plot data for Zone 1 contains native shrub and trees, however, the portion of Zone 1 that would be impacted (0.08 ha) contains only grass and grasslike and forb growth forms. To account for this, the

future integrity score for Zone 1 was calculated assuming that no shrubs or trees would be impacted, whereas, composition and structure score for the other growth forms was reduced to zero.

The calculation of hollow-bearings trees, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows. However, it was noted where it was considered likely that hollows were present but not visible from ground level.

8. MITIGATING AND MANAGING IMPACTS

8.1. MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal is provided below.

8.1.1. Impacts from the clearing of vegetation and habitats

- 1. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or wildlife handler.
- 2. Relocate habitat features (fallen timber, hollow logs) into retained vegetation patches within the development site.

8.1.2. Indirect impacts

- 1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.
- 2. Noise barriers or daily/seasonal timing of construction and operation activities to reduce impacts of noise.
- 3. Light shields or daily/seasonal timing of construction activities to reduce impacts of light spill.
- 4. Adaptive dust monitoring programs to control air quality.
- 5. Temporary fencing to protect significant environmental features such as riparian zones.
- 6. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.
- 7. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.
- 8. Preparation of a Biodiversity Management Plan to regulate activity in clearing of vegetation, pest animal management and weed management.

8.1.3. Prescribed impacts

- 1. Screening and landscaping plantings to be comprised of local indigenous species representative of the vegetation in the development site. The food potential for fruit, pollen and nectar feeders will be considered in selecting component species.
- 2. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment
- 3. Enforce speed limits and install signage during construction to reduce impacts of vehicle strikes on threatened fauna.
- 4. Clearly survey and mark environmental no-go areas during construction to prevent clearing within unauthorised areas and where threatened species habitat occurs
- 5. Fencing to prevent Koala from entering the development site during construction
- 6. Use of non-barbed wire fencing for permanent/security fencing
- 7. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.
Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of reside	ent fauna through vegetation clearing	and habitat removal				
Time works to avoid critical life cycle events.	 If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur. 	Construction.	Regular.	Contractor.	Moderate.	Species not detected during pre-clearing surveys may be impacted. No HBTs are to be removed, but paddock trees may support nesting.
Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecologist or wildlife handler.	 Pre-clearing checklist. Tree clearing procedure. 	Construction.	Regular.	Contractor.	Moderate.	Species not detected during pre-clearing surveys may be impacted.

Indirect impacts on native vegetation and habitat

Clearing protocols that	Approved clearing limits to be	Construction.	Regular.	Contractor.	Low.	Clearing may exceed
identify vegetation to be	clearly delineated with temporary	/				what has been assessed
retained, prevent						and approved.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences consequences consequen
inadvertent damage and reduce soil disturbance: for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.	 fencing or similar prior to construction commencing. No stockpiling or storage within dripline of any mature trees. In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance. 					
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.	• A Construction Environmental Management Plan would include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	Construction.	Regular.	Contractor.	Low.	None.
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill.	Avoid night works.Direct lights away from vegetation.	Construction/Operation.	Regular.	Contractor.	Low.	None.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Adaptive dust monitoring programs to control air quality.	 Daily monitoring of dust generated by construction activities. Construction would cease if dust observed being blown from site until control measures were implemented. All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site. 	Construction.	Regularly.	Contractor.	Moderate.	Sedimentation in ephemeral waterways and dams.
Temporary fencing to protect significant environmental features such as riparian zones.	• Prior to construction commencing, exclusion fencing, and signage would be installed around habitat to be retained.	Construction.	Regularly.	Contractor.	Low.	None.
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.	 A Weed Management procedure would be developed for the proposal to prevent and minimise the spread of weeds. This would include: Management protocol for declared priority weeds under the <i>Biosecurity Act 2015</i> during and after construction. 	Construction/Operation.	Regular.	Contractor.	Moderate.	Weed encroachment.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	 Weed hygiene protocol in relation to plant, machinery, and fill. The weed management procedure would be incorporated into the Biodiversity Management Plan. 					
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.	Site induction.Toolbox talks.	Construction.	Regular.	Contractor.	Moderate.	Impacts to native vegetation or threatened species for Staff training not being followed.
Preparation of a biodiversity management plan to regulate activity in vegetation and habitat adjacent to the proposed development.	 Preparation of a Biodiversity Management Plan that would include protocols for: Protection of native vegetation to be retained. Best practice removal and disposal of vegetation. Weed management. Pest animal management Unexpected threatened species finds. Exclusion of vehicles through sensitive areas. 	Construction.	Regular.	Contractor.	Moderate.	Impacts to native vegetation or threatened species for Staff training not being followed.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	 Rehabilitation of disturbed areas. 					
Prescribed biodiversit	yimpacts					
Instigating clearing protocols including pre- clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events for rocks, human made structures and non-native vegetation	 Pre-clearing checklist Tree clearing procedure Staged habitat removal Unexpected threatened species finds procedure 	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted.
Screening and landscaping plantings to be comprised of local indigenous species representative of the vegetation in the development site.	 Screening and landscaping plantings to be comprised of local indigenous species representative of the vegetation in the development site. 	Operation.	Regular.	Client.	Moderate.	Plants not surviving.
Sediment barriers and spill management procedures to control	 An erosion and sediment control plan would be prepared in 	Construction.	Regular.	Contractor.	Moderate.	Impacts may occur to waterway if erosion and

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
the quality of water runoff released from the site into the receiving environment.	conjunction with the final design and implemented.Spill management procedures would be implemented.					sedimentation control plan not implemented.
Staff training and site briefing to communicate impacts of traffic strikes on native fauna.	 Awareness training during site inductions regarding enforcing site speed limits. Site speed limits to be enforced to minimise fauna strike. 	Construction/Operation.	Regular.	Contractor.	Moderate.	Fauna strikes from vehicles.
Plain wire instead of barbed used on top of the perimeter fence and stock fencing to reduce impacts on birds, microbats and Koala Squirrel Glider.	 Security fencing would be comprised of 2 m high cyclone fencing. Fencing in place prior to construction commencing. Use plain wire perimeter fencing where this intersects woodland to avoid potential entrapment of fauna on fence. 	Construction.	Regular.	Client.	Low.	None.

9. SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline.
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size.
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution.
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1. POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

9.1.1. Threatened ecological communities

There are no SAII candidate threatened ecological communities present at the development site.

9.1.2. Threatened species

There are no SAII candidate species recorded at the development site.

9.1.3. Additional potential entities

No further species were considered to be potential SAII entities.

10. REQUIREMENT TO OFFSET

10.1. IMPACTS REQUIRING AN OFFSET

10.1.1. Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

- a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or
- b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required are documented in Table 10-1 and mapped on Figure 10-1.

The full Biodiversity Credit Report generated by the BAM-C is provided in E.1.

Zone ID	PCT ID	Zone Name	Impact area (ha)	Vegetation Integrity Score	Future Vegetation Integrity Score	Ecosystem credits required		
PCT 98: F soils in the	PCT 98: Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion							
1	98	Roadside	0.08	78.1	57.8	1		
					TOTAL:	1		

Table 10-1 PCTs and vegetation zones that require offsets.

10.1.2. Paddock tree credits

Offsets are required for the clearing of Class 2 and Class 3 paddock trees. One Class 3 paddock tree would be removed by the proposal. This paddock tree forms part of PCT 98: Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion. Ecosystem credits are calculated as per the streamlined assessment defined in the BAM – Appendix 1 and Table 12. These ecosystem credits required are documented in Table 10-2. The credit profile for the paddock trees is shown in Appendix G.

One ecosystem credit is required for the clearing of the paddock trees.

Table 10-2 Paddock trees that require offsets.

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required			
PCT 98: Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion							
Class 3 >30 cm DBH	No	1	0.75	1			
			TOTAL:	1			

10.1.3. Species credits

No species credit species require offsets for the proposal as the species polygon for Bristle-faced -Freetailed Bat encompasses only Category 1 – Exempt Land within the development site The full Biodiversity Credit Report generated by the BAM-C is provided in Appendix E.1.

10.1.4. Offsets required under the EPBC Act

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

10.2. IMPACTS NOT REQUIRING AN OFFSET

Impacts to PCTs that do not meet the thresholds identified in section 10.1.1 do not require offsets. As the one Zone of PCT 98 within the development site satisfies these thresholds, there are no Zones that do not require an offset. Two of the three paddock tress that would be removed are Class 1 and as such, do not require offsetting. These trees are shown on Figure 10-1.

Table 10-3 Impacts not requiring an offset

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required		
PCT 98: Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion						
Class 1<20 cm DBH	No	2	0	0		
			TOTAL:	0		

10.3. AREAS NOT REQUIRING ASSESSMENT

Approximately 92 ha of land within the development site is considered to be Category 1 – Exempt Land, therefore, in accordance with the BAM, these areas do not require assessment, other than for prescribed impacts. Impacts to Category 1 – Exempt Land do not require offsetting.

These areas are mapped on Figure 10-1.



Figure 10-1 Impacts requiring offset, impacts not requiring offset and areas not requiring assessment



10.4. SUMMARY OF OFFSET CREDITS REQUIRED

Table 10-4 Summary of offset credits required.

Ecosystem Credits	Offset credits required
98 - Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	2
TOTAL:	2

11. CONCLUSIONS

NGH has prepared this BDAR on behalf of BayWa r.e for the Yarren Hut Solar Farm, approximately 17km northwest of Nyngan, NSW. The purpose of this BDAR is to satisfy the assessment requirements of the BOS and BAM as set out under the BC Act for the proposal and to address the biodiversity matters raised in the SEARs. In this BDAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the BAM.
- Identification of one PCT and one species credit species (Bristle-nosed Free-tailed Bat) within the development site, the impacts to which have been adequately assessed.
- Mitigation measures which have been outlined to reduce the impacts to biodiversity
- The generation of 2 ecosystem credits within the development site, and no species credits.

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

- a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or
- b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
- c) Funding a biodiversity action that benefits the threaten entity(ies) impacted by the development.

12. REFERENCES

Bogan Shire (2018) Bogan Shire Annual Report 2017/18.

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- DoE (2014) EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory), Commonwealth Department of Environment, 2014.
- DoE (2016). Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <u>http://www.environment.gov.au/sprat</u>.
- Department of the Environment and Energy (2019). Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains. Canberra: Department of the Environment and Energy.

NSW Government 2018, Determining Strahler Stream Order Fact Sheet,

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- Office of Environment and Heritage (OEH) (2016) NSW Guide to Surveying Threatened Plants, State of NSW and Office of Environment and Heritage
- Office of Environment and Heritage (OEH) (2017) Biodiversity Assessment Methodology (BAM). Office of Environment and Heritage for the NSW Government, Sydney, NSW.
- Office of Environment and Heritage (OEH) (2020) BioNet Vegetation Information System: Classification Database. Accessed online at <u>http://www.environment.nsw.gov.au/research/Visclassification.htm</u>
- Thackaway and Creswell (1995) An Interim Biogeographic Regionalisation for Australia, Australian Nature Conservation Agency, Canberra

APPENDIX A LAND CATEGORY ASSESSMENT

24 March 2020

David Geering Senior Conservation Planning Officer BCD - North West Department of Planning Industry and Environment PO Box 2111 Dubbo, NSW, 2640



David.geering@environment.nsw.gov.au

Dear David,

Re: Yarren Hut Solar Farm 19-754

NGH has been engaged to prepare a Biodiversity Development Assessment (BDAR) for the proposed Yarren Hut Solar Farm. The development site is located approximately 17km north west of Nyngan, New South Wales on the Mitchell highway on private land located at Lot 21 DP 704061.

Section 6.8(3) of the BC Act determines that the Biodiversity Assessment Method (BAM) is to exclude the assessment of the impacts of clearing of native vegetation on Category 1-exempt land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)). Boundaries mapping Category 1-exempt land on the Native Vegetation Regulatory Mapping are not yet publicly available. During the transitional period, accredited assessors may establish the categorisation of land for the agency head to consider, following the method utilised to develop the Native Vegetation Regulatory Map.

Category 1-exempt land is defined under the LLS Act (Part 5A Division 2 Section 60H) as;

- Land cleared of native vegetation as at 1 January or lawfully cleared after 1 January 2019
- Low Conservation Grasslands
- Land containing only low conservation groundcover (not being grasslands)
- Native vegetation identified as regrowth in a Property Vegetation Plan under the repealed Native Vegetation Act 2003
- Land biodiversity certified under the BC Act.

This letter report establishes the methodology, results and conclusions to evaluate the land categorisation for the development site. It is requested that the Department of Planning, Industry and Environment (DPIE) review the proposed methodology, endorse it if considered appropriate, and provide comment where required for the land categorisation of the development site for the proposed Yarren Hut Solar Farm.

If you have any questions, please contact me on the number below. I would be pleased to discuss this matter further with you.

Yours sincerely,

Mitch Palmer A/Principal Ecologist



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Attachment 1

Methodology

An initial desktop assessment and literature review of previous studies was undertaken over the development site to determine the ecological constraints and native vegetation communities on site. Assessment of the development site as Category 1 – exempt and Category 2 – regulated land was undertaken using the following data sources:

- 2017 Land Use Dataset (Australian Land Use and Management (ALUM) Classification version 7 (Office of Environment and Heritage (OEH), 2017)
- NSW Woody Vegetation extent and Foliage Projective Cover (FPC) 2011 (OEH, 2015)
- Sensitive regulated and vulnerable lands on the Native Vegetation Regulatory Map Portal
- Central West/Lachlan State Vegetation Mapping (OEH, 2019)

Due to the clear historical evidence demonstrated within in the layers above, it was not deemed a requirement to review 1990 aerial imagery for the purpose of this assessment.

Results

The following table (Table 1) demonstrates how the above mentioned layers were used in determining land category.

Table 1 Summary	/ of data	sources and	interpretation
-----------------	-----------	-------------	----------------

Data Sources	Category 1 –	Category 2–	Excluded Land	
	Exempt Land	Regulated Land		
Current Aerial Imagery Nyngan Locality	 Clear evidence of cropping Clear evidence of significant groundcover modification 	Woody vegetation present at 1990 demonstrated within woody vegetation extent layer	N/A	
2017 Land Use Dataset	Land use identified as;	Land use identified as;	N/A	
	CroppingReservoir/dam	 Grazing native vegetation 		
NSW Woody vegetation extent	 Areas of woody vegetation regrowth that has occurred post 1990 following previous clearing events 	Woody vegetation present as at 1990 inclusive of paddock trees	N/A	
Native Regulatory Map • Sensitive regulated land • Vulnerable regulated land • Excluded land	N/A	No areas identified as vulnerable or sensitive regulated land	Areas identified as excluded on the Native Regulatory Map such as transport/ communication land use on SP2 zoned land	

In summary, the analyses of the above sources identified the following:

- A high proportion of the land within the development site has previously been used for cropping and is therefore predominately category 1 exempt land (Figure 3).
- Field surveys conducted in March 2020 identified evidence of fallowed paddocks (Figure 1 and Figure 2).
- Another determining feature of constant agricultural use is a lack of woody vegetation regrowth in the majority of areas, as represented in the aerial imagery and field observations (Figure 1, Figure 2 and Figure 3). The 2011 Woody Vegetation extent does however identify scattered paddock trees in the development site which has been mapped as Category 2 regulated land (Figure 4).
- The Native Vegetation Regulatory Map identifies areas of vulnerable and sensitive regulated land, however neither of these layers are evident within the development site. Land zoned as SP2 have been identified as excluded land (Figure 6).



Figure 1 Site view from Mitchell Highway, showing fallowed paddocks.



Figure 2 Paddock tree surrounded by fallowed paddocks.

Conclusion

Based on the above data sources, with the exception of the SP2 zoned land, there is evidence to suggest that predominately the development has been under regular cropping, supported by recent imagery, field surveys and 2017 Land Use Mapping data. Draft maps of those areas considered to be Category 1 – Exempt Land and Category 2 – Regulated Land has been produced and demonstrated in Figures 3 to 4. The relevant datasets used in the assessment are included in Figures 4 to 6.

Figures

Figure 1 Site view from Mitchell Highway, showing fallowed paddocks	4
Figure 2 Paddock tree surrounded by fallowed paddocks.	5
Figure 3 Development Site overview and Land categorisation	8
Figure 4 NSW Woody Vegetation Extent and FPC 2011	9
Figure 5 Land Use Dataset	10
Figure 6 2017 Land Zoning	11



Yarren Hut Land Category Assessment Map 1 of 2

Legend

Development Site
 Development Footprint
 Roads

Land Cat Assessment

Cat 1 - Exempt Land
Cat 2 - Regulated Land

Excluded Land



Ref. 19-754 Yamen Hut Biodwersity 20200317 \ Yamen Hut Land Category Assessment Map 1 of 2 Author s. downey Date creates (20.03.2020 Datum: GDA94 / MGA zone 55

NGH

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Figure 3 Development Site overview and Land categorisation



Figure 4 NSW Woody Vegetation Extent and FPC 2011



Figure 5 Land Use Dataset



Yarren Hut Land Zoning

Development Site

Development Footprint

Land Zoning

RU1 - Primary Production

SP2 - Infrastructure



0.25

0.5 km

Data Attribution © NGH 2020 © LPI Base Map, 2020

Ref: 19-754 Yamen Hut Biodiversity 20200317 \ Yamen Hut Land Zoning Author: s.downey Date creates: 20.03.2020 Datum: GDA94 / MGA zone 55



Figure 6 2017 Land Zoning

Biodiversity Development Assessment Report Yarren Hut Solar Farm

APPENDIX B PLOT DATA

FUNCTION

Function attri	butes for	P1	
BAM Attribut	e (20x20m plot)		
	Stratum	Sum	
Count of Notice	Tree (TG)	3	
	Shrub (SG)	5	
	Forb (FG)	5	
Bicknoss	Grass & grasslike (GG)	4	
Richness	Fern (EG)	0	
	Other (OG)	0	
	TOTAL	17	
BAM Attribut	e (20x20m plot)		
	Stratum	Sum	
	Tree (TG)	25.1	
	Shrub (SG)	31.6	
Count of cover	Forb (FG)	2.2	
abundance	Grass & grasslike (GG)	1.7	
(<u>native</u> vascular	Fern (EG)	0	
plants)	Other (OG)	0	
	TOTAL Native	60.6	
	TOTAL 'HTE'	0	
BAM Attribut	e (20 x 50m plot) Tree Stem Co	ounts	
DBH (cm)	Euc	Non Euc	Hollows
>80	1		1
50-79			
30-49		1	
20-29		9	
10-19		22	
5-9		35	
<5		19	N/A

8

	utes (1 x 1m	PIOLS		
	Tape length	% cover	Average %	Photos
Litter Cover	5m	5%		
	15m	2%		
	25m	1%	2.20%	
	35m	1%		
	45m	2%		
	5m	95%		
Para ground	15m	97%		
cover	25m	98%	97%	
	35m	99%		
	45m	98%		
-	5m	No		
gan	15m	0%		
ove	25m	0%	0%	
۲ ²	35m	0%		
0	45m	0%		
	5m	0%		
Rock Cover	15m	0%		
	25m	0%	0%	
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Length of logs (m)

Species recor	ded for	P1							
Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
Euca popu bimb	Eucalyptus populnea subsp. bimbil	Bimble Box	Myrtaceae	5	1		Tree (TG)	No	
Acac exce	Acacia excelsa	Ironwood	Fabaceae (Mimosoidea	20	20		Tree (TG)	FALSE	

Erem mitc	Eremophila mitchellii	Budda	Myoporaceae	25	20		Shrub (SG)	No	
Scle birc	Sclerolaena birchii	Galvinized Burr	Chenopodiaceae	1	100		Shrub (SG)	No	
Aris jeri	Aristida jerichoensis	Jericho Wiregrass	Poaceae	0.1	5		Grass & grasslike (GG)	No	
Eina nuta erem	Einadia nutans subsp. eremaea		Chenopodiaceae	0.5	200		Forb (FG)	No	
Apop anom	Apophyllum anomalum	Warrior Bush	Capparaceae	0.1	1		Shrub (SG)	No	
Mair	Maireana spp.	Cotton Bush, Bluebusl	Chenopodiaceae	0.5			Shrub (SG)	No	
Ente acic	Enteropogon acicularis	Curly Windmill Grass	Poaceae	1	100		Grass & grasslike (GG)	No	
Sida corr	Sida corrugata	Corrugated Sida	Malvaceae	0.5	300		Forb (FG)	No	
Sola	Solanum spp.		Solanaceae	0.1	50	*	Forb (FG)	No	
Port	Portulaca spp.		Portulacaceae	1	500	*	Forb (FG)	No	
Chry apic	Chrysocephalum apiculatum	Common Everlasting	Asteraceae	0.1	20		Forb (FG)	No	
Geij parv	Geijera parviflora	Wilga	Rutaceae	5			Shrub (SG)	No	
Enne	Enneapogon spp.	Nineawn Grass, Bottle	Poaceae	0.5	100		Grass & grasslike (GG)	No	
Call glau	Callitris glaucophylla	White Cypress Pine	Cupressaceae	0.1	1		Tree (TG)	No	
Erag brow	Eragrostis brownii	Brown's Lovegrass	Poaceae	0.1	20		Grass & grasslike (GG)	No	
Poa annu	Poa annua	Winter Grass	Poaceae	0.1	20	*		No	

APPENDIX C ANABAT RESULTS

Bat call analysis of sites near Nyngan, NSW, for NGH.

Site		Date	S.fl	M.pe	M.pl	M.ri	S.el	C.go	C.pi	N.sp	S.ba	S.gr	V.ba	V.vu	Total Passes
NW N	lyngan	26/02/2020	С	Р	C PO P C C P C P C 733					733					
KEY S.fl M.pe M.pl M.ri S.el C.go C.pi N.sp S.ba S.gr V.ba V.vu	Yellow-bellin Inland Free Southern Fr Southeaste Bristle-nose Gould's Wa Little Pied E Unidentified Inland Broad Little Broad Inland Fore Little Forest	ed Sheathtail tail Bat reetail Bat rn Freetail Bat ed Freetail Bat ttled Bat Bat I Long-eared B d-nosed Bat -nosed Bat st Bat	Bat		Austro Mormo Mormo Setiros Chalin Nyctoj Scotol Scotol Vespa	onomus opterus opterus stris ele olobus olobus ohilus s repens repens delus k delus v	austra peters planice ridei eryi gouldii picatus p. balstori greyii paversto rulturnu	lis i əps s i pckii							
Certai C	nty of Identific Confident	ation F	þ	Probab	le		Po	Po	ssible						



APPENDIX D EPBC ACT PROTECTED MATTERS SEARCH RESULTS

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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

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Summary Details Matters of NES Other Matters Protected by the EPBC Act Extra Information Caveat Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	9
Listed Migratory Species:	7

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 <u>permit</u> 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:	13
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:	None
Regional Forest Agreements:	None
Invasive Species:	20
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
<u>Riverland</u>	600 - 700km upstream
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream

Listed Threatened Ecological Communities

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
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community likely to occur within area
<u>Grey Box (Eucalyptus microcarpa) Grassy Woodlands</u> and Derived Native Grasslands of South-eastern	Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area

[Resource Information]

Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		

Name	Status	Type of Presence
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, N	<u>ISW and the ACT)</u>	
Koala (combined populations of Queensland, New	Vulnerable	Species or species habitat
South Wales and the Australian Capital Territory) [85104]		may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the	ne 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		
Motacilla flava		
Yellow Wagtail [644]		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
		may occur within area
Colidria formusinos		
Curlew Sandniner [856]	Critically Endangered	Species or species habitat
	Childany Endangered	may 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

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	

Name	Threatened	Type of Presence
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		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
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

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
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
		T (D
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Name	Status	Type of Presence
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis		
Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat

Plants

Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]

Lycium ferocissimum African Boxthorn, Boxthorn [19235]

Opuntia spp. Prickly Pears [82753]

Species or species habitat likely to occur within area

likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.47312 147.09104

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 E EPBC ACT HABITAT ASSESSMENT

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed from the EPBC Act Protected Matters Report.

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No further assessment would be necessary at this stage of the project.

Yes: The proposal could impact this species or its habitats. Further investigation into the likelihood and consequence of the impact of the proposal on these species would be considered under the EPBC Act for the EIS.

E.1 THREATENED ECOLOGICAL COMMUNITIES

Species	Habitat requirements	Presence Of habitat	Likelihood Of occurrence	Potential Impact
Threatened Ecologic	al Communities			
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions EPBC – E BC – E	Found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The structure of the community may vary from tall riparian woodlands to very open 'savanna like' grassy woodlands with a sparse midstorey of shrubs and saplings. Typically, these woodlands form mosaics with grasslands and wetlands, and are characterised by Coolibah (Eucalyptus coolabah) and, in some areas, Black Box (E. largiflorens). Other tree species may be present including River Cooba (Acacia stenophylla), Cooba (A. salicina), Belah (Casuarina cristata) and Eurah (Eremophila bignoniiflora).	Absent Characteristic tree species absent from the development site.	Unlikely Development site cleared. Presence eliminated during site survey.	No TEC not present.
Grey Box (<i>Eucalyptus</i> <i>microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South- eastern Australia EPBC- E	Generally, occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. The tree canopy is dominated (≥ 50% canopy crown cover) by <i>Eucalyptus microcarpa</i> (Grey Box). Widespread associated tree species that may be present include: <i>Allocasuarina luehmannii</i> (Bulloke), <i>Brachychiton populneus</i> (Kurrajong), <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Eucalyptus albens</i> (White Box), <i>E. camaldulensis</i> (River Red Gum), <i>E. conica</i> (Fuzzy Box), <i>E. leucoxylon</i> (Yellow Gum, SA Blue Gum), <i>E. melliodora</i> (Yellow Box) and <i>E. populnea</i> (Bimble Box, Poplar Box). The	Absent Characteristic tree species absent from the development site.	Unlikely Development site cleared. Presence eliminated during site survey.	No TEC not present.

Species	Habitat requirements	Presence Of habitat	Likelihood Of occurrence	Potential Impact
	ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.			
Poplar Box Grassy Woodland on Alluvial Plains EPBC – E	The Poplar Box Grassy Woodland typically has a tree canopy dominated by <i>Eucalyptus populnea</i> and understorey mostly of native grasses and other herbs. Itis found inland of the Great Dividing Range from southern NSW into central Queensland, mostly in gently undulating to flat landscapes. It now mainly occurs as scattered remnants on former and current floodplain country, mostly outside of national parks, although many important remnants are in in roadside reserves and travelling stock reserves/routes.	Present Alluvial soil landscape.	Unlikely Development site contains Poplar Box; however, vegetation does not meet key diagnostic characteristics (see Section 5.2).	No TEC not present.
Weeping Myall Woodlands EPBC – E	The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Queensland, with one small outlying patch in northern Victoria. Occurs in a range from open woodlands to woodlands, generally 4-12 m high, in which Weeping Myall (Acacia pendula) trees are the sole or dominant overstorey species Weeping Myall trees often occur in monotypic stands, however other vegetation may also occur in the ecological community, though not as dominant species. These include: Western Rosewood (Alectryon oleifolius subsp. elongatus); Poplar Box (Eucalyptus populnea); or Black Box (Eucalyptus largiflorens). Grey	Absent Characteristic tree species absent from the development site.	Unlikely Development site cleared. Presence eliminated during site survey.	No TEC not present.

Species	Habitat requirements	Presence Of habitat	Likelihood Of occurrence	Potential Impact
	Mistletoe (Amyema quandang) commonly occurs on the branches of Weeping Myall trees throughout the ecological community's range.			

E.2 FAUNA

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Aves				
Botaurus poiciloptilus Australasian Bittern EPBC – E BC - E	In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Occurs in permanent freshwater wetlands with tall, dense vegetation. Favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. <i>Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate. Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Absent No water bodies or riparian vegetation within development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Calidris ferruginea</i> Curlew Sandpiper EPBC – CE BC - E	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh. This species does not breed in Australia. This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.	Absent No water bodies or riparian vegetation within development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Grantiella picta</i> Painted Honeyeater BC – V EPBC – V	The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Present Some woodland present in road reserve. No mistletoes recorded.	Unlikely Within species known range, though no BioNet records within 10km.	No No specific breeding or foraging habitat would be impacted by the proposal.
<i>Leipoa ocellate</i> Malleefowl EPBC – V BC – E	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species.	Present Woodland within road reserve, but species prefers mallee.	Unlikely Minimal suitable habitat present	No No suitable habitat would be impacted by the proposal.
Pedionomous torquatus Plains-wanderer EPBC – CE BC – E	The vast majority (>99%) of records of Plains-wanderers in NSW over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east. Even within its western Riverina stronghold, the Plains-wanderer has a very patchy distribution. Surveys in the 1990s across 5,000km2 of the western Riverina covering 37 properties found only 5% of the total area comprised suitable habitat.	Absent No suitable understory within development site.	Unlikely Outside known distribution. No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Yarren Hut Solar Farm

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Polytelis swainsonii</i> Superb Parrot EPBC – V BC – V	The Superb Parrot is found throughout eastern inland NSW. On the South- western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Present Foraging or traversal only. No breeding habitat, HBT within road reserve not suitable.	Possible Two BioNet records within 10 km of development site.	Yes Small amount of foraging habitat only, such that an AoS is not recommended.
Rostratula australis Australian Painted Snipe BC – E EPBC – E IBRA Sub-region: Inland Slopes, Lower Slopes	They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Females, which are larger and more brightly coloured than males, are thought to sometimes be polyandrous, mating with several males and leaving each one to incubate and raise chicks. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water. Breeding is often in response to local conditions; generally, occurs from September to December.	Absent No water bodies or riparian vegetation within development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Mammals

Yarren Hut Solar Farm

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Nyctophilus corbeni Corben's Long- eared Bat, South- eastern Long-eared Bat EPBC – V BC - V IBRA Sub-region: Inland Slopes, Lower Slopes	Corben's Long-eared Bat occurs from the south eastern side of the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. The Species inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> 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. The species roosts in tree hollows, crevices, and under loose bark, and breeds in autumn with one or two young born in late spring to early summer.	Present Hollow-bearing tree present within development site but would not be impacted. Development site lacks typical foraging habitat.	Unlikely Study area within known distribution of species, however, <i>Nyctophilus</i> recorded on Anabat is unlikely to be this species.	No No suitable habitat would be impacted by the proposal.
Phascolarctos cinereus Koala BC - V EPBC - V IBRA Sub-region: Inland Slopes, Lower Slopes	Occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains.	Present Two secondary food trees present (Poplar Box)	Unlikely Feed trees present, however, no signs of Koala identified during targeted surveys.	Yes Limited to one Poplar Box (paddock tree). EPBC Koala habitat assessment revealed no critical habitat present, therefore, no AoS required.

Migratory Species

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Actitis hypoleucos Common Sandpiper EPBC - CE	This migratory wetland species is found along all Australian coastlines and many inland areas. They are active birds that will pursue invertebrates over rocks. Breeding habitat is mainly in Europe.	Absent No wetlands, mangroves or coastal landforms in study area.	Unlikely No suitable habitat in study area.	No No suitable habitat would be impacted by the proposal.
<i>Apus pacificus</i> Fork-tailed Swift EPBC – M	This migratory marine species is a non-breeding visitor to Australia and has been recorded in all regions of NSW. Found across a range of habitats from inland open plains to wooded areas. They are mainly exclusively aerial flying from < 1m to 300 m above ground.	Present Aerial species	Possible Development site within known distribution of species.	No Exclusively aerial species and not dependent on habitat in development site
<i>Ardea alba</i> Great Egret EPBC – M	Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Ardea ibis</i> Cattle Egret EPBC – M	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where	Absent No suitable water bodies or	Unlikely No suitable habitat present.	Νο

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	drainage is poor. Will also forage at garbage dumps and is often seen with cattle and other stock.	riparian vegetation within or adjacent to development site.		No suitable habitat would be impacted by the proposal.
<i>Calidris acuminate</i> Sharp-tailed Sandpiper EPBC - M	This migratory wetland species wades mud in estuarine habitats feeding on invertebrates. They are widespread throughout much of NSW but are sparse in the south-central and lower western regions. Breeding habitat is in Northern Siberia.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Calidris ferruginea</i> Curlew Sandpiper EPBC - M	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh. This species does not breed in Australia. This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Calidris melanotos</i> Pectoral Sandpiper EPBC - M	This species breeds in high-arctic tundra from the Yamal Peninsula eastwards to the Bearing Strait in Siberia and in arctic Alaska and Canada. It is known to migrate mostly through the USA and Mexico and spends most of its non- breeding months in South America. A small number of these birds are known to reach Australia and are believed to be concentrated in south-eastern Australia. This species prefers freshwater mudflats.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Chrysococcyx</i> <i>osculans</i> Black-eared Cuckoo EPBC – M	The Black-eared Cuckoo is found in drier country where species such as mulga and mallee form open woodlands and shrublands. It is often found in vegetation along creek beds.	Absent No riparian woodland or suitable shrubs within development site.	Unlikely Outside known distribution. No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Gallinago hardwickii</i> Latham's Snipe, Japanese Snipe EPBC - M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's Snipe does not breed within Australia.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Haliaeetus leucogaster White-bellied Sea Eagle EPBC – M	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts.' Nests are large structures built from sticks and lined with leaves or grass.	Absent No forest or woodland with large trees within development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
<i>Merops ornatus</i> Rainbow Bee-eater EPBC - M	Rainbow Bee-eaters are most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. They will be found on farmland with remnant vegetation and in orchards and vineyards. They will use disturbed sites such as quarries, cuttings and mines to build nesting tunnels.	Absent No suitable vegetation present within development site. No breeding habitat.	Unlikely No suitable habitat present. May use paddock trees for traversal.	No suitable habitat would be impacted by the proposal.
<i>Motacilla flava</i> Yellow Wagtail EPBC - M	This migratory terrestrial species migrates from Africa to Australia in summer and breeds in Europe. Foraging habitat in Australia comprises mostly well- watered open grasslands and the fringes of Wetlands. Roosts in Mangroves and other dense vegetation.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Rostratula benghalensis Greater Painted Snipe EPBC – M	Usually found close to the fringes of reed beds along shorelines of marshes, swamps, ponds and streams. Solitary or in pairs, sometimes in groups of up to 12. Rather shy and retiring, skulking close to the vegetation so that it can retreat to cover if disturbed.	Absent No suitable water bodies or riparian vegetation within or adjacent to development site.	Unlikely No suitable habitat present.	No No suitable habitat would be impacted by the proposal.
CE BC = listed as Critic CE EPBC = listed as Cr	ally Endangered under Schedule 1 of the NSW Biodiversity Conservation Act 2016 itically Endangered under the Commonwealth Environment Protection & Biodiversity	CAMBA = Chinese-Australia Migratory Bird Agreement JAMBA = Japan-Australia Migratory Bird Agreement		
Conservation Act 1999. E BC = listed as Endangered under Schedule 1 of the NSW <i>Biodiversity Conservation Act 2016</i> E EPBC = listed as Endangered under the Commonwealth <i>Environment Protection & Biodiversity Conservation</i> <i>Act 1999</i>				
V BC = listed as Vulnera	able under Schedule 1 of the NSW Biodiversity Conservation Act 2016			
V EPBC = listed as Vulr Act 1999.	nerable under the Commonwealth Environment Protection & Biodiversity Conservation			
M EPBC = listed as Mig Act 1999.	ratory under the Commonwealth Environment Protection & Biodiversity Conservation			
CE FM = listed as Critic	ally Endangered under Schedule 4A of the NSW Fisheries Management Act 1994.			
E FM = listed as Endang	gered under Schedule 4 of the NSW Fisheries Management Act 1994.			
V FM = listed as Vulnera	able under Schedule 5 of the NSW Fisheries Management Act 1994.			

APPENDIX F BAM ECOSYSTEM CREDIT REPORT



BAM Credit Summary Report

Proposal Details

Zone	Vegetation zone	Vegetation	Area (ha)	Constant	Species sensitivity to gain class (for	Biodiversity risk	Potential SAII	Ecosystem
Ecosys	stem credits for J	olant communi	ties types (PCT), ecol	ogical communities & threatened s	pecies habitat		-
				* D the wit	isclaimer: BAM data last updated may indi BAM calculator database. BAM calculator h Bionet.	icate either compl database may no	ete or partial up ot be completely	odate of aligned
3				Ma	jor Projects			
Assessr	nent Revision			Ass	essment Type			
				Ор	en		To be finalised	
Assesso	or Number			BA	M Case Status		Date Finalised	
				11/	06/2020		27	
Assesso	or Name			Rep	port Created		BAM Data vers	sion *
000191	74/BAAS18155/20/	00019175		Yar	ren Hut Solar Farm		04/06/2020	
Assessr	nent Id			Pro	posal Name		BAM data last	updated *

Zone	Vegetation zone	Vegetation	Area (ha)	Constant	Species sensitivity to gain class (for	Biodiversity risk	Potential SAII	Ecosystem
	name	integrity loss /			BRW)	weighting		credits
		gain						

Assessment Id

Proposal Name

00019174/BAAS18155/20/00019175



BAM Credit Summary Report

Poplar Box - White Cypre Belt South Bioregion	ss Pine - Wilga -	Ironwood sh	rubby woodland on red sandy-loam so	oils in the Darling Riverine F	Plains Bioregio	n and Brigalow
1 98_Roadside	20.3	0.1	0.25 High Sensitivity to Potential C	Gain 1.50		1
					Subtotal	1
					Total	1

Species credits for threatened species

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

Proposal Name

00019174/BAAS18155/20/00019175

Yarren Hut Solar Farm

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APPENDIX G BAM PADDOCK TREE CREDIT REPORT



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019174/BAAS18155/20/00019446	Yarren Hut Solar Farm	26/11/2019
Assessor Name	Report Created 11/06/2020	BAM Data version * 22
Assessor Number	BAM Case Status Open	Date Finalised To be finalised
Assessment Revision 1	Assessment Type Paddock Trees	

* 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			
98-Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soil in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion						
3	False	1.0	1			
			1			
			1			

00019174/BAAS18155/20/00019446