



**NGH**



# **BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT**

**Yarren Hut Solar Farm**

**November 2020**

**Project Number: 19-754**



# DOCUMENT VERIFICATION

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**Certification**

For submission of a Biodiversity Development Assessment Report for a development proposal assessed under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979*.

**EIS prepared by:** NGH Pty Ltd

**Applicant:** BayWa r.e. Projects Australia Pty Ltd

**Proposed development:**

The Yarren Hut Solar Farm proposal includes the construction, operation and decommissioning of a photovoltaic solar farm that would produce up to 28 Megawatts (MW) of alternating current (AC) electricity. Associated infrastructure includes a substation, staff amenities, internal access tracks and fencing.

**Land to be developed:**

Lot 21 DP 704061

**Certification:**

I certify that I have prepared the contents of this Biodiversity Development Assessment Report in accordance with the *Biodiversity Assessment Method 2000*. To the best of my knowledge, this assessment contains all available information that is relevant to the biodiversity assessment of the project and that information is neither false nor misleading.

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## ACRONYMS AND ABBREVIATIONS

AC	Alternating current
AEP	annual exceedance probability
BAM	Biodiversity Assessment Methodology
BAM-C	BAM Calculator
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
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	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
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	<i>Local Land Services Act 2016</i> (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
SAIL	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 sandy-loam 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 EPBC 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. One species credit species Bristle-nosed Free-tailed Bat was detected, although it does not have habitat that will be directly impacted and thus does not generate credits.

The proposal generated two species credit species, one for Major Mitchell Cockatoo and one for Shrub Sida.

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.

# 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.



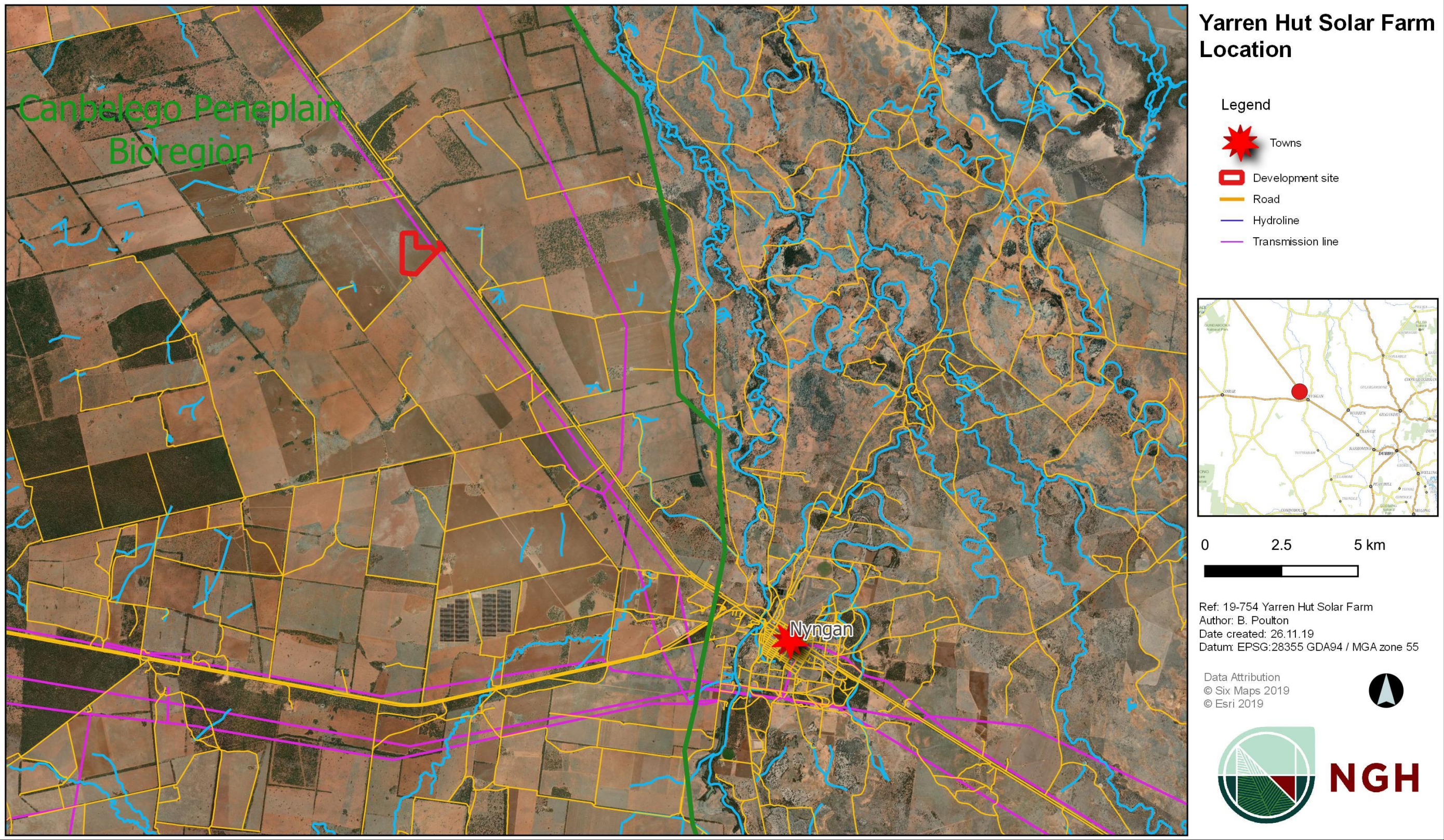


Figure 1-1 Location of the development site



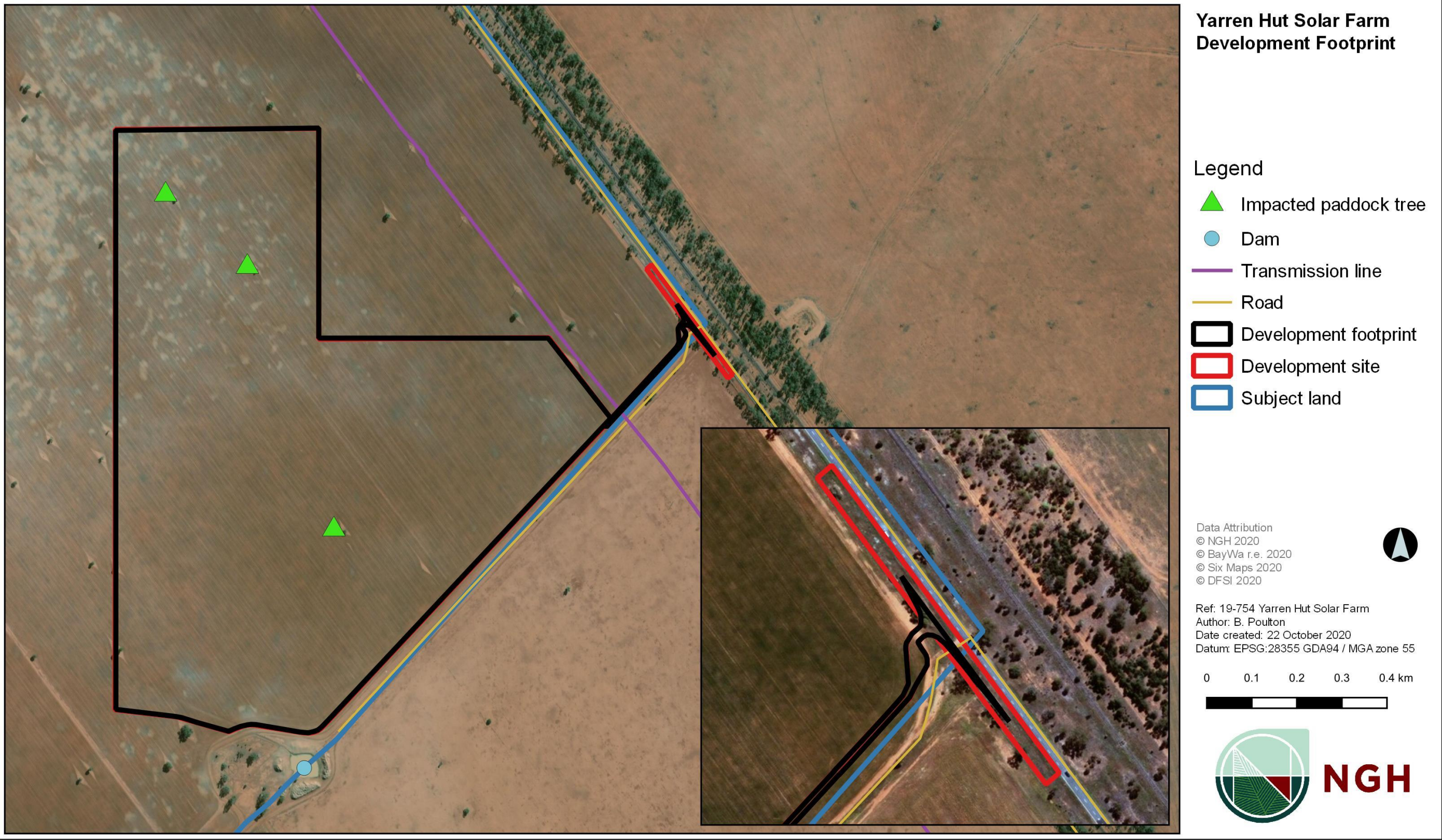


Figure 1-2 Proposed development footprint



### **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  
<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- 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  
(<http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>).
- NSW OEH's BioNet threatened biodiversity database Accessed online via login at <http://www.bionet.nsw.gov.au/>.
- NSW OEH Threatened Species Profiles  
<http://www.environment.nsw.gov.au/threatenedSpeciesApp/> and  
[www.environment.nsw.gov.au/AtlasApp/UI\\_Modules/](http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/).
- OEH BioNet Vegetation Classification Database (OEH 2017) Accessed online via login at <http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>.
- OEH VIS Mapping Accessed online at <http://www.environment.nsw.gov.au/research/VISmap.htm>.
- 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](https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU).
- NSW Biodiversity Values Map  
<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>.

## 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).



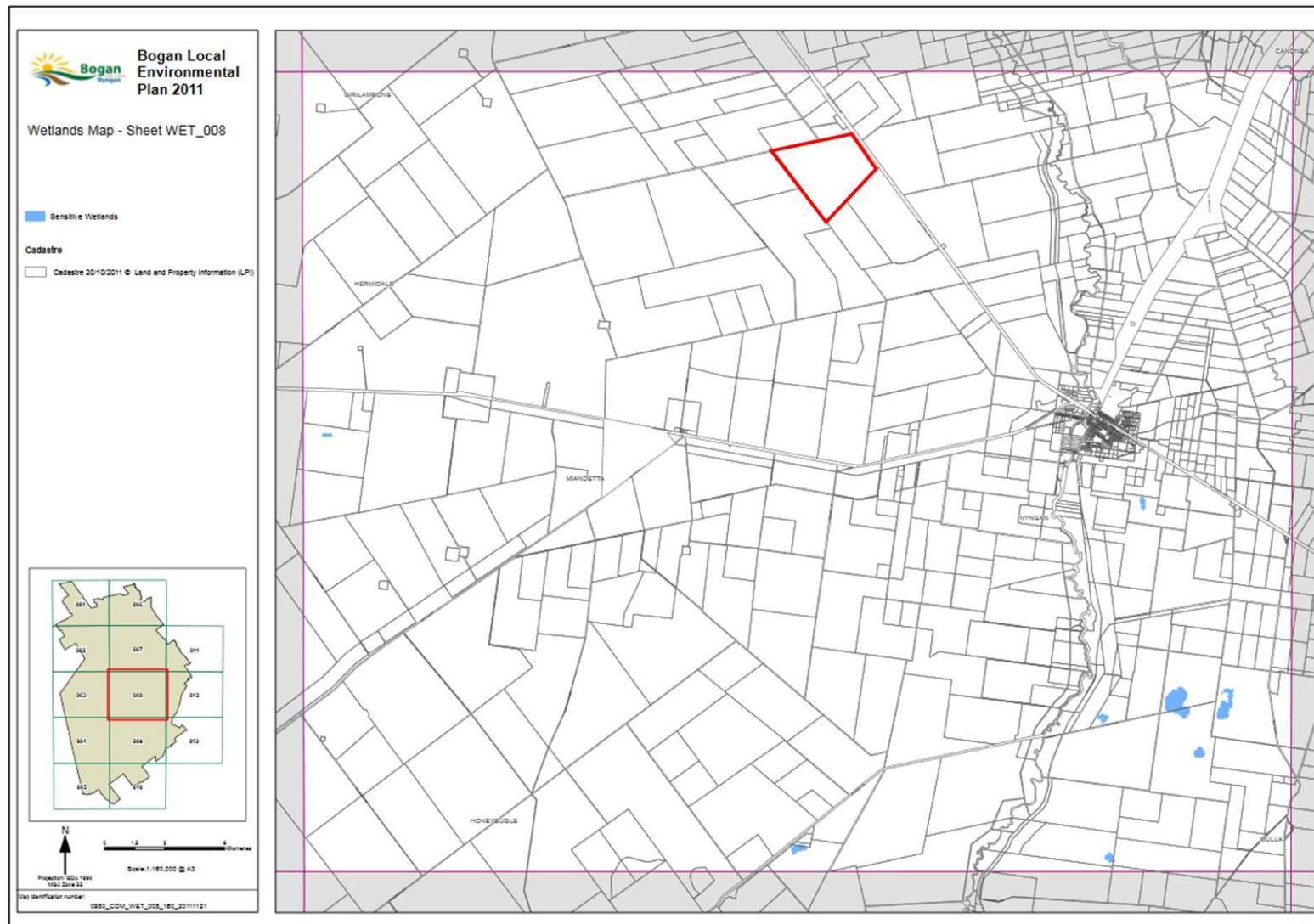


Figure 2-3 Wetlands identified in the Bogan LEP (Lot, 21 DP 704061 outlined in red)

## **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).



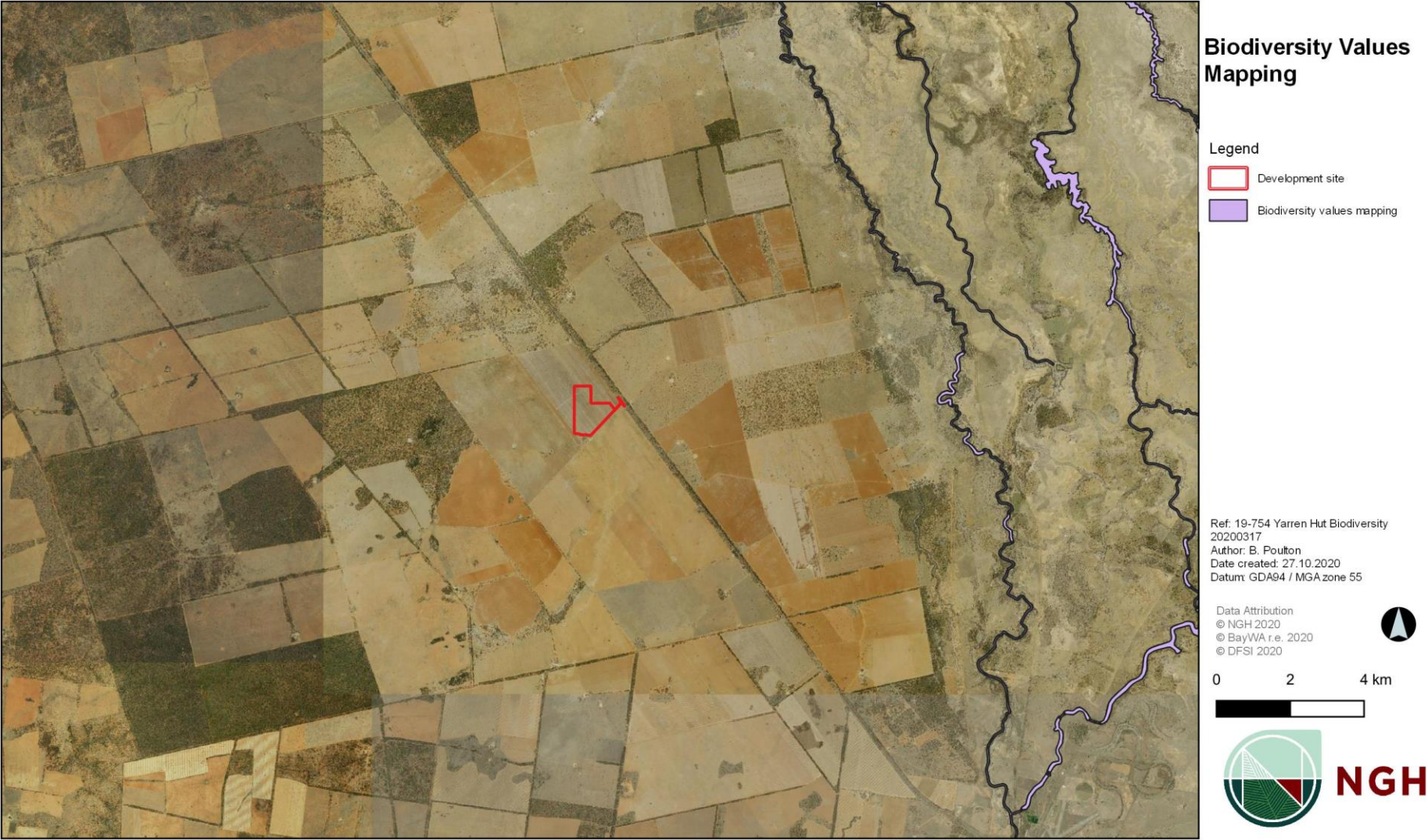


Figure 2-4 Areas listed as high biodiversity value (development site outlined in red)

## **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 3-5). 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 (shown in Figure 3-1). Native vegetation in the roadsideOne hollow-bearing tree (HBT) is present within this area (as shown in Figure 3-2). Roadside vegetation looking north west showing hollow bearing tree.



Figure 3-1. Native vegetation in the roadside



Figure 3-2. Roadside vegetation looking north west showing hollow bearing tree.

### **3.2. EXOTIC VEGETATION**

Approximately 92 ha of the development site occurs as cleared agricultural land used for cropping (Figure 3-3 and Figure 3-4). These areas, at the time of assessment, contained no extent vegetation other than the paddock trees described above (shown on Figure 3-5). 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.





Figure 3-3. Access point on Mitchell Highway looking west across development site that has been previously cropped.



Figure 3-4 Example of cropping within the development site showing paddock trees

### **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 3-5 Native vegetation extent within the development site



### **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 accredited 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 3-8). 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, intermittently, 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.

Table 3-1 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

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		
<b>Vegetation formation</b>	Semi-arid woodlands (shrubby sub-formation)	
<b>Vegetation class</b>	Western Peneplain Woodlands	
<b>Vegetation type</b>	<b>PCT ID</b>	98
	<b>Common Community Name</b>	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
<b>Approximate extent within the development site</b>	0.54 ha of this PCT occurs within the road reserve portion of the development site. 0.08 ha occurs within the Development footprint. 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.	
<b>Species relied upon for PCT identification</b>	<b>Species name</b>	<b>Relative cover</b>
	Poplar Box <i>Eucalyptus populnea</i> subsp <i>bimbil</i>	5%
	Ironwood <i>Acacia excelsa</i>	20%
	Budda <i>Eremophila mitchellii</i>	25%
	Wilga <i>Geijera parviflora</i>	5
	White Cypress Pine <i>Callitris glaucophylla</i>	<1%
<b>Justification of evidence used to identify the PCT</b>	This PCT was identified with a canopy of Poplar Box and tall shrubs/trees layer including Ironwood, Budda and Wilga. White Cypress occurred minimally within the BAM plot but was widely distributed in neighbouring sections of the road reserve. Of the likely PCTs present based on relevant vegetation mapping, PCT 98 has the highest affinity with the species recorded and as such was chosen as the most likely PCT present.	
<b>Threatened ecological community (TEC) Status</b>	Not listed under either the BC Act or EPBC Act.	
<b>Estimate of percent cleared in NSW</b>	40%	

**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**

**Examples**



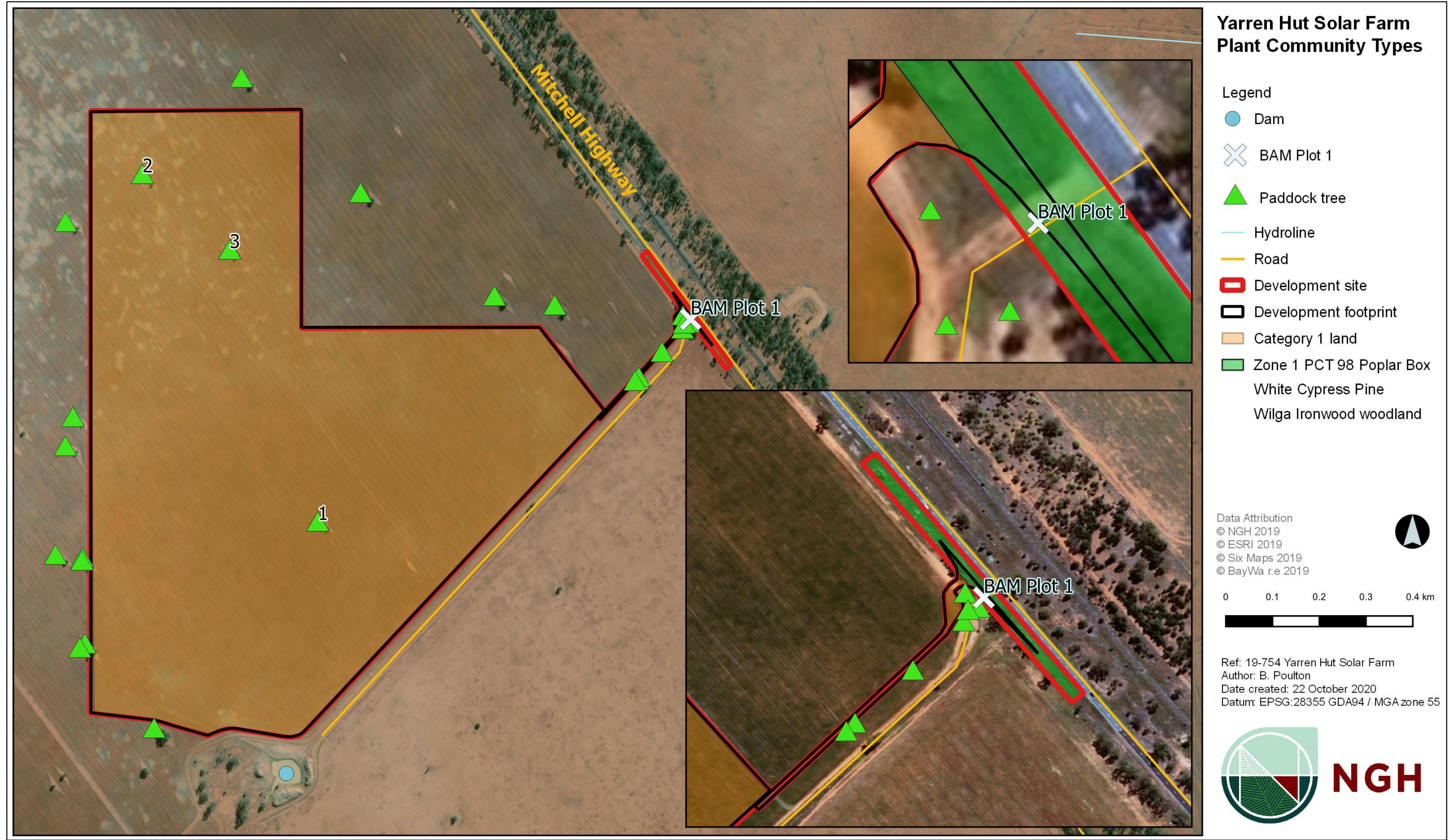
Figure 3-6 PCT 98 present within the road reserve portion of the development site.

**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**



Figure 3-7 Ironwood paddock tree present within the development site.







### **3.5. VEGETATION INTEGRITY ASSESSMENT**


#### **3.5.1. Vegetation zones and survey effort**

From the site survey, (27 February 2020) there was one PCT on site located in the road reserve on the Mitchell Highway. Approximately 150 metres either side of the proposed access point on Mitchell Highway was surveyed on foot to determine the PCT and the vegetation condition. PCT 98 was identified as part of the development site in one condition state and therefore one vegetation zone. Vegetation Zone 1 covers 0.54 hectares. 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 3-9.

Vegetation Zone One was mapped in the field using a handheld geographical information system (GIS) Tablet using QField. The BAM plot was set out and completed as per the BAM under the BC Act by an accredited assessor. The BAM plot requires a 20 x 50 metre quadrat with a 20x20 metre floristics plot within the larger plot, however as this site is linear a 10 x 100 metre plot was conducted with 10 x 40 metre floristic plot. The BAM plot included one hollow bearing tree, however this tree is not within the Development footprint. Species were identified to genus and species where possible.

The BAM plot data results and photographs are included in Appendix B.

Table 3-2 Vegetation zones within the development site

Zone ID	PCT ID	Stratification condition unit /	Area in development site (ha)	Area in development footprint (ha)	Survey effort (# plots)	Patch size (ha)	Example
1	98	<b>Woodland</b> 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	



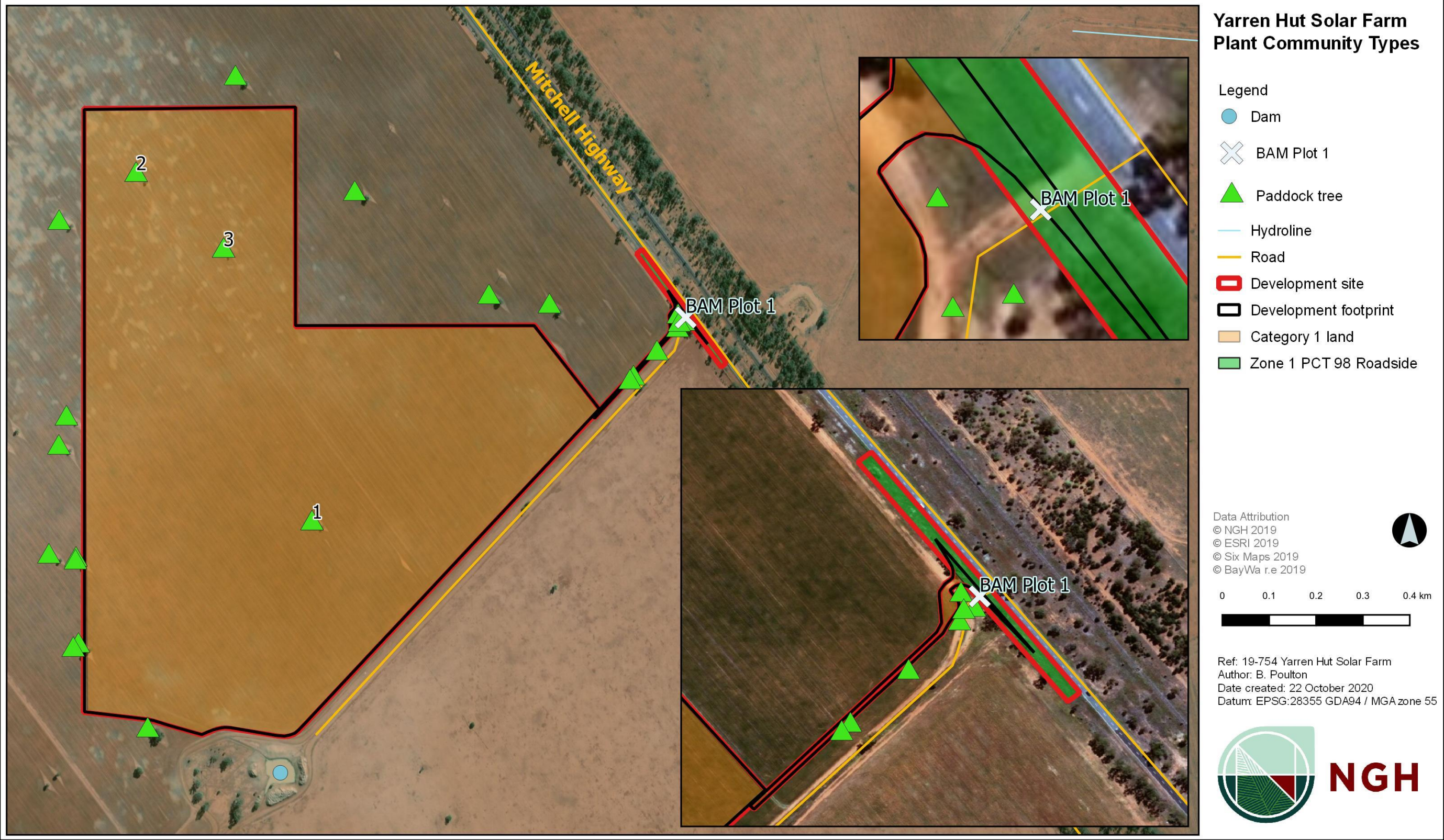


Figure 3-9 Vegetation zones, paddock tree IDs and one BAM plot location at the development site




### 3.5.2. Paddock trees



There are three paddock trees (1-3) within the development site and development footprint (see Figure 3-9): 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 3-9.

Table 3-3 Paddock trees present within the development site

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

Tree ID	Class	Species	DBH (cm)	PCT	Hollows	Photo
2	1	Poplar Box <i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	18	98	No	
3	1	Poplar Box <i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	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 vegetation zone 1 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	<b>78.1</b>

## 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 <i>Hamirostra melanosternon</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
Brolga <i>Grus rubicunda</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
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 <i>Artamus cyanopterus cyanopterus</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

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) <i>Pomatostomus temporalis temporalis</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
Hooded Robin (South-eastern form) <i>Melanodryas cucullata 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 <i>Antechinomys laniger</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
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 <i>Grantiella picta</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
Pied Honeyeater <i>Certhionyx variegatus</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
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 <i>Daphoenositta chrysoptera</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
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

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Yellow-bellied Sheath-tail Bat <i>Saccolaimus flaviventris</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

#### 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 restrictions <sup>1</sup>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
<b>Fauna</b>							
Barking Owl <i>Ninox connivens</i> (Breeding)	From land clearing over the last century, the Barking Owl habitat is reduced to linear riparian strips of remnant trees (OEH 2020). For breeding the Barking Owl requires 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 absent in development footprint. Adjacent hollow bearing tree has small and medium hollows which are not large enough for this species.	Excluded	Habitat constraints not present
Black-breasted Buzzard <i>Hamirostra 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



Credit species	Habitat and geographic restrictions <sub>1</sub>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
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 <i>Burhinus grallarius</i>	Habitat requirements are ground cover (<15cm in height), fallen timber and leaf litter, lack of shrubs and open woodlands (DEC 2006). Known to occur in IBRA sub-region along the Bogan River (DEC 2006).	High	Endangered	Not listed	Lack of fallen/standing dead timber including logs in development footprint.	Excluded	Habitat constraints not present
Koala <i>Phascolarctos 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 morphnoides</i> (Breeding)	Found in open eucalypt forest, woodland or open woodlands. Little eagle builds a large stick nest in winter in tall living trees within a patch of native vegetation, Paddock trees also provide important breeding habitat.	Moderate	Vulnerable	Not listed	One Class 3 and two Class 2 paddock trees present, however, both trees are small	Excluded	Habitat constraints not present

Credit species	Habitat and geographic restrictions <sub>1</sub>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
					(<10m) and unlikely to be utilised by the species		
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> (Breeding)	Found in a treed and treeless inland habitats that are close to water throughout the arid and semi-arid areas of NSW (OEH 2017). For breeding the Major Mitchell requires 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. Adjacent hollow bearing tree has 8 medium hollows	Included	Habitat constraints present in adjacent road reserve (outside of development footprint)
Masked Owl <i>Tyto novaehollandiae</i> (Breeding)	The Masked Owl distribution in NSW extends from the coast to the western plains (OEH 2017) The population numbers are higher towards the east coast and the species can be found in dry eucalypt forests and woodlands from sea level to 1100 m (OEH 2017). For breeding the Masked Owl requires living or dead trees with hollows greater than 20 cm diameter.	High	Vulnerable	Not listed	No suitable hollow bearing trees in development footprint. Adjacent hollow bearing tree has small and medium hollows which are not large enough for this species.	Excluded	Habitat constraints not present

Credit species	Habitat and geographic restrictions <sub>1</sub>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
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) <i>Geophaps scripta scripta</i>	Ground dwelling species that nests on the ground (OEH 2019). Prefers 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 (OEH 2019). Predicted to occur in IBRA subregion (OEH 2019). Predicted Population distribution shows it is likely to be further north between Bourke and	High	Critically Endangered	Vulnerable	Outside of predicted geographical range. Very few records in NSW (NPWS 1999).	Excluded	Habitat in road reserve which is degraded and unsuitable.



Credit species	Habitat and geographic restrictions <sub>1</sub>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	Moree and scattered north of Broken Hill (NPWS 1999).						
Superb Parrot <i>Polytelis swainsonii</i> (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 and height above the ground.	Excluded	Habitat constraints not present
White-bellied Sea-Eagle <i>Haliaeetus 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 viable foraging resource, such as	Excluded	Habitat constraints not present

Credit species	Habitat and geographic restrictions <sub>1</sub>	Sensitivity to gain class	NSW listing status	National listing status	Habitat Constraints and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
					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 locally abundant and is often more common in disturbed sites.	High	Endangered	Not listed	Potential habitat present within Zone 1. Species can inhabit disturbed areas and has been found along roadsides in NSW.	Included	Potential habitat present. Survey required.
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#### 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.

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

Species credit species	Biodiversity risk rating	Survey period	Assumed to occur/survey/expert report	Present on site?	Species polygon area
<b>Fauna</b>					
Bristle-faced Free-tailed Bat <i>Setirostris eleryi</i>	2	Oct-Mar	Surveyed Feb 2020	No	500 m radius, outside of the development footprint
Koala <i>Phascolarctos cinereus</i> (Breeding)	2	All year	Surveyed Feb 2020	No	NA
Major Mitchell's Cockatoo <i>(Lophochroa leadbeateri)</i>	2	Sept-Dec	Assumed Presence	No	0.0077 hectares within the development footprint.
<b>Flora</b>					
Shrub Sida <i>Sida rohlenae</i>	2	Sep-Feb	Surveyed Feb 2020, drought conditions	No	0.08 hectares within the



Species credit species	Biodiversity risk rating	Survey period	Assumed to occur/survey/expert report	Present on site?	Species polygon area
			therefore assumed presence		development footprint

### 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.

Table 4-4 Weather conditions during target surveys

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

#### Major Mitchell Cockatoo

No survey effort was carried out for Major Mitchell. The Major Mitchell has assumed presence due the surveys being conducted outside of the required survey period (September-December). The species polygon for the area that will be impacted is 0.0077 hectares of PCT 98 vegetation zone 1. This is shown in Figure 4-1 Species credit species targeted survey locations and threatened species polygons. The hollows present within the development site are considered of suitable size for Major Mitchell Cockatoo.

#### 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, Bristle-faced 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 radius 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

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 the Mitchell Hwy Approximately 150 metres either side of the proposed access was surveyed. A total length of 300 metres with a 10 m wide transect was 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.

The flora survey area is shown in Figure 4-1 Species credit species targeted survey locations and threatened species polygons

### SURVEY RESULTS

No Shrub Sida were detected within the surveyed area.

Limitations - sub-optimal conditions.

Although the Shrub Sida was not detected during the February 2020 survey, the species is assumed to be present due to the prolonged drought. It is possible the Shrub Sida could be present and therefore assumed presence has been included in the BAM\_C. The species polygon for the area that will be impacted is 0.08 hectares of PCT 98 vegetation zone 1. This is shown in Figure 4-1 Species credit species targeted survey locations and threatened species polygons.





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.
- Avoid impacts to roadside vegetation (PCT 98) by avoiding trees, shrubs logs and utilising existing access points.
- Avoid the hollow bearing tree in the road reserve
- 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.
- 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.



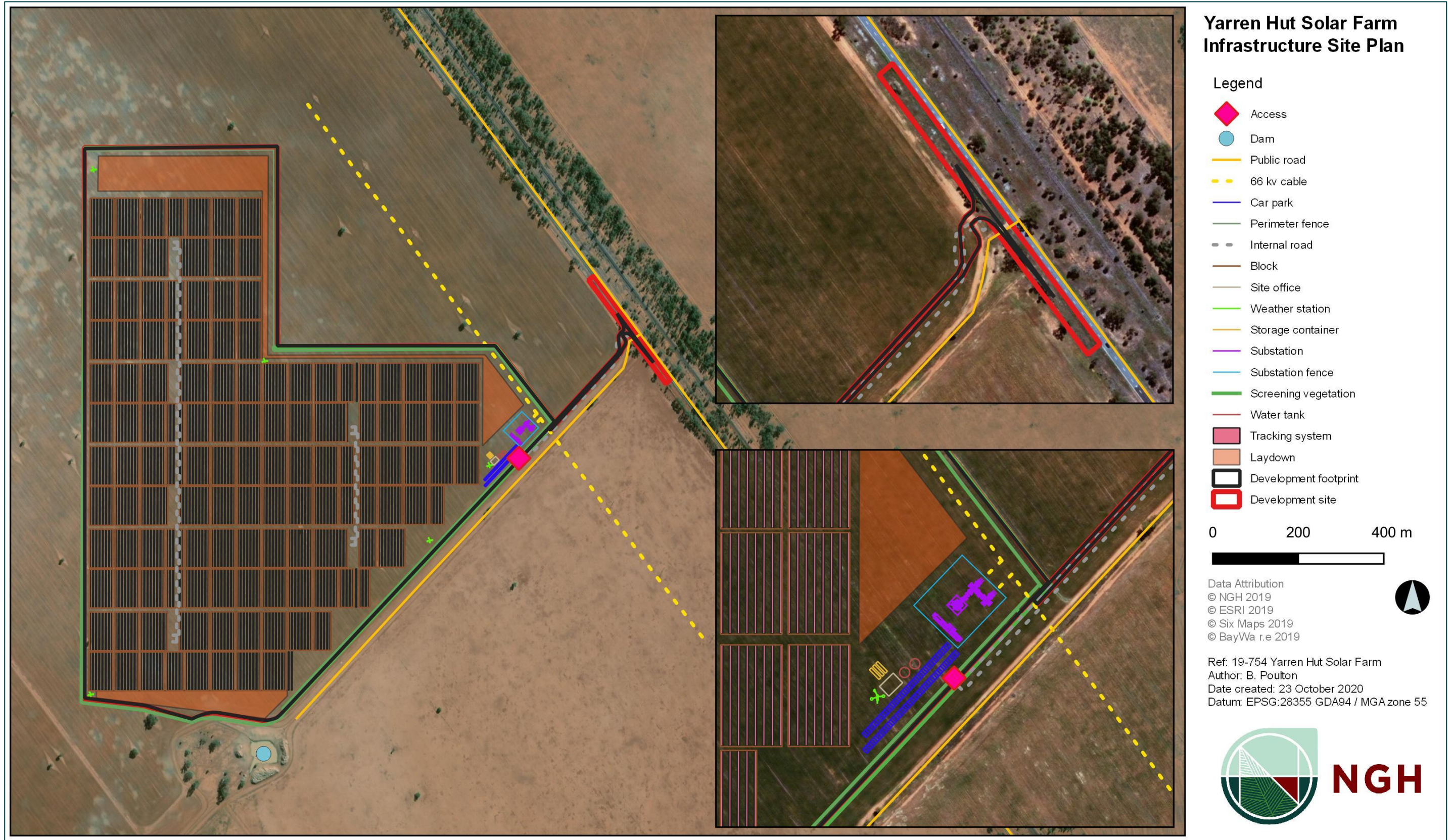


Figure 6-1 Final project layout



## **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 in 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.

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.

Table 7-1 Potential impacts on biodiversity during the construction and operational phases

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	<ul style="list-style-type: none"> <li>• Direct loss of native flora and fauna habitat</li> <li>• Potential over-clearing of habitat outside proposed development footprint</li> <li>• Injury and mortality of fauna during clearing of fauna habitat and habitat trees</li> </ul>
Removal of paddock trees	Three trees	Once	Construction Phase: Short Term	<ul style="list-style-type: none"> <li>• Injury and mortality of fauna during clearing of fauna habitat and habitat trees</li> <li>• Direct Loss of native flora and fauna habitat</li> </ul>
Displacement of resident fauna	Unknown	Regular	Construction & Operation Phase: Long Term	<ul style="list-style-type: none"> <li>• Direct loss of native fauna</li> <li>• Decline in local fauna populations</li> </ul>
Injury or death of fauna	Unknown	Regular	Construction Phase: Short Term	<ul style="list-style-type: none"> <li>• Direct loss of native fauna</li> <li>• Decline in local fauna populations</li> </ul>
Shading by solar infrastructure	51 ha (70% of solar array)	Regular	Operational Phase: Long-term	<ul style="list-style-type: none"> <li>• Modification of native fauna habitat</li> <li>• Potential loss of groundcover resulting in unstable ground surfaces and sedimentation of adjacent waterways.</li> </ul>
Existence of permanent solar infrastructure	Total 76 ha (73 ha Solar array)	Regular	Operational Phase: long-term	<ul style="list-style-type: none"> <li>• Modification of habitat beneath array</li> <li>• Reduced fauna movements across landscape due to fencing</li> </ul>



Nature of impact	Extent	Frequency	Duration and timing	Consequence
(Fencing, array infrastructure).				<ul style="list-style-type: none"> <li>Collision risks to birds and microbats (fencing).</li> </ul>

### 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 vegetation zone 1 within the development site

Zone ID	PCT	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
<b>TOTAL:</b>			<b>3</b>

### 7.1.3. Loss of species credit species habitat or individuals

As detailed in Section 4.2, Major Mitchell, Koala, Bristle-faced Free-tailed Bat and Shrub Sida were the only species credit species considered to have potential habitat within the development site. The Koala, Bristle-faced Free-tailed Bat and Shrub Sida 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.

Major Mitchell and Shrub Sida are assumed presence in the roadside vegetation

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.

There is a hollow bearing tree in the vegetation Zone 1 Mitchell Highway road reserve that will not be impacted and thus it has been excluded from the development footprint. No roadside trees and shrubs will be impacted from the entrance upgrade.

## **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 timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
<b>Indirect impacts (those listed below are included in the BAM)</b>					
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Phase: Short-term	<ul style="list-style-type: none"> <li>• Koala</li> <li>• Superb Parrot (foraging)</li> <li>• Bristle-faced Free-tailed Bat (foraging)</li> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• Minor direct loss of native flora and fauna habitat</li> <li>• Low potential for injury and mortality of fauna during clearing of fauna habitat and habitat trees</li> <li>• Minor disturbance to stags, fallen timber, and bush rock</li> <li>• Increased edge effects</li> </ul> <p>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</p>
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operational Phase: Long-term	<ul style="list-style-type: none"> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> <li>• Koala</li> <li>• Bristle-faced Free-tailed Bat (foraging)</li> <li>• Superb Parrot (foraging)</li> </ul>	<ul style="list-style-type: none"> <li>• Minor loss of native flora and fauna habitat</li> </ul> <p>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</p>



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	<ul style="list-style-type: none"> <li>• Koala</li> <li>• Superb Parrot (foraging)</li> <li>• Bristle-faced Free-tailed Bat (foraging)</li> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• May alter fauna activities and/or movements</li> <li>• Minor loss of foraging or breeding habitat</li> </ul> <p>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</p>
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	<ul style="list-style-type: none"> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• Minor loss of native flora and fauna habitat.</li> </ul> <p>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</p>
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction & Operational Phase: Long-term	<ul style="list-style-type: none"> <li>• Koala</li> <li>• Superb Parrot (foraging)</li> <li>• Bristle-faced Free-tailed Bat (foraging)</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of foraging habitat</li> </ul>
Rubbish dumping	Unknown	Regular	Construction & Operational Phase: Long term	<ul style="list-style-type: none"> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• Degradation of potential habitat</li> </ul>

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Earthworks mobilisation and of sediments	Unknown	Regular	Construction phase: Short term	<ul style="list-style-type: none"> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion and sedimentation and/or pollution of soils, dams and downstream habitats.</li> <li>• Potential loss of ground cover resulting in unstable ground surfaces and sedimentation of adjacent waterways.</li> </ul>
Increase risk of fire	Unknown	Regular	Operational Phase: Long term	<ul style="list-style-type: none"> <li>• Koala</li> <li>• Bristle-faced Free-tailed Bat (foraging)</li> <li>• Superb Parrot (foraging)</li> <li>• PCT 98 Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland</li> </ul>	<ul style="list-style-type: none"> <li>• Slight increase in the unlikely event component failure or damage results in a bushfire resulting in biodiversity impacts</li> </ul>







### **7.3. PRESCRIBED 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 increase 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 threatened 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.

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

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	

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, <b>OR</b> 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 <b>contiguous landscape</b> < 1000 ha, but ≥ 500 ha.	
	0 (low)	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	



Attribute	Score	Inland	Applicable to the proposal?
		score 1 or 2 for koala occurrence, <b>OR</b> 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, <b>OR</b> 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
<b>Total</b>	<b>2</b>	<b>Decision: Habitat not critical to the survival of the Koala—assessment of significance not required</b>	

#### 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, after prolonged drought 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-bearing 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. One hollow bearing tree was detected within the development site, information regarding this HBT is provided in Appendix H.

## **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 consequences and of residual impacts
<b>Displacement of resident fauna through vegetation clearing and habitat removal</b>						
Time works to avoid critical life cycle events.	<ul style="list-style-type: none"> <li>If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur.</li> </ul>	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.	<ul style="list-style-type: none"> <li>Pre-clearing checklist.</li> <li>Tree clearing procedure.</li> </ul>	Construction.	Regular.	Contractor.	Moderate.	Species not detected during pre-clearing surveys may be impacted.
<b>Indirect impacts on native vegetation and habitat</b>						
Clearing protocols that identify vegetation to be retained, prevent	<ul style="list-style-type: none"> <li>Approved clearing limits to be clearly delineated with temporary</li> </ul>	Construction.	Regular.	Contractor.	Low.	Clearing may exceed what has been assessed and approved.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk of consequences and of residual impacts
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.	<ul style="list-style-type: none"> <li>fencing or similar prior to construction commencing.</li> <li>No stockpiling or storage within dripline of any mature trees.</li> <li>In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance.</li> </ul>					
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.	<ul style="list-style-type: none"> <li>A Construction Environmental Management Plan would include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.</li> </ul>	Construction.	Regular.	Contractor.	Low.	None.
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill.	<ul style="list-style-type: none"> <li>Avoid night works.</li> <li>Direct lights away from vegetation.</li> </ul>	Construction/Operation.	Regular.	Contractor.	Low.	None.

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



Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk of consequences and residual impacts
	<ul style="list-style-type: none"> <li>○ Weed hygiene protocol in relation to plant, machinery, and fill.</li> <li>• The weed management procedure would be incorporated into the Biodiversity Management Plan.</li> </ul>					
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.	<ul style="list-style-type: none"> <li>• Site induction.</li> <li>• Toolbox talks.</li> </ul>	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.	<ul style="list-style-type: none"> <li>• Preparation of a Biodiversity Management Plan that would include protocols for: <ul style="list-style-type: none"> <li>○ Protection of native vegetation to be retained.</li> <li>○ Best practice removal and disposal of vegetation.</li> <li>○ Weed management.</li> <li>○ Pest animal management</li> <li>○ Unexpected threatened species finds.</li> <li>○ Exclusion of vehicles through sensitive areas.</li> </ul> </li> </ul>	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 consequences and of residual impacts
	<ul style="list-style-type: none"> <li>Rehabilitation of disturbed areas.</li> </ul>					
<b>Prescribed biodiversity impacts</b>						
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	<ul style="list-style-type: none"> <li>Pre-clearing checklist</li> <li>Tree clearing procedure</li> <li>Staged habitat removal</li> <li>Unexpected threatened species finds procedure</li> </ul>	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.	<ul style="list-style-type: none"> <li>Screening and landscaping plantings to be comprised of local indigenous species representative of the vegetation in the development site.</li> </ul>	Operation.	Regular.	Client.	Moderate.	Plants not surviving.
Sediment barriers and spill management procedures to control	<ul style="list-style-type: none"> <li>An erosion and sediment control plan would be prepared in</li> </ul>	Construction.	Regular.	Contractor.	Moderate.	Impacts may occur to waterway if erosion and

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk consequences and of residual impacts
the quality of water runoff released from the site into the receiving environment.	<ul style="list-style-type: none"> <li>conjunction with the final design and implemented.</li> <li>Spill management procedures would be implemented.</li> </ul>					sedimentation control plan not implemented.
Staff training and site briefing to communicate impacts of traffic strikes on native fauna.	<ul style="list-style-type: none"> <li>Awareness training during site inductions regarding enforcing site speed limits.</li> <li>Site speed limits to be enforced to minimise fauna strike.</li> </ul>	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.	<ul style="list-style-type: none"> <li>Security fencing would be comprised of 2 m high cyclone fencing.</li> <li>Fencing in place prior to construction commencing.</li> <li>Use plain wire perimeter fencing where this intersects woodland to avoid potential entrapment of fauna on fence.</li> </ul>	Construction.	Regular.	Client.	Low.	None.
<b>Enhancement actions</b>						
Vegetation screening (comprising local native	<ul style="list-style-type: none"> <li>Vegetation screening plantings including a 5 m wide vegetation buffer comprising native trees and</li> </ul>	Construction	Regular.	Client.	Low.	Additional forage and nesting habitat for birds and other fauna.



Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk of consequences and of residual impacts
species) will increase available local habitat.	shrubs would be planted along the north and eastern boundaries of the development site facing New England Highway.					

## **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  $\geq 15$  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  $\geq 17$  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  $\geq 20$  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 Appendix F for ecosystem credits and species credits and Appendix G for paddock trees

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

Zone ID	PCT ID	Zone Name	Impact area (ha)	Vegetation Integrity Score	Future Vegetation Integrity Score	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						
1	98	Roadside	0.08	78.1	57.8	1
					<b>TOTAL:</b>	<b>1</b>

#### 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
			<b>TOTAL:</b>	<b>1</b>

### 10.1.3. Species credits

Species credit species that require offsets are Major Mitchell Cockatoo and Shrub Sida. The proposal for the species polygon for Bristle-faced -Free-tailed Bat encompasses only Category 1 – Exempt Land within the development site. The species credit species is shown in Table 10-3.

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

Table 10-3. Species that require offsetting

Species Name	Vegetation zone	Habitat condition (vegetation integrity score)	Change in habitat condition	Area (ha)/Count	Biodiversity risk weighting	Potential SAIL	Species credits
Major Mitchell's Cockatoo ( <i>Lophochroa leadbeateri</i> )	98_Roadside	20.3	20.3	0.0077	2	False	1
Shrub Sida ( <i>Sida rohlenae</i> )	98_Roadside	20.3	20.3	0.08	2	False	1
					<b>Subtotal</b>		<b>2</b>

### 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 trees that would be removed are Class 1 and as such, do not require offsetting. These trees are shown on Figure 10-1.

Table 10-4 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
			<b>TOTAL:</b>	<b>0</b>

### 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 10-5 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
Species Credit Species for Major Mitchell's Cockatoo ( <i>Lophochroa leadbeateri</i> )	1
Species credit species for Shrub Sida ( <i>Sida rohlenae</i> )	1
<b>TOTAL:</b>	<b>4</b>

## 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 three species credit species 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 following details the credit requirements:

- The generation of 2 ecosystem credits for Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Bragalow Belt South Bioregion within the development site (1 credit for the loss paddock trees and 1 credit for loss of PCT 98 in the access treatment) and;
- 2 species credits, one for Major Mitchell Cockatoo and one for Shrub Sida. Bristle-nosed Free-tailed Bat, although detected does not have habitat that will be directly impacted and thus does not generate 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

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# 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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ABN 31 124 444 622 ACN 124 444 622



NGH  
Accredited Assessor BAAS 17051  
(02) 4917 3974

# 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	<ul style="list-style-type: none"> <li>• Clear evidence of cropping</li> <li>• Clear evidence of significant groundcover modification</li> </ul>	<ul style="list-style-type: none"> <li>• Woody vegetation present at 1990 demonstrated within woody vegetation extent layer</li> </ul>	N/A
2017 Land Use Dataset	Land use identified as; <ul style="list-style-type: none"> <li>• Cropping</li> <li>• Reservoir/dam</li> </ul>	Land use identified as; <ul style="list-style-type: none"> <li>• Grazing native vegetation</li> </ul>	N/A
NSW Woody vegetation extent	<ul style="list-style-type: none"> <li>• Areas of woody vegetation regrowth that has occurred post 1990 following previous clearing events</li> </ul>	<ul style="list-style-type: none"> <li>• Woody vegetation present as at 1990 inclusive of paddock trees</li> </ul>	N/A
Native Regulatory Map <ul style="list-style-type: none"> <li>• Sensitive regulated land</li> <li>• Vulnerable regulated land</li> <li>• Excluded land</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• No areas identified as vulnerable or sensitive regulated land</li> </ul>	<ul style="list-style-type: none"> <li>• Areas identified as excluded on the Native Regulatory Map such as transport/communication land use on SP2 zoned land</li> </ul>

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

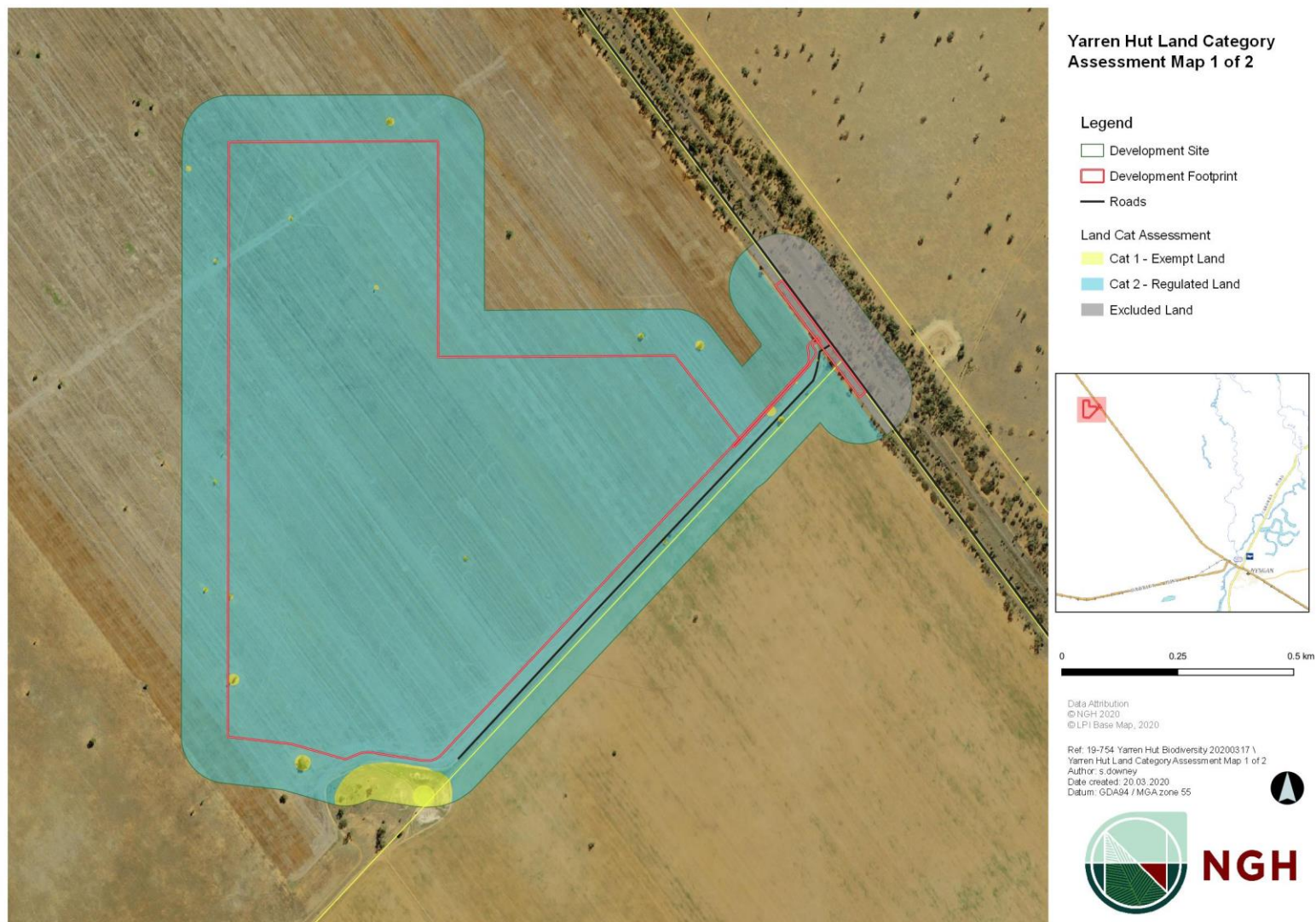


Figure 3 Development Site overview and Land categorisation

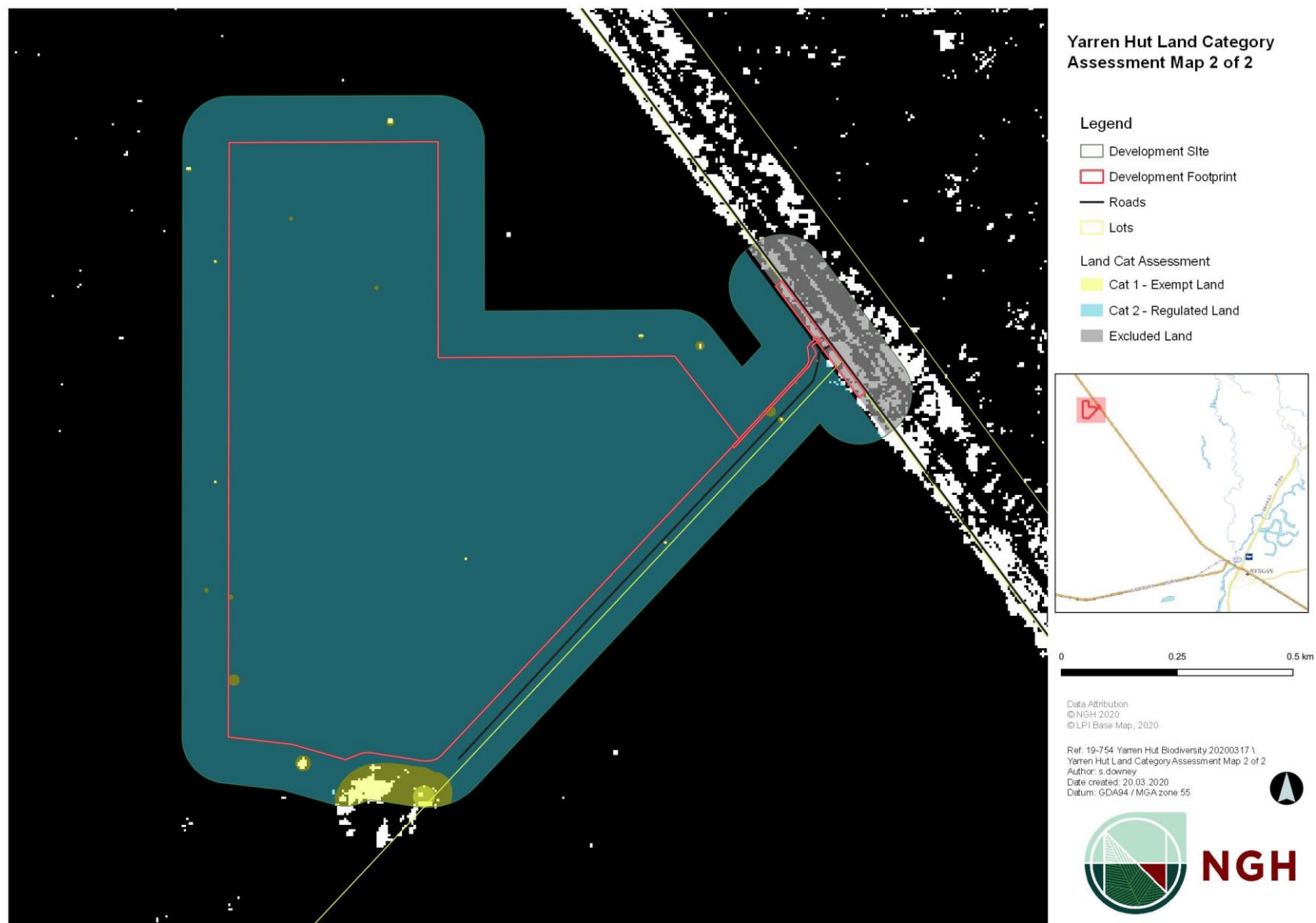


Figure 4 NSW Woody Vegetation Extent and FPC 2011



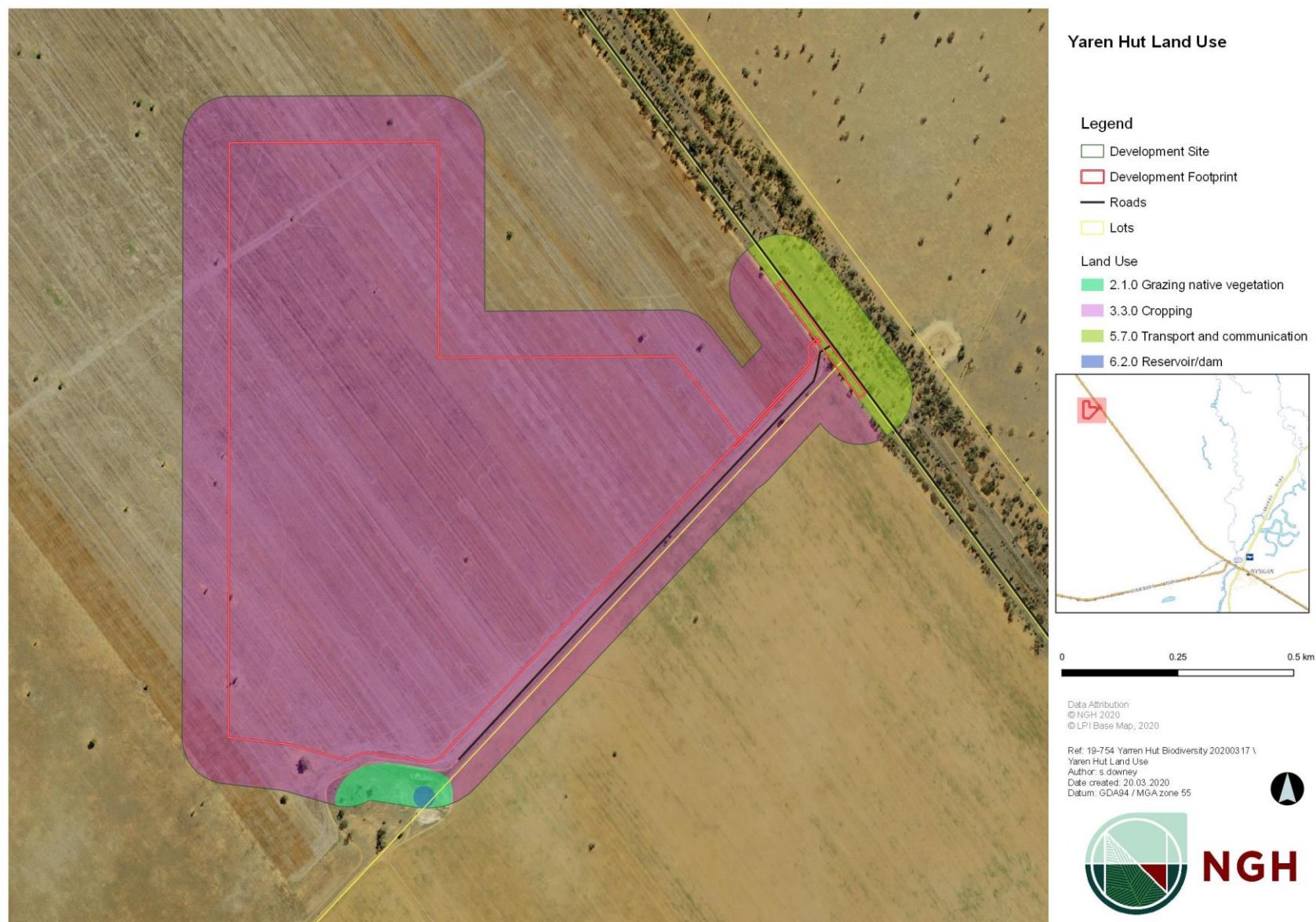


Figure 5 Land Use Dataset








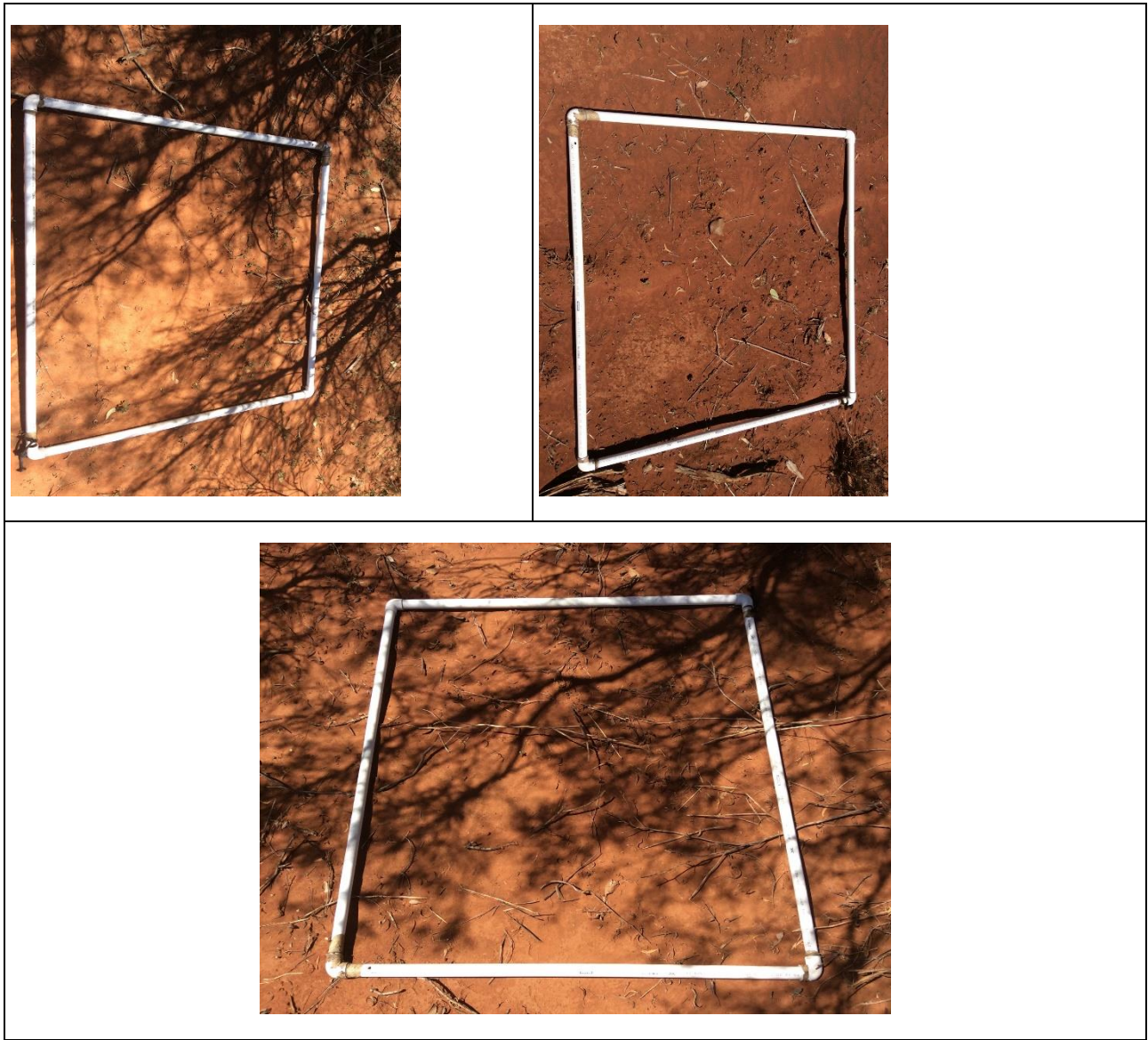
Figure 6 2017 Land Zoning



# APPENDIX B BAM PLOT FIELD DATA

## B1.1 BAM Plot Photos

	
Head of plot	Tail of Plot
	





**B1.2 BAM Plot Data**

**FUNCTION**

Function attributes for			P1
BAM Attribute (20x20m plot)			
Count of Native Richness	Stratum	Sum	
	Tree (TG)	3	
	Shrub (SG)	5	
	Forb (FG)	5	
	Grass & grasslike (GG)	4	
	Fern (EG)	0	
	Other (OG)	0	
	TOTAL	17	
BAM Attribute (20x20m plot)			
Count of cover abundance (native vascular plants)	Stratum	Sum	
	Tree (TG)	25.1	
	Shrub (SG)	31.6	
	Forb (FG)	2.2	
	Grass & grasslike (GG)	1.7	
	Fern (EG)	0	
	Other (OG)	0	
	TOTAL Native	60.6	
	TOTAL 'HTE'	0	

BAM Attribute (20 x 50m plot) Tree Stem Counts			
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
Length of logs (m)		8	

BAM Attributes (1 x 1m Plots)				
Litter Cover	Tape length	% cover	Average %	Photos
	5m	5%	2.20%	
	15m	2%		
	25m	1%		
	35m	1%		
	45m	2%		
Bare ground cover	5m	95%	97%	
	15m	97%		
	25m	98%		
	35m	99%		
Cryptogam cover	45m	98%	0%	
	5m	No		
	15m	0%		
	25m	0%		
	35m	0%		
Rock Cover	45m	0%	0%	
	5m	0%		
	15m	0%		
	25m	0%		
	35m	0%		
45m	0%			

**COMPOSITION & STRUCTURE**

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

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



## APPENDIX C ANABAT RESULTS

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 Nyngan	26/02/2020	C	P	C	Po	P	C	C	P	C	P	P	C	733

**KEY**

<b>S.fl</b>	Yellow-bellied Sheath-tail Bat	<i>Austronomus australis</i>
<b>M.pe</b>	Inland Freetail Bat	<i>Mormopterus petersi</i>
<b>M.pl</b>	Southern Freetail Bat	<i>Mormopterus planiceps</i>
<b>M.ri</b>	Southeastern Freetail Bat	<i>Mormopterus ridei</i>
<b>S.el</b>	Bristle-nosed Freetail Bat	<i>Setirostris eleryi</i>
<b>C.go</b>	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>
<b>C.pi</b>	Little Pied Bat	<i>Chalinolobus picatus</i>
<b>N.sp</b>	Unidentified Long-eared Bat	<i>Nyctophilus sp.</i>
<b>S.ba</b>	Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>
<b>S.gr</b>	Little Broad-nosed Bat	<i>Scotorepens greyii</i>
<b>V.ba</b>	Inland Forest Bat*	<i>Vespadelus baverstockii</i>
<b>V.vu</b>	Little Forest Bat	<i>Vespadelus vulturnus</i>

**Certainty of Identification**

C	Confident	P	Probable	Po	Possible
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# **APPENDIX D EPBC ACT PROTECTED MATTERS SEARCH RESULTS**



# EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/11/19 13:50:25

[Summary](#)

[Details](#)

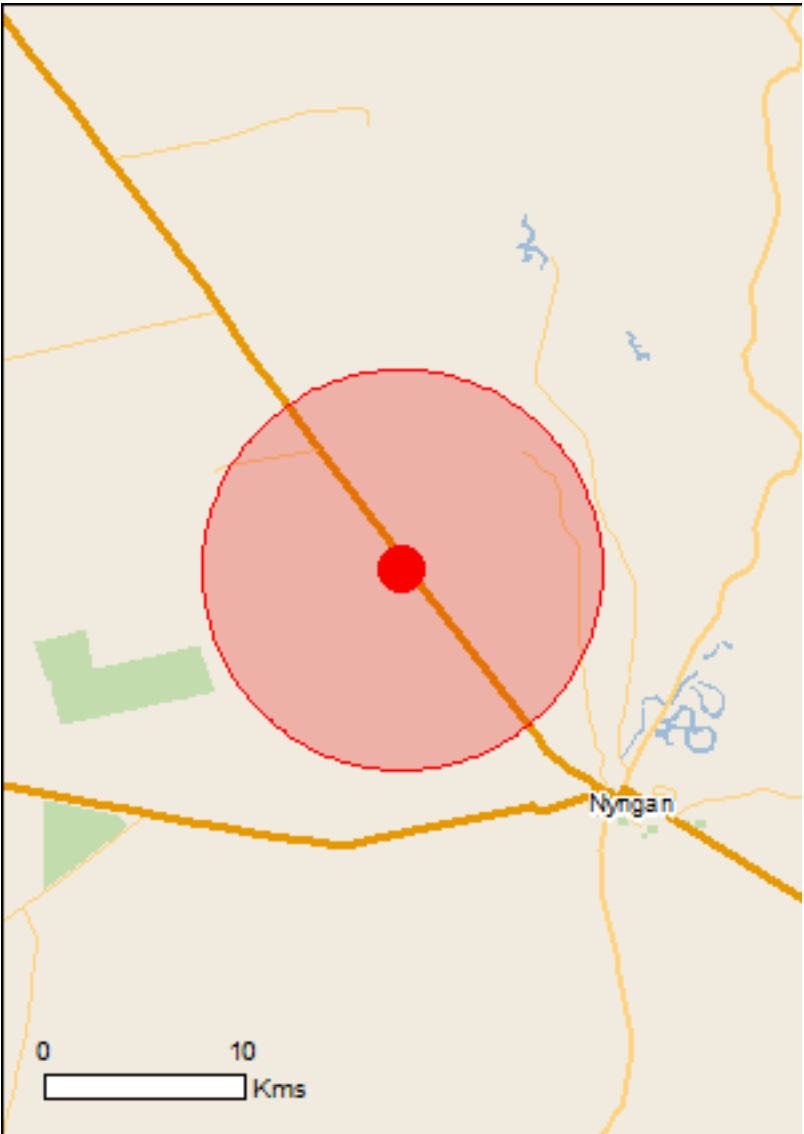
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

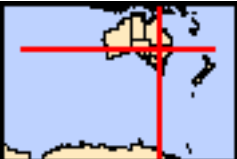
[Acknowledgements](#)



This map may contain data which are  
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[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 [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	3
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	4
<a href="#">Listed Threatened Species:</a>	9
<a href="#">Listed Migratory Species:</a>	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 [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	13
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	20
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[ Resource Information ]
Name	Proximity	
<a href="#">Banrock station wetland complex</a>	600 - 700km upstream	
<a href="#">Riverland</a>	600 - 700km upstream	
<a href="#">The coorong, and lakes alexandrina and albert wetland</a>	800 - 900km upstream	

Listed Threatened Ecological Communities	[ Resource Information ]
--	--------------------------

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

Name	Status	Type of Presence
<a href="#">Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</a>	Endangered	Community likely to occur within area
<a href="#">Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</a>	Endangered	Community may occur within area
<a href="#">Poplar Box Grassy Woodland on Alluvial Plains</a>	Endangered	Community likely to occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community likely to occur within area

Listed Threatened Species	[ Resource Information ]
---------------------------	--------------------------

Name	Status	Type of Presence
Birds		
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Leipoa ocellata</a> Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pedionomus torquatus</a> Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Polytelis swainsonii</a> Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		

Name	Status	Type of Presence
<a href="#">Nyctophilus corbeni</a> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[ [Resource Information](#) ]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species		
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area

Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

### Extra Information

Invasive Species	[ <a href="#">Resource Information</a> ]
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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



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 likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		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.

## 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
<b>Threatened Ecological Communities</b>				
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 ( <i>Eucalyptus coolabah</i> ) and, in some areas, Black Box ( <i>E. largiflorens</i> ). Other tree species may be present including River Cooba ( <i>Acacia stenophylla</i> ), Cooba ( <i>A. salicina</i> ), Belah ( <i>Casuarina cristata</i> ) and Eurah ( <i>Eremophila bignoniiflora</i> ).	<b>Absent</b> Characteristic tree species absent from the development site.	<b>Unlikely</b> Development site cleared. Presence eliminated during site survey.	<b>No</b> TEC not present.
Grey Box ( <i>Eucalyptus 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 ( $\geq 50\%$ canopy crown cover) by <i>Eucalyptus microcarpa</i> (Grey Box). Widespread associated tree species that may be present include: <i>Allocasuarina luehmannii</i> (Bullocke), <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 ground layer also is highly variable in development and composition,	<b>Absent</b> Characteristic tree species absent from the development site.	<b>Unlikely</b> Development site cleared. Presence eliminated during site survey.	<b>No</b> TEC not present.

Species	Habitat requirements	Presence Of habitat	Likelihood Of occurrence	Potential Impact
	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. It is 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 roadside reserves and travelling stock reserves/routes.	<b>Present</b> Alluvial soil landscape.	<b>Unlikely</b> Development site contains Poplar Box; however, vegetation does not meet key diagnostic characteristics (see Section 5.2).	<b>No</b> 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 ( <i>Acacia pendula</i> ) 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 ( <i>Alectryon oleifolius</i> subsp. <i>elongatus</i> ); Poplar Box ( <i>Eucalyptus populnea</i> ); or Black Box ( <i>Eucalyptus largiflorens</i> ). Grey Mistletoe ( <i>Amyema quandang</i> ) commonly occurs on the branches of Weeping Myall trees throughout the ecological community's range.	<b>Absent</b> Characteristic tree species absent from the development site.	<b>Unlikely</b> Development site cleared. Presence eliminated during site survey.	<b>No</b> TEC not present.

## E.2 FAUNA

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<b>Aves</b>				
<i>Botaurus poiciloptilus</i> 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</i> , <i>Cyperus</i> , <i>Eleocharis</i> , <i>Juncus</i> , <i>Typha</i> , <i>Baumea</i> , <i>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.	<b>Absent</b> No water bodies or riparian vegetation within development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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.	<b>Absent</b> No water bodies or riparian vegetation within development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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.	<b>Present</b> Some woodland present in road reserve. No mistletoes recorded.	<b>Unlikely</b> Within species known range, though no BioNet records within 10km.	<b>No</b> 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.	<b>Present</b> Woodland within road reserve, but species prefers mallee.	<b>Unlikely</b> Minimal suitable habitat present	<b>No</b> No suitable habitat would be impacted by the proposal.
<i>Pedionomous torquatus</i> 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 5,000km <sup>2</sup> of the western Riverina covering 37 properties found only 5% of the total area comprised suitable habitat.	<b>Absent</b> No suitable understorey within development site.	<b>Unlikely</b> Outside known distribution. No suitable habitat present.	<b>No</b> No suitable habitat would be impacted by the proposal.



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.	<b>Present</b> Foraging or traversal only. No breeding habitat, HBT within road reserve not suitable.	<b>Possible</b> Two BioNet records within 10 km of development site.	<b>Yes</b> Small amount of foraging habitat only, such that an AoS is not recommended.
<i>Rostratula australis</i> 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.	<b>Absent</b> No water bodies or riparian vegetation within development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> No suitable habitat would be impacted by the proposal.
<b>Mammals</b>				

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<p><i>Nyctophilus corbeni</i></p> <p>Corben's Long-eared Bat, South-eastern Long-eared Bat</p> <p>EPBC – V</p> <p>BC - V</p> <p>IBRA Sub-region: Inland Slopes, Lower Slopes</p>	<p>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.</p> <p>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.</p>	<p><b>Present</b></p> <p>Hollow-bearing tree present within development site but would not be impacted. Development site lacks typical foraging habitat.</p>	<p><b>Unlikely</b></p> <p>Study area within known distribution of species, however, <i>Nyctophilus</i> recorded on Anabat is unlikely to be this species.</p>	<p><b>No</b></p> <p>No suitable habitat would be impacted by the proposal.</p>
<p><i>Phascolarctos cinereus</i></p> <p>Koala</p> <p>BC - V</p> <p>EPBC - V</p> <p>IBRA Sub-region: Inland Slopes, Lower Slopes</p>	<p>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.</p>	<p><b>Present</b></p> <p>Two secondary food trees present (Poplar Box)</p>	<p><b>Unlikely</b></p> <p>Feed trees present, however, no signs of Koala identified during targeted surveys.</p>	<p><b>Yes</b></p> <p>Limited to one Poplar Box (paddock tree). EPBC Koala habitat assessment revealed no critical habitat present, therefore, no AoS required.</p>

### Migratory Species

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Actitis hypoleucos</i> 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.	<b>Absent</b> No wetlands, mangroves or coastal landforms in study area.	<b>Unlikely</b> No suitable habitat in study area.	<b>No</b> 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.	<b>Present</b> Aerial species	<b>Possible</b> Development site within known distribution of species.	<b>No</b> 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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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	<b>Absent</b> No suitable water bodies or	<b>Unlikely</b> No suitable habitat present.	<b>No</b>

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 acuminata</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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> No suitable habitat would be impacted by the proposal.
<i>Chrysococcyx 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.	<b>Absent</b> No riparian woodland or suitable shrubs within development site.	<b>Unlikely</b> Outside known distribution. No suitable habitat present.	<b>No</b> 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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Haliaeetus leucogaster</i> 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.	<b>Absent</b> No forest or woodland with large trees within development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> 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.	<b>Absent</b> No suitable vegetation present within development site. No breeding habitat.	<b>Unlikely</b> No suitable habitat present. May use paddock trees for traversal.	<b>No</b> 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.	<b>Absent</b> No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b> No suitable habitat present.	<b>No</b> No suitable habitat would be impacted by the proposal.

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
<i>Rostratula benghalensis</i> 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.	<b>Absent</b>  No suitable water bodies or riparian vegetation within or adjacent to development site.	<b>Unlikely</b>  No suitable habitat present.	<b>No</b>  No suitable habitat would be impacted by the proposal.

CE BC = listed as Critically Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

V BC = listed as Vulnerable under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

CE FM = listed as Critically Endangered under Schedule 4A of the NSW *Fisheries Management Act 1994*.

E FM = listed as Endangered under Schedule 4 of the NSW *Fisheries Management Act 1994*.

V FM = listed as Vulnerable under Schedule 5 of the NSW *Fisheries Management Act 1994*.

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

# APPENDIX F BAM ECOSYSTEM CREDIT REPORT



## Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019174/BAAS18155/20/00019175	Yarren Hut Solar Farm	21/10/2020
Assessor Name	Report Created	BAM Data version *
	05/11/2020	31
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
3	Major Projects	

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAI	Ecosystem credits
<b>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</b>											
1	98_Roadside	Not a TEC	78.1	20.3	0.08			High Sensitivity to Potential Gain	1.50		1
										<b>Subtotal</b>	<b>1</b>
										<b>Total</b>	<b>1</b>

## Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Species credits
<b><i>Lophochroa leadbeateri</i> / Major Mitchell's Cockatoo ( Fauna )</b>								
98_Roadside	20.3	20.3	0.01	Vulnerable	Not Listed	2	False	1
							<b>Subtotal</b>	<b>1</b>
<b><i>Setirostris eleryi</i> / Bristle-faced Free-tailed Bat ( Fauna )</b>								
98_Roadside	20.3	20.3	0	Endangered	Not Listed	2	False	0
							<b>Subtotal</b>	<b>0</b>
<b><i>Sida rohlenae</i> / Shrub Sida ( Flora )</b>								
98_Roadside	20.3	20.3	0.08	Endangered	Not Listed	2	False	1
							<b>Subtotal</b>	<b>1</b>

# **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	BAM Data version *
	11/06/2020	22
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
1	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
<b>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</b>			
3	False	1.0	1
			<b>1</b>
			<b>1</b>



## APPENDIX H HOLLOW BEARING TREE DATA

ID	Species	DBH (cm)	Small Hollow (< 10 cm),	Medium (10 – 20 cm)	Large (> 20 cm).	Fissuring	Signs of use	Removed or retained
1	<i>Eucalyptus populnea</i>	95	3	8		No	No	Retained