

Appendix C Biodiversity Development Assessment Report



Pacific Hydro Pty Ltd
Daroobalgie solar farm
Biodiversity Development Assessment Report

March 2022

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Certification under Section 6.15 of the *Biodiversity Conservation Act 2016*

I, Melissa Cotterill (BAAS18127) certify that this Biodiversity Development Assessment Report and the accompanying finalised credit report dated 16 March 2022 has been prepared in accordance with the requirements of (and information provided under) the Biodiversity Assessment Method.



Melissa Cotterill – BAAS18127

16 March 2022

1. Introduction

1.1 Overview

Pacific Hydro proposes to construct and operate a 100 megawatt (MW) solar farm (approximately) and associated transmission line at Daroobalgie, about 11 kilometres north-east of Forbes (referred to as the 'proposal').

The proposal requires development consent from the Minister for Planning under Part 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The Secretary's Environmental Assessment Requirements (SEARs) for an environmental impact statement (EIS) were provided on 19 December 2019 by the Department of Planning, Industry and Environment (DPIE). The proposal is listed as State Significant Development (SSD) 10387.

This Biodiversity Development Assessment Report (BDAR) considers the assessment requirements of the NSW *Biodiversity Conservation Act 2016* (BC Act), *Fisheries Management Act 1994* (FM Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as well as the relevant SEARs. This BDAR has been prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

1.2 Key features of the proposal

The proposal comprises the construction, operation and eventual decommissioning or reconditioning of a 100 MW photovoltaic (PV) solar farm (approximate capacity) at Daroobalgie, about 11 kilometres north-east of Forbes in the NSW South Western Slopes.

The key features of the proposal include:

- A network of solar arrays comprised of about 420,000 PV solar panels and Power Conversion Units (PCUs) (DC-AC inverters). The panels would be mounted on either fixed-tilt or single-axis-tracking structures about four metres in maximum height when tilted
- Electrical collection systems, substation and control room. This would enable conversion of the power generated from the solar panels to be converted at the substation to be transmissible along the 132 kV network. The substation has a footprint approximately 140 metres by 40 metres.
- Battery energy storage system (BESS) with embedded storage, to be housed in a 150 metre by 75 metre compound
- Construction of an electricity transmission line (ETL) of 132 kilovolt (kV) capacity, connecting the solar farm to a switchyard near the existing 132 kV transmission line about 500 metres to the west of the Newell Highway. The ETL would be about 8.5 kilometres in length and constructed from monopole structures about 25 to 30 metres in height. The ETL easement would be 45 metres wide. Stay-wires would be required to support poles at locations where the transmission line changes direction. No formal access track would be required for the transmission line, which would be accessed approximately two to three times per year. Access would be along existing roads where practicable.
- Construction of a switchyard to connect the ETL to existing TransGrid infrastructure. This is likely to be within a 90 metre by 55 metres area
- Underground electrical cabling to connect the solar panels
- Operations and maintenance (O&M) facility, including demountable offices, amenities, equipment sheds, storage and parking areas

- Internal access roads to provide access throughout the solar farm site during operation
- Perimeter security fencing
- Temporary construction compound.

Construction of the proposal would take about 12 to 18 months to complete.

The proposed solar arrays and associated components are expected to operate for up to 35 years. At the end of its operational life, the proposal would be either reconditioned or decommissioned. Decommissioning would remove all above ground infrastructure and rehabilitating the site to allow it to be used for purposes such as agriculture.

The proposal site and key features are mapped on Figure 1.1.

1.3 Secretary's environmental assessment requirements

This BDAR addresses the relevant SEARs for the EIS, related to the assessment of biodiversity values and impacts as outlined in the requirements of the NSW Department of Planning, Industry and Environment (DPIE), and relevant guidelines and policies. The Biodiversity SEARs are detailed in Table 1-1.

Table 1-1: Secretary's environmental assessment requirements relevant to biodiversity

Item	Section	Where addressed in this report
Biodiversity	The EIS must address the following specific issues:	
	an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless DPIE determine that the proposed development is not likely to have any significant impacts on biodiversity values	This report is the BDAR prepared in accordance with the BAM
	the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM	Section 7.1.1 (avoid impacts) Section 7.1.2 and Section 9 (mitigate impacts) Sections 8.5, 8.1 and 8.2 (assess direct, indirect and prescribed impacts) Section 10 (offset impacts)

Item	Section	Where addressed in this report
	the BDAR must include details of the measures proposed to address the offset obligation	Section 10.1.3

1.4 Purpose of this report

The purpose of this report is to assess the potential biodiversity impacts from the construction and operation of the proposal. The report:

- Outlines the methods used in the biodiversity assessment
- Describes the existing environment of the study area, including the results of the desktop assessment and site surveys
- Assesses the value and conservation significance of native vegetation and habitats at the proposal site and the potential for threatened biota and matters of national environmental significance (MNES) to occur at the proposal site or be affected by the proposal
- Provides a description of the proposal, including potential impacts on biodiversity values and measures to avoid or mitigate impacts
- Assesses the significance of impacts on threatened biota and MNES
- Presents the data used to perform the BAM credit calculations for the proposal
- Calculates the number and type of biodiversity credits that would be required to offset impacts of the proposal in accordance with the BAM.

1.5 Glossary of terms and acronyms

Term	Definition
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method The rules for biodiversity assessment established under the BC Act that determine credits created, credits required and the circumstances that improve or maintain biodiversity values.
BAM-C	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BC Act	<i>Biodiversity Conservation Act 2016</i>
BC Regulation	Biodiversity Conservation Regulation 2017
BCD	Biodiversity Conservation Division (of the Department of Planning, Industry and Environment)
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
Biodiversity credit	A unit of biodiversity value to measure specific development impacts or conservation gains in accordance with the

Term	Definition
	BAM. Includes ecosystem credits and species credits.
Biodiversity credit report	Specifies the number and type of biodiversity credits: required to offset the impacts of a development to obtain a Biodiversity Certification Agreement; or that would be generated through conservation and management of a Stewardship site under a Biodiversity Stewardship site agreement.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	Biodiversity Offset Scheme
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
DBH	Diameter at breast height
DEE	Department of the Environment and Energy
DPI	Department of Primary Industries
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered ecological community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFMP	Flora and Fauna Management Plan
HTW	High threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 10 km radius of the proposal site.
Migratory species	Species listed under listed under international agreements (i.e Ramsar, JAMBA, CAMBA and ROKAMBA conventions) to which Australia is a party
MNES	Matters of National Environmental Significance
NSW	New South Wales
NPW Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage
PCT	Plant community type

Term	Definition
Proposal site	The area that would be directly impacted by construction and operation of the proposal. Encompasses the solar farm site and the transmission line corridor. Comprises the 'development site' as referenced in the BAM
SAIL	Serious and irreversible impact
SAIL entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAILs)
SEPP	State Environment Planning Policy
Species credit	A credit that relates to an individual threatened species that cannot be reliably predicted based on habitat surrogates. Threatened species that require species credits are identified in the Threatened Biodiversity Data Collection
Study area	The area that was subject to a site survey and assessed for direct or indirect impacts arising from construction and operation of the proposal. This included the properties on which the solar farm will be constructed, as well as publicly accessible sections of several transmission line options. Comprises the 'subject land' as referenced in the BAM. A buffer of 1,500 metres has been used in desktop assessments in accordance with the BAM.
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened ecological community
Threatened biota	Threatened species, populations or ecological communities listed under the BC Act, FM Act and/or the EPBC Act.

1.6 Scope and limitations

This BDAR has been prepared by GHD for Pacific Hydro and may only be used and relied on by Pacific Hydro and its related bodies corporate for the purpose agreed between GHD and Pacific Hydro as set out in sections 1.3 and 1.4 of this report.

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

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

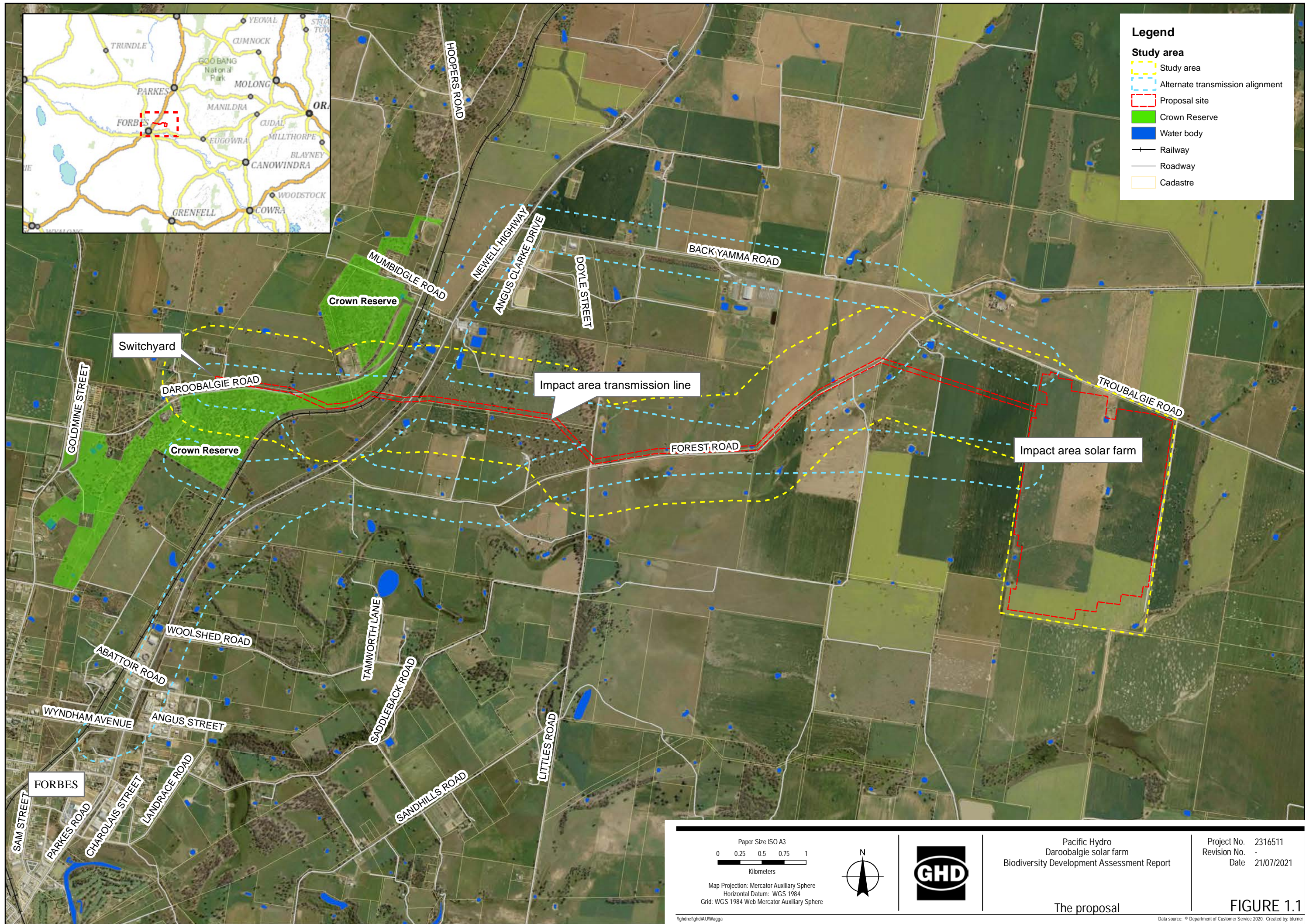
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that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

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this BDAR on the basis of information provided by Pacific Hydro and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, particular climatic conditions leading up to field surveys. As a result, not all relevant site features and conditions may have been identified in this report. Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.



Data Disclaimer: Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2019, NSW Department of Lands, Geoscience Australia) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

2. Legislative context

2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) provides legal protection for biota of conservation significance in NSW. The BC Act aims to, amongst other things, ‘maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development’. It provides for the listing of threatened species and communities, establishes a framework to avoid, minimise and offset the impacts of proposed development (the Biodiversity Offsets Scheme), and establishes a scientific method for assessing the likely impacts on biodiversity values and calculating measures to offset those impacts (the Biodiversity Assessment Method, BAM). These are discussed further below.

2.1.1 Biodiversity Offset Scheme and Biodiversity Assessment Methodology

The BC Act, together with the *Biodiversity Conservation Regulations 2017*, provides a mechanism to address impacts on biodiversity from land clearing associated with development. Under this legislation, there are provisions for a Biodiversity Offsets Scheme (BOS), which includes a framework to avoid, minimise and offset impacts of development on biodiversity.

The aim of the BOS is to provide a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting. It also allows for the establishment of biodiversity stewardship agreements, which are in-perpetuity agreements entered into by landholders, to secure offset sites and generate biodiversity credits, which can be used to offset impacts of development. The aim of the BOS is to ensure that the impacts of development, clearing or biodiversity certification will result in no net loss of biodiversity.

The Biodiversity Assessment Method (BAM) was established by OEH as a standard method to implement the aims of the BOS and to address the loss of biodiversity and threatened species. The scheme creates a market framework for the conservation of biodiversity values and the offsetting of development impacts. It also provides the mechanisms to offset impacts of development, clearing or biodiversity certification such that there is no loss of biodiversity values.

The BAM sets out how biodiversity values will be assessed, prescribes requirements to avoid and minimise impacts, establishes rules for calculating the number and class of credits required for unavoidable impacts, and determines the trading rules that will apply. The methodology includes a software package known as the Biodiversity Assessment Method Calculator (the BAM calculator) which processes site survey and assessment data. The BAM calculator specifies the type and extent of surveys required for a biodiversity assessment and then processes survey data to calculate the number and type of biodiversity credits that are either required at a development site or will be generated at a stewardship site. The BAM must be applied by a person accredited under the BC Act.

The Biodiversity Conservation Trust Fund (BCTF) ensures that landowners have the funds needed to carry out the management actions required each year and provides a financial incentive to landowners to carry out those actions. The scheme is administered by DPIE and ensures accountability and compliance through legislation, regular reporting requirements and financial measures. Under certain circumstances a developer may make a payment directly into the BCTF to offset the impacts of a proposed development in lieu of purchasing and

retiring biodiversity credits. The BCT must then use funds in the BCTF to purchase and retire appropriate biodiversity credits.

The BOS and BAM have been addressed in accordance with the project SEARs through the preparation of this BDAR by accredited assessors.

2.2 Fisheries Management Act 1994

The objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. It provides for the listing of threatened species, populations and ecological communities, listing of 'Key Threatening Processes', and the requirements or otherwise for the preparation of a Species Impact Statement (SIS).

One of the objectives of the FM Act is to 'conserve key fish habitats' which includes aquatic habitats that are important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. To assist in the protection of key fish habitats, DPI has produced the Policy and guidelines for fish habitat conservation and management (DPI, 2013). This policy applies to the following developments, works or activities, each of which can impact on key fish habitat:

- Dredging or reclamation
- Impeding fish passage
- Damaging marine vegetation
- De-snagging

The FM Act has been considered in this assessment through:

- Desktop review to determine the threatened biota that are predicted to occur within the locality of the proposal and hence could occur, subject to the habitats present.
- Aquatic habitat assessment.
- Assessment of potential impacts on threatened biota and key fish habitat.
- Identification of suitable impact mitigation and environmental management measures for aquatic habitats, where required.

2.3 Biosecurity Act 2015

The *Biosecurity Act 2015* provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

One priority weed for the North West region was recorded in the proposal site. Legal requirements to minimise the potential for the introduction and/or spread of weeds as a result of the proposal are discussed in Section 5.1.1.

2.4 Environment Protection and Biodiversity Conservation Act 1999

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

The NSW Government and Australian Government finalised amendments to the Assessment Bilateral Agreement after changes to NSW legislation, and the Amending Agreement no. 1 was signed on 24 March 2020. The Australian Government formally endorsed the NSW BOS through the *EPBC Act Condition-setting Policy* (DAWE 2020).

Under the bilateral agreement, only one decision including conditions on approval is made by NSW, accounting for impacts to MNES occurring in NSW. Specific consideration of the assessment, approval and offsetting requirements for MNES under the bilateral agreement is only required for controlled actions. The EPBC Act condition setting policy (DAWE 2020) notes that where a project demonstrates compliance with an endorsed state or territory policy, the proponent will not be required to simultaneously comply with the corresponding Australian Government policy. As such, a proponent is not required to calculate offsets separately using the EPBC Act offsets policy (DSEWPac 2012) and associated calculator, unless offsets are required for a species not listed under the BC Act.

The EPBC Act has been considered in this assessment through:

- Desktop review to determine the listed biodiversity matters that are predicted to occur within the locality of the proposal and hence could occur, subject to the habitats present
- Targeted field surveys for listed threatened biota and migratory species
- Assessment of potential impacts on threatened and migratory biota, including assessments of significance in accordance with the EPBC Act Significant Impact Guidelines 3.1 (DotE, 2013)
- Identification of suitable impact mitigation and environmental management measures for threatened and migratory biota, where required.

Based on the assessments of significance of impacts on MNES presented in this BDAR the proposal would not result in a significant impact on any MNES. Therefore, no further assessment or consideration of biodiversity offset requirements under the EPBC Act or bilateral agreement is required.

2.5 Assessment guidelines and information

This report has been prepared in accordance with the Biodiversity Assessment Method (DPIE 2020a) and with reference to the following guidelines:

- *Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020b)
- *NSW survey guide for threatened frogs – A guide to the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE, 2020c).

- *Survey guidelines for Australia's threatened bats – Guidelines for detecting bats listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999* (DEWHA, 2010)

3. Methods

3.1 Desktop assessment

3.1.1 Data review

A desktop database review was undertaken to identify threatened flora and fauna species, populations and ecological communities (threatened biota) listed under the BC Act and EPBC Act, that could be expected to occur in the locality, based on previous records, known distribution ranges, and habitats present. These were also used to obtain the necessary site data to perform BAM calculations.

A 20 kilometre search radius from the proposal site was used to identify threatened species that were previously recorded in the locality. A larger search radius than the standard 10 kilometres was used to overcome the risk of potentially low survey effort in the region suggesting lower occurrence of threatened species.

The threatened biota and migratory species identified in the desktop assessment are presented in Appendix A. Following collation of database records and threatened species and community profiles, a 'likelihood of occurrence' assessment was prepared for threatened biota and migratory species with reference to the broad vegetation types and habitats contained within the study area. This was further refined following field surveys and verification of vegetation types and identification and assessment of habitat present within the proposal site. A likelihood of occurrence ranking was attributed to these biota based on this information.

Information sources used in the preparation of this report include:

- NSW Department of Planning, Industry and Environment (DPIE) BioNet Atlas for records of threatened biota previously recorded in the locality (website for the Atlas of NSW Wildlife) (OEH 2021a) and *Threatened Biodiversity Data Collection* (TBDC) profiles of threatened species listed under the BC Act (DPIE 2021a)
- DPIE *Threatened biodiversity profile search* online database for threatened ecological communities and species listed under the BC Act (OEH 2021b)
- NSW *BioNet Vegetation Classification* (OEH 2021c) to identify matching plant community types (PCTs) in the study area
- DAWE (2021a) EPBC Act Protected Matters Search Tool – for a 10 kilometre radius around the proposal site (searched August 2020)
- DAWE (2021b) Species profile and threats database, online profiles
- The list of species credit-type species and predicted species identified by the BAM calculator (DPIE 2021b).

3.1.2 Background research

Background research was conducted to identify:

- Landscape-scale features of the study area in accordance with Subsection 3.1.3 of the BAM (DPIE 2020)
- Site context of the study area that includes assessing vegetation cover and patch size as required under Section 3.2 and Subsections 4.3.2 of the BAM (DPIE 2020)

- The likely distribution of native vegetation and threatened ecological communities, based on previous mapping and aerial photograph interpretation, for targeted field verification as required under Section 4 of the BAM (DPIE 2020)
- A list of predicted and candidate threatened species and populations of flora and fauna to assess the habitat suitability and threatened biodiversity data collection as required under Section 5 of the BAM (DPIE 2020)
- Availability of baseline information to determine whether additional surveys, mapping and reporting is required to support project approval.

The background research included analysis of the following information sources:

- Aerial photographic imagery
- NSW (Mitchell) Landscapes mapping and landscape descriptions (DECC, 2008b, a)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) mapping
- Initial BAM calculations
- State Vegetation Type Map: Riverina Region v1.2, 2016 VIS-ID 4469, State Government of NSW and Department of Planning, Industry and Environment 2016 (DPIE 2016)
- Atlas of Groundwater Dependent Ecosystems (GDE) (BOM 2021a)
- Directory of Important Wetlands of Australia (DIWA) (DEWHA, 2008)
- Aerial photographs and satellite imagery of the proposal site and buffer area.

3.1.3 Category 1 – Exempt Land mapping

Section 6.12 of the BC Act requires a BDAR to be prepared in accordance with the BAM which is established under Section 6.8 of the BC Act. Section 6.8(3) of the BC Act excludes certain areas from the assessment of impacts of clearing of native vegetation and loss of habitat, which includes category 1 – exempt land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act). Category 1 – exempt land is defined in Part 5A, Division 2 of the LLS Act is broadly defined as being:

- Land cleared of native vegetation as at 1 January 1990 or lawfully cleared after 1 January (but before 25 August 2017)
- Low conservation value 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 bio-certified under the BC Act.

Plantings within the solar farm proposal site have been classified as category 1 – exempt land due to evidence of them being planted post 1990 and being within existing cleared and cropped paddocks. With reference to the location of the solar farm proposal site in Figure 5.1, the image gives a clear indication that the plantings in the central section of the solar farm, south of Zone 1, were absent in aerial imagery from 2006. This enables this area to be classified as Category 1 as land cleared of native vegetation as at 1 January 1990, with the plantings established post 2006. The planting that comprises Zone 1 is present on the 2006 aerial image with no previous images available, and is therefore not classified as Category 1 land and subject to the BAM. This area is also shown on Figure 5.1.

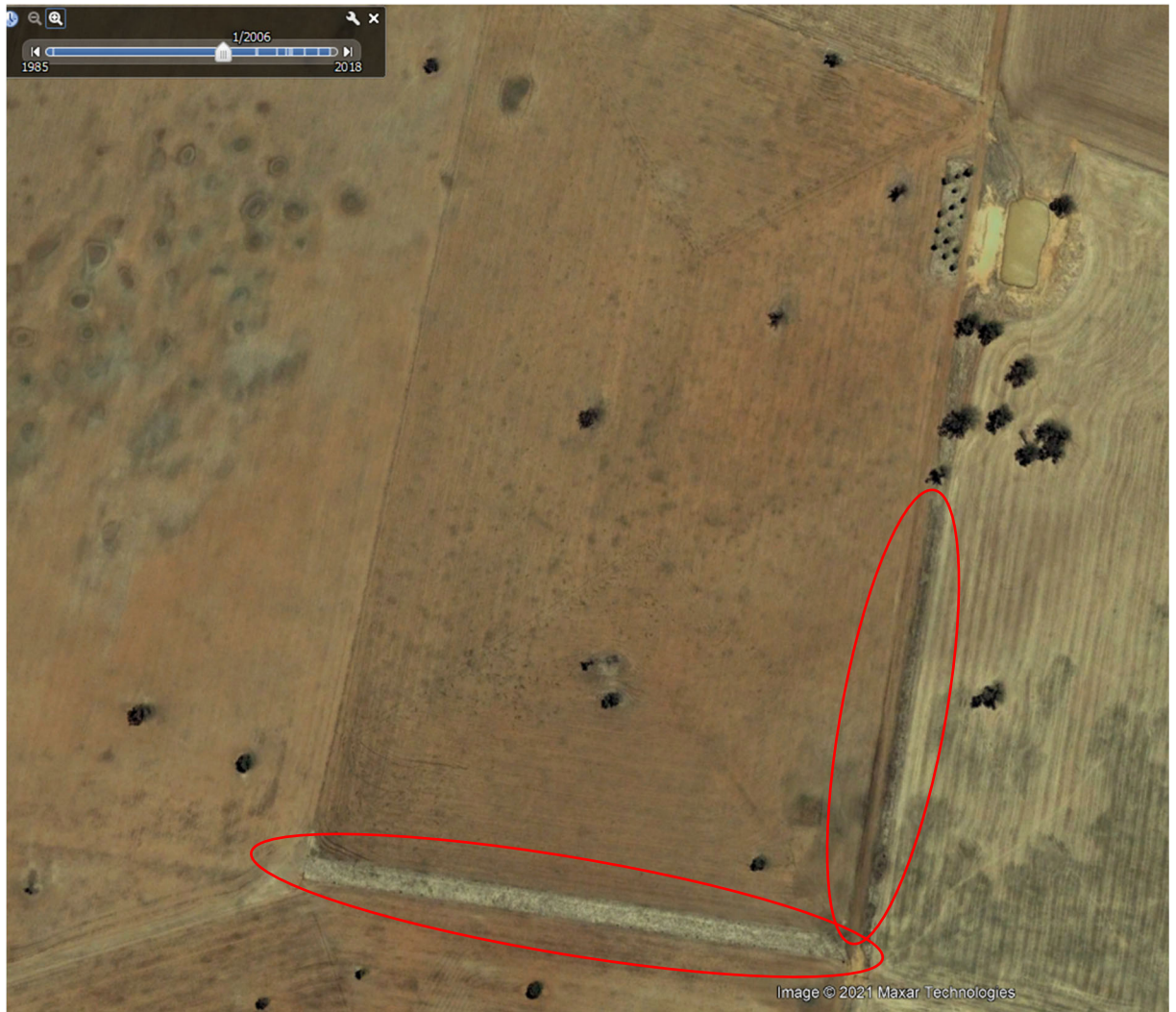


Figure 3.1: Native plantings catagorised as Category 1 (exempt land)

3.2 Site survey

3.2.1 Survey overview

Staged surveys of the proposal site were conducted in accordance with the BAM and with reference to appropriate threatened species survey guidelines for targeted species. The entire length of the transmission line was accessible during the survey periods and assessed via walked transects. Site surveys included:

- Initial site stratification and vegetation mapping
- Sampling of vegetation integrity plots
- Habitat assessments, including hollow-bearing tree assessments
- Tree removal and paddock tree assessments
- Targeted surveys for threatened flora
- Targeted surveys for threatened fauna.

Survey effort was formally stratified across the proposal site in accordance with the BAM. Survey effort that has directly contributed to this BDAR is summarised in Table 3-1, mapped on Figure 3.2 and is described in detail below.

Table 3-1: Survey techniques and timing

Stage	Date	Survey Technique
Project inception meeting and rapid site inspection	24 September 2018	Initial site overview
BAM assessment survey	30 September 2018	Vegetation mapping Targeted flora searches Opportunistic fauna survey Habitat assessment
BAM assessment survey	18-19 December 2018	Vegetation mapping Vegetation integrity plots Habitat assessment Opportunistic fauna survey
Candidate species credit fauna surveys	14-15 August 2019	Call playback Spotlighting Opportunistic fauna survey
BAM assessment survey	7-8 September 2020	Vegetation integrity plots Targeted flora searches Habitat assessment Targeted fauna survey Opportunistic fauna survey
BAM assessment survey and candidate species credit flora and fauna survey	25-26 August 2020	Vegetation integrity plots Targeted flora searches Call playback Spotlighting Habitat assessment Opportunistic fauna survey
Candidate species credit flora survey and additional plots	7-8 December 2020	Vegetation integrity plots Targeted flora searches Anabat recordings Opportunistic fauna survey

3.2.2 Vegetation and flora surveys

Vegetation mapping

Vegetation was assessed with reference to the BAM (DPIE 2020). Regional vegetation mapping was ground-truthed in the field via driven and walked transects across the study area to verify community type and boundaries, floristic and structural homogeneity within patches and to update mapping as required. The proposed transmission alignment was inspected via walked transects. The entire alignment was accessible.

Native vegetation communities in the study area were assigned to the closest equivalent Plant Community Type (PCT) held in the BioNet Vegetation Classification database (OEH 2021c). The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the vegetation integrity plot data collected from the site. In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the sites were also compared to the descriptions in the database in order to determine the most suitable PCT.

Areas of planted trees were mapped as the closest matching PCT. Threatened ecological communities (TECs) as defined in NSW and Commonwealth legislation were also identified.

The native vegetation in the proposal site was then stratified into vegetation zones in accordance with Section 4.3 of the BAM (DPIE 2020). A vegetation zone is defined in the BAM as a relatively homogenous area that is the same PCT and has the same broad condition state. Each vegetation zone was assigned a patch size in accordance with Subsection 4.3.2 of the BAM (DPIE 2020).

Vegetation integrity survey plots (assessing site condition)

Following the stratification of the proposal site into vegetation zones, plot surveys were conducted in accordance with Section 4.3.3 and Section 4.3.4 the BAM (DPIE 2020) to obtain vegetation integrity data for the calculation of biodiversity credits. The field data sheets are provided in Appendix C.

Plots were located to comply with the minimum number of plots required by Table 3 in the BAM (DPIE 2020). Due to refinements of the proposal site boundary during detailed design as part of efforts to reduce impacts on native vegetation, some plots sampled were not required to be used in the BAM calculations. In total, 22 plots were sampled within all potential options for the proposal site, with 9 plots located within the final proposal site and 13 plots outside of the proposal site. The location of survey plots is shown on Figure 3.2 and the minimum plot survey requirements are summarised in Table 3-2.

Three vegetation zones that were mapped at the proposal site were each smaller than the minimum vegetation zone area permitted by the BAM calculator. These three vegetation zones were sampled by plots and initial calculations were completed to determine a VI score. However, the area value for these zones defaulted to '0' in the BAM calculator. This resulted in error messages that prevented the completion of the development assessment and so, using 'assessors use of judgement', these vegetation zones were excluded from the credit calculations. The PCT, condition, area, plot ID and VI score data for these excluded zones are presented in Table 3-2. It should be noted that the total area of these vegetation zones is 0.004 ha and would not be sufficient to tangibly affect the total area of another vegetation zone at the proposal site, noting that vegetation zone areas are rounded to the nearest 0.01 hectare according to the BAM. Further, 0.003 of this total area contained vegetation with a VI score of 13.8 or less, which is less than the minimum VI score of 15 that would require calculation of an offset according to the BAM.

Table 3-2: Minimum plot survey requirements

Vegetation zone	Area in proposal site (ha)	Minimum number of plots required	Number of plots sampled	Plot IDs, Comments
<i>Solar farm</i>				
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - planting	0.23	1	1	P3 Planted trees, mapped as the closest matching PCT. Plantings in central section of solar farm proposal site are consistent, therefore plot location in Category 1 mapped land is indicative of planting in Zone 1.
Total (solar farm)	0.23	1	1	
<i>Transmission line</i>				
PCTID 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	0.65	1	1	2SR
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - good	0.59	1	1	P4
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - derived native grassland	0.01	1	1	P9 – plot data entered into BAM calculator, VI score of 0.9. Impact area defaulted to 0 hectares and could not calculate change in VI score, therefore

Vegetation zone	Area in proposal site (ha)	Minimum number of plots required	Number of plots sampled	Plot IDs, Comments
				the zone was excluded from the BAM calculator.
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - good	0.38	1	1	PD – plot location 100 metres north of alignment, part of same patch
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - derived native grassland	0.0025	1	1	PF – plot data entered into BAM calculator, VI score of 13.8. Impact area defaulted to 0 hectares and could not calculate change in VI score, therefore the zone was excluded from the BAM calculator.
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - derived scrub	1.40	1	1	3
PCTID 244 – Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	0.68	1	1	4
PCTID 360 – Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion	0.004	1	1	PA – plot data entered into BAM calculator, VI score of 59.3. Impact area defaulted to 0 hectares and could not calculate change in VI score, therefore

Vegetation zone	Area in proposal site (ha)	Minimum number of plots required	Number of plots sampled	Plot IDs, Comments
				the zone was excluded from the BAM calculator.
Total (transmission line)	3.7	8	8	
Total (minus removed vegetation zones)	3.7			
<i>TOTAL for whole proposal site</i>	3.93	9	9	

Plots were sampled at random locations within each of the vegetation zones by walking a random distance into the vegetation zone and then locating the plot on a randomly generated compass bearing, this was then repeated for subsequent plots within the vegetation zone. Plots were purposely not located near ecotones, tracks and their edges or other locally disturbed areas.

The site value was determined by assessing ten attributes used to assess function, composition and structure of vegetation within a 50 metre by 20 metre plot. These attributes were then assessed against benchmark values. Benchmarks are quantitative measures of the range of variability in condition in vegetation with relatively little evidence of alteration, disturbance or modification by humans since European settlement (DECC, 2009).

Attributes assessed within each plot are listed in Table 3-3. All flora species within a 20 metre by 20 metre quadrat nestled within the 50 metre by 20 metre plot were identified according to the nomenclature of the Royal Botanic Gardens and Domain Trust (RBGT 2021). Each species identified was allocated a growth form group¹ and designated as either native, exotic or high threat exotic in accordance with the lists accessed by assessors via the BAM calculator.

The overall condition of vegetation was assessed through general observation and comparison against the PCT condition benchmark data as well as using parameters such as species diversity, history of disturbance, weed invasion and canopy health.

Table 3-3: Site data collected within each plot

Attribute	Area assessed
Native plant species richness	20 X 20 metre plot
Percentage foliage cover for each species	20 X 20 metre plot
Estimated number of individuals for each species	20 X 20 metre plot
Number of large trees	50 X 20 metre plot
Tree regeneration (presence/absence)	50 X 20 metre plot
Tree stem size class	50 X 20 metre plot
Total length of fallen logs	50 X 20 metre plot
Litter cover	5 times 1 X 1 metre plot
High threat exotic vegetation cover	50 X 20 metre plot
Hollow bearing trees	50 X 20 metre plot

Threatened plant surveys

Potential candidate species credit entities for the proposal site were identified and assessed in accordance with Section 5.2 and Section 5.3 of the BAM (DPIE 2020). All threatened plants are classified under the BAM as species credit entities as their occurrence cannot be reliably predicted based on vegetation type.

¹ TG – tree, SG – shrub, GG – grass/grasslike, FG – forb, EG – fern, OG – other (Table 2 of the BAM, DPIE 2020)

The suite of threatened plants with potential to occur in the proposal site was identified based on the desktop assessment results and the species credit entities identified by preliminary BAM Calculations (see Appendix A). Habitat for these species was identified and assessed based on threatened species profiles and the experience and judgement of GHD ecologists. A large area of the proposal site, particularly the solar farm site, is highly modified and is dominated by exotic species, grazed and cropped, and can be readily discounted as supporting populations of threatened plant species. However, there were areas of native woodland and grassland in reasonable condition that had not been recently grazed, and were considered likely to provide potential habitat for select threatened flora species to occur.

Twelve threatened flora species associated with clay soils, gilgais and/or vegetation types present on site were considered to have potential habitat within the eucalypt and acacia woodland types and associated derived native grassland areas, or gilgai habitats of the proposal site. These were mainly woodland forb species, including Slender Darling Pea (*Swainsona murrayana*), Mossgiel Daisy (*Brachyscome papillosa*) and Silky Swainson-pea (*Swainsona sericea*).

Searches were undertaken with due consideration of threatened species survey guidelines (DPIE 2020b), by utilising meandering traverses within all areas of potential habitat within the proposal site. This survey effort was largely limited to the transmission line portion of the proposal site and the alternative transmission line options within the study area. The solar farm site is heavily degraded and dominated by introduced groundcover species, and therefore unlikely to provide potential habitat for threatened species. Areas of adjacent remnant vegetation and the planting within the solar farm site were searched.

3.2.3 Terrestrial fauna surveys

Fauna habitat assessment

Fauna habitat assessments were undertaken throughout the proposal site during all survey periods, including observation of potential shelter, basking, roosting, nesting and/or foraging sites. Specific habitat features and resources such as water bodies, food trees, the density of understorey vegetation, the composition of ground cover, the soil type, presence of hollow-bearing trees, leaf litter and ground debris were noted.

Indicative habitat criteria for targeted threatened species (i.e. those determined as having the potential to occur within the proposal site following the desktop review) were identified prior to fieldwork. Habitat criteria were based on information provided in OEH and DPIE threatened species profiles, field guides, and the knowledge and experience of GHD field ecologists.

Habitat assessments included searches for resources of potential value to threatened fauna including:

- Trees with bird nests or other potential fauna roosts
- Rock outcrops or overhangs providing potential shelter sites for fauna
- Burrows, dens and warrens
- Distinctive scats or latrine sites, owl whitewash and regurgitated pellets under roost sites
- Tracks or animal remains
- Evidence of activity such as feeding scars, scratches and diggings
- Specific food trees and evidence of foraging (chewed *Allocasuarina* cones)

The locations and quantitative descriptions of significant habitat features were captured with a handheld GPS unit and photographed where appropriate. The field survey effort included dawn and dusk observations of hollows for evidence of occupancy.

Opportunistic and incidental observations of fauna species were recorded at all times during field surveys. This included a conscious focus on suitable areas of habitat during flora surveys, for instance fallen timber was scanned and/or turned for reptiles and mature trees and stags were scanned for roosting birds.

Targeted surveys

Under the BAM, targeted surveys are not required for threatened fauna species that can be reliably predicted to occur at the proposal site based on habitat surrogates (predicted / ecosystem credit species). These species are assumed to be present within certain PCTs, given a certain patch size and condition. Nonetheless these species and their habitats were recorded along with fauna that are not listed as threatened, as a general guide to the condition and biodiversity value of the proposal site.

Targeted, seasonal surveys are required for candidate threatened species entities i.e. species credit species and specific habitat resources such as nesting or roosting habitat for dual credit species. Candidate species credit entities that have a moderate potential to occur at the proposal site (refer to Appendix A) were targeted during these surveys are listed in Table 3-4.

Targeted threatened fauna surveys were conducted in:

- September 2018
- December 2018
- August 2019
- August 2020
- December 2020.

Further detail regarding candidate fauna species targeted during surveys is provided in Section 6.1.

Targeted fauna survey techniques and effort conducted in the proposal site are summarised in Table 3-5. Survey effort was stratified across the entire study area, noting that fauna species are mobile and may rely upon habitat resources in the proposal site even if not directly observed at the proposal site. All fauna observations were recorded on pro forma field data sheets.

Table 3-4: Candidate fauna species credit entities targeted during surveys

Common name	Scientific name	BAM survey months	Survey method / timing
Sloan's Froglet	<i>Crinia sloanei</i>	July and August	Call playback, spotlighting – August
Southern Myotis	<i>Myotis macropus</i>	October to March	Anabat recording – December
Superb Parrot (breeding)	<i>Polytelis swainsonii</i>	September to December	Diurnal bird surveys – September

			Searches for candidate nest trees – all survey rounds
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Table 3-5: Targeted fauna survey techniques and effort

Survey technique	Survey effort
Daytime traverses Active reptile/ amphibian searches Active searches for scats and signs	Targeted searches of habitat for 12 person hours Included dedicated searches for any signs of fauna occupation. Included searching for evidence of feeding, foraging and signs of bird presence (such as pellets, whitewash, nests etc.) and other biota (scats, scratchings, diggings, nests etc.). Active searches of woody debris, under rocks and other ground litter were conducted throughout the proposal site targeting frogs and reptiles.
Spotlighting	Two consecutive nights of walked spotlighting transects on 14-15 August 2019 and 25-26 August 2020 (4 person hours each night) were conducted between the hours of 7 – 9 PM. Total effort = 16 person hours.
Call Playback	Two consecutive nights of call playback on 14-15 August 2019 and 25-26 August 2020 (4 person hours each night) targeting Sloan's Froglet. Total effort = 16 person hours.
Ultrasonic call recordings (Anabat)	1 x Anabat positioned in a potential bat flyway in different locations over two nights (12 hours each night from 7-8 December 2020). Total effort = 24 hours.
Diurnal bird surveys	2 person hours over 7 days (September, August, December) Total effort = 14 person hours.
Opportunistic fauna surveys	Fauna surveys in conjunction with plot/transects and flora searches on 11 survey days.

3.2.4 Aquatic habitat assessment

A rapid aquatic habitat assessment was undertaken along the drainage lines and at the farm dams in the proposal site. The character and condition of the waterways was noted.

An assessment of potential habitat for threatened aquatic species was based on the habitat assessments undertaken during the field survey and published habitat preferences of threatened biota. Key fish habitat maps for the Forbes area (DPI, 2007) were reviewed and key fish habitat was identified according to the following classifications as detailed in (DPI, 2013):

- Type 1 – highly sensitive fish habitat (includes freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or three metres in length, or native aquatic plants; known or expected protected or threatened fish habitat; and areas of critical habitat).
- Type 2 – moderately sensitive key fish habitat (freshwater habitats other than those defined in Type 1).
- Type 3 – minimally sensitive key fish habitat (ephemeral aquatic habitat not supporting native aquatic or wetland vegetation).

- Not key fish habitat (includes first and second order streams on gaining streams).

3.3 Survey conditions

The field surveys were undertaken between September 2018 and December 2020. Bureau of Meteorology (BOM) records for the survey dates are outlined in Table 3-6. These records were taken at Forbes Airport weather station (065103) located approximately 18 kilometres west of the proposal site (BOM 2021b).

Table 3-6: Daily weather observations during the survey period

Date	Minimum temperature (Deg Celsius)	Max temperature (Deg Celsius)	Rainfall (mm)
24 September 2018	5.8	23.5	0
30 September 2018	0.5	22.4	0
18 December 2018	17.5	35.8	0
19 December 2018	-	38.0	0
14 August 2019	-3.3	14.9	0
15 August 2019	-1.3	18.4	0
25 August 2020	-0.2	12.9	0
26 August 2020	-1.1	14.9	0
7 September 2020	7.3	22.9	0
8 September 2020	8.7	24.8	0
7 December 2020	10.0	26.3	0
8 December 2020	10.1	23.7	0

3.4 Geographical Information System (GIS) analysis

GIS was used to:

- Plot the proposal site on a high resolution aerial photo base and to map vegetation zones, survey effort, habitat resources and biodiversity values across the site
- Calculate the extent of native vegetation to be impacted
- Identify patch sizes relevant to the proposal site
- Confirm the relevant IBRA bioregion, IBRA subregion and NSW (Mitchell) Landscape for the site.

Additional GIS analysis was used to plot a 1,500 metre buffer area surrounding the solar farm site and a 500 metre buffer around the transmission line alignment in which site context components were calculated. Native vegetation cover, extent and connectivity were assessed using aerial photography. Aerial photo interpretation was used to identify and record distinct vegetation patches, determine the broad condition state of vegetation types and the location and extent of vegetated habitat corridors. Aerial photography was examined at scales between 1:2000 and 1:4000.

The buffer area and GIS area calculations were used to enter information about landscape value and to determine the change in Landscape Value score by assessing the impact of the proposal on native vegetation cover and connectivity as well as the patch size.

3.5 BAM calculations

The proposal was assessed according to the methodology presented in the BAM (DPIE 2020), and the Biodiversity Assessment Methods Calculator Users Guide (OEH, 2017b). The BAM calculator is a software application that is used to apply the BAM. Data is entered into the BAM calculator based on information collected in the desktop assessment, site surveys and from using GIS mapping software.

Due to the transmission line being a linear development and requiring a different buffer area for the landscape assessment to the solar farm, two calculator cases were assessed: one for the solar farm site using a 1,500 metre buffer; and second for the transmission line using a 500 metre buffer for a linear development.

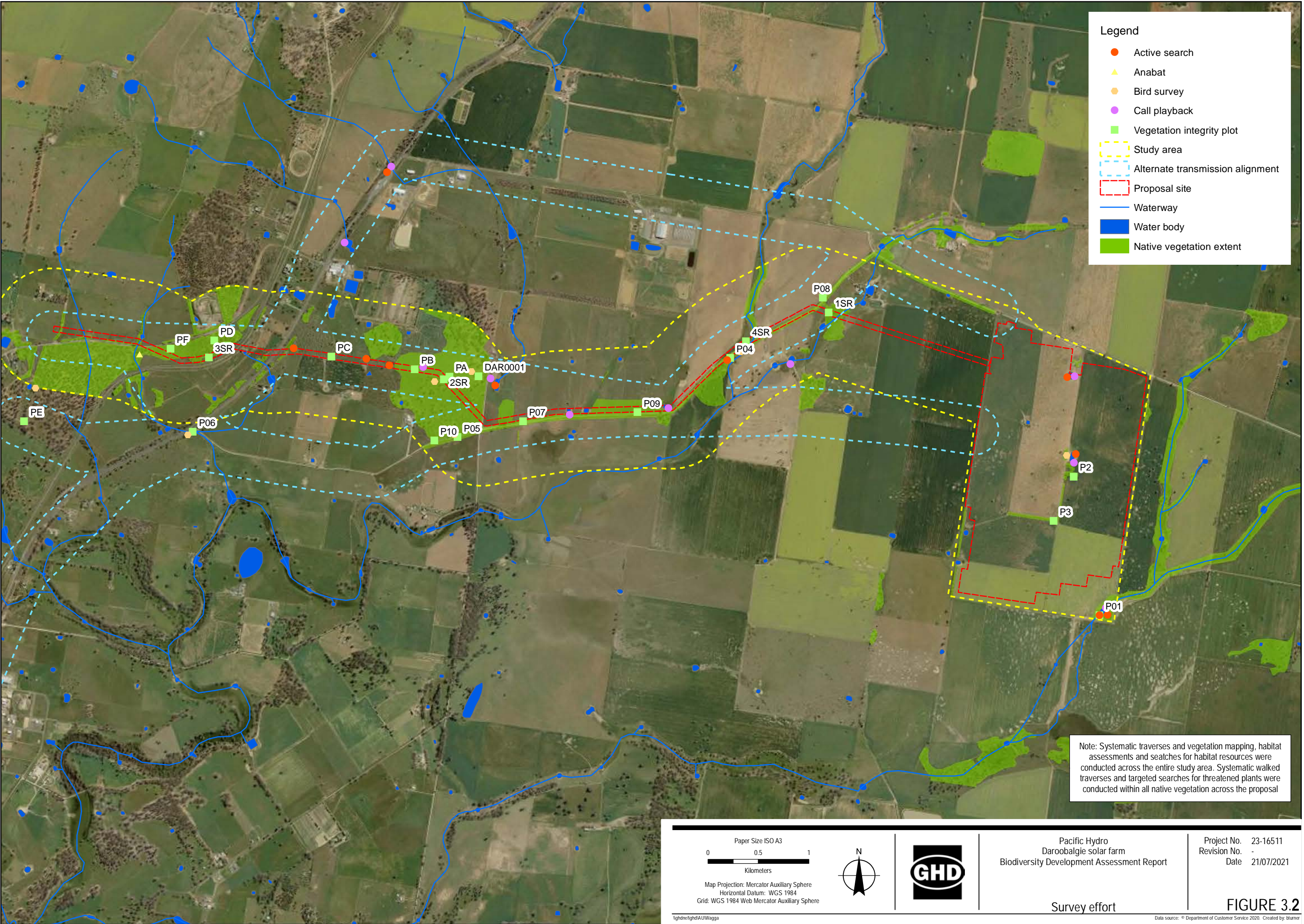
The BAM calculations were performed by Melissa Cotterill using calculator version 1.4.0.00 (DPIE 2021). Data entered into the BAM calculator is provided in Appendix D. The biodiversity credit report is included in Appendix F.

3.6 Staff qualifications

This BDAR was prepared by Melissa Cotterill (accredited assessor number BAAS18127) in accordance with the BAM. A technical review of the report and credit calculations was undertaken by Ben Harrington (BAAS17023) and Leigh Maloney (BAAS18086). Staff qualifications are presented in Table 3-7.

Table 3-7: GHD ecology staff and qualifications

Name	Position / Project role	Qualifications	Relevant experience
Ben Harrington	Technical Director Biodiversity Technical Review	BSc, MSc, Accredited BAM Assessor (BAAS17023)	17+ years
Leigh Maloney	Senior Ecologist Field surveys, Credit calculations review	BEnvSc (Hons) Accredited BAM Assessor (BAAS18086)	17+ years
Kirsten Crosby	Senior Ecologist, Targeted fauna surveys	BSc (Zoology), PhD Accredited BAM Assessor (BAAS17011)	16+ years
Melissa Cotterill	Ecologist, Field surveys, reporting	BSc (Biology) Accredited BAM Assessor (BAAS18127)	9 years
Brianna Turner	Graduate Ecologist Site surveys, draft reporting	BSc (Ecology)	3 years



4. Landscape context

The BAM requires the assessment of landscape features to help describe the biodiversity values of the proposal site and assess the impacts of the proposal. Landscape features relevant to the BAM calculations are shown on Figure 4.1 for the solar farm site and Figure 4.2 for the transmission line alignment, discussed below and summarised in Table 4-1.

4.1 Location

The proposed solar farm site is located about 11 kilometres north-east of Forbes, within the Forbes Shire Council local government area. The proposal site is within a rural property located on the southern side of Troubalgie Road, about five kilometres east of the Newell Highway at part Lot 77 of DP 750183.

The proposal site also includes the corridor for an approximate 8.5-kilometre-long transmission line between the north-western boundary of the solar farm site and a switchyard to be located adjacent to the existing Forbes-Parkes 132kV transmission line about 500 metres west of the Newell Highway. The transmission line alignment traverses a number of private properties and road reserves along its length.

4.2 Existing land uses

The proposal site occupies an area of about 300 hectares, and has previously been used for agricultural purposes, with the primary use being cropping with some grazing. The site contains limited infrastructure, which is restricted to a disused shed located adjacent to an access track into the property from Troubalgie Road. An alternative property access point is located on the eastern boundary of the site and runs along the boundary.

The transmission line alignment traverses numerous private properties used for both grazing and cropping. Two property access tracks are traversed in the central and western sections of the alignment and two local roads; Forest Road and Darroobalgie Road in the eastern and western sections of the alignment, respectively. The Newell Highway and Stockinbingal Parkes Railway are traversed in the western section of the alignment.

The transmission line alignment also traverses a portion of Crown Reserve (Lot 7003 DP 1060435.) bordering the western side of the railway, which is used as a Travelling Stock Reserve (TSR).

4.3 Climate

In the town of Forbes, located approximately 11 kilometres south-west of the proposal site the climate is warm and temperate. About 491 mm of precipitation falls annually with lowest rainfall occurring in April, and highest in December. January typically experiences the warmest temperatures, with an average maximum temperature of 34.5 degrees celsius and July experiences the coolest average minimum temperatures at 2.5 degrees celsius.

4.4 Landscape features

The study area occurs in the NSW South Western Slopes IBRA bioregion. Landscape features within the proposal site are summarised in Table 4-1 and shown in Figure 4.1 and Figure 4.2 as required by Section 3.1 of the BAM.

Table 4-1: Landscape features

Landscape features	Study area
IBRA bioregions and subregions	NSW South West Slopes Bioregion, Lower Slopes
NSW (Mitchell) Landscape regions	Eugowra Plains (solar farm site and eastern section of transmission line) Calarie Plains (western section of transmission line)
Local Government Area (LGA)	Forbes
Rivers and streams	Undefined, ephemeral drainage lines are present in the eastern and western sections of the transmission line site, and through the south-eastern corner of the solar farm property boundary. These are not listed as key fish habitat.
Important wetlands	No important wetlands occur at the proposal site, on adjacent lands or downstream.
Connectivity features	Vegetation at the site provides limited connectivity with areas outside the site. There is a TSR in the western section of the transmission line alignment which connects to vegetation within the proposal site.
Areas of geological significance and soil hazard features	There are no karst, caves, crevices, cliffs, rocks or other areas of geological significance located within the proposal site or buffer area surrounding the site.
Areas of outstanding biodiversity value	No declared areas of outstanding biodiversity value occur in or near the proposal site
Landscape features listed in the SEARs	No additional landscape features are listed in the SEARs

4.4.1 NSW (Mitchell) landscape

The proposal site is located within the two NSW (Mitchell) Landscapes: the Eugowra Plains and Calarie Plains. The descriptions for these soil landscapes are reproduced below from DECC (2008a):

Eugowra Plains: *Alluvial plains and lower hill slopes of the Lachlan River terraces and tributary valleys on Quaternary alluvium. General elevation 250 to 300 metres, local relief 15 metres. Extensive red-brown earths and cracking clay soils. Extensively cleared and farmed. Originally this area carried white cypress pine (*Callitris glaucophylla*) and grey box (*Eucalyptus microcarpa*) with yellow box (*Eucalyptus melliodora*) communities and River Red Gum (*Eucalyptus camaldulensis*) adjacent to stream lines. Includes small areas of low bedrock hills.*

Calarie Plains: *Undulating low hills and rises on folded steep dipping Ordovician quartz sandstone, slate and chert, Silurian and Devonian quartzite, sandstone, conglomerate and small areas of limestone. General elevation 250 to 300m, local relief 15m. Open woodlands of red ironbark (*Eucalyptus sideroxylon*) and grey box (*Eucalyptus microcarpa*) with a grassy understorey.*

‘Eugowra Plains’ was entered as the Mitchell landscape for the solar farm and transmission line BAM calculator cases.

The soils, vegetation and landform across the majority of the proposal site is well matched to the Eugowra Plains soil landscape. It is characterised by alluvial clay soils on a relatively flat landscape and supports vegetation containing Grey Box (*Eucalyptus microcarpa*) with White Cypress Pine (*Callitris glaucophylla*) as described in the description of this soil landscape.

4.5 Determining site context

To determine site context as required under Section 3 of the BAM (Section 3.2 and Subsection 4.3.2), an assessment of native vegetation cover and patch size has been undertaken and is outlined below.

4.5.1 Native vegetation cover

Native vegetation cover (woody and non-woody) was assessed on the proposal site and within a 1,500 metre buffer area surrounding the outside edge of the boundary of the solar farm proposal site, and within a 500 metre buffer area surrounding the outside edge of the boundary of the transmission line proposal site (approach for linear development). Aerial photography was examined at scales between 1:2000 and 1:4000. The percent native vegetation cover within the 1,500 metre and 500 metre buffer areas were assessed to be 6.0 percent and 17.6 percent respectively and includes (see Table 4-2):

- Remnant native vegetation types
- Planted native vegetation types
- Derived native grasslands.

Areas that were excluded include:

- Cleared areas
- Non-native vegetation
- Dams, ponds and other waterbodies
- Buildings
- Non-native plantings.

The identification of native vegetation (including derive native grasslands) in the buffer areas was based on review of the Riverina Region v1.2, 2016 VIS-ID 4469 State Vegetation Type Map (DPIE 2016), in combination with aerial photograph interpretation and ground-truthing during field surveys.

Table 4-2: Native vegetation cover

Native vegetation cover unit	1,500 m buffer area	500 m buffer area
Total assessment area	2,084 (nearest whole hectare)	916 (nearest whole hectare)
Area of native vegetation cover (woody and non-woody)	126 (nearest whole hectare)	161 (nearest whole hectare)
% native vegetation cover	6.0%	17.6%
Cover class	0-10%	>10-30%

4.5.2 Patch size

Patch size is defined under the BAM (DPIE 2020) as an area of native vegetation that:

- Occurs on the development site or biodiversity stewardship site (i.e. proposal site).
- Includes native vegetation that has a gap of less than 100 metres from the next area of native vegetation (or ≤ 30 metres for non-woody ecosystems).

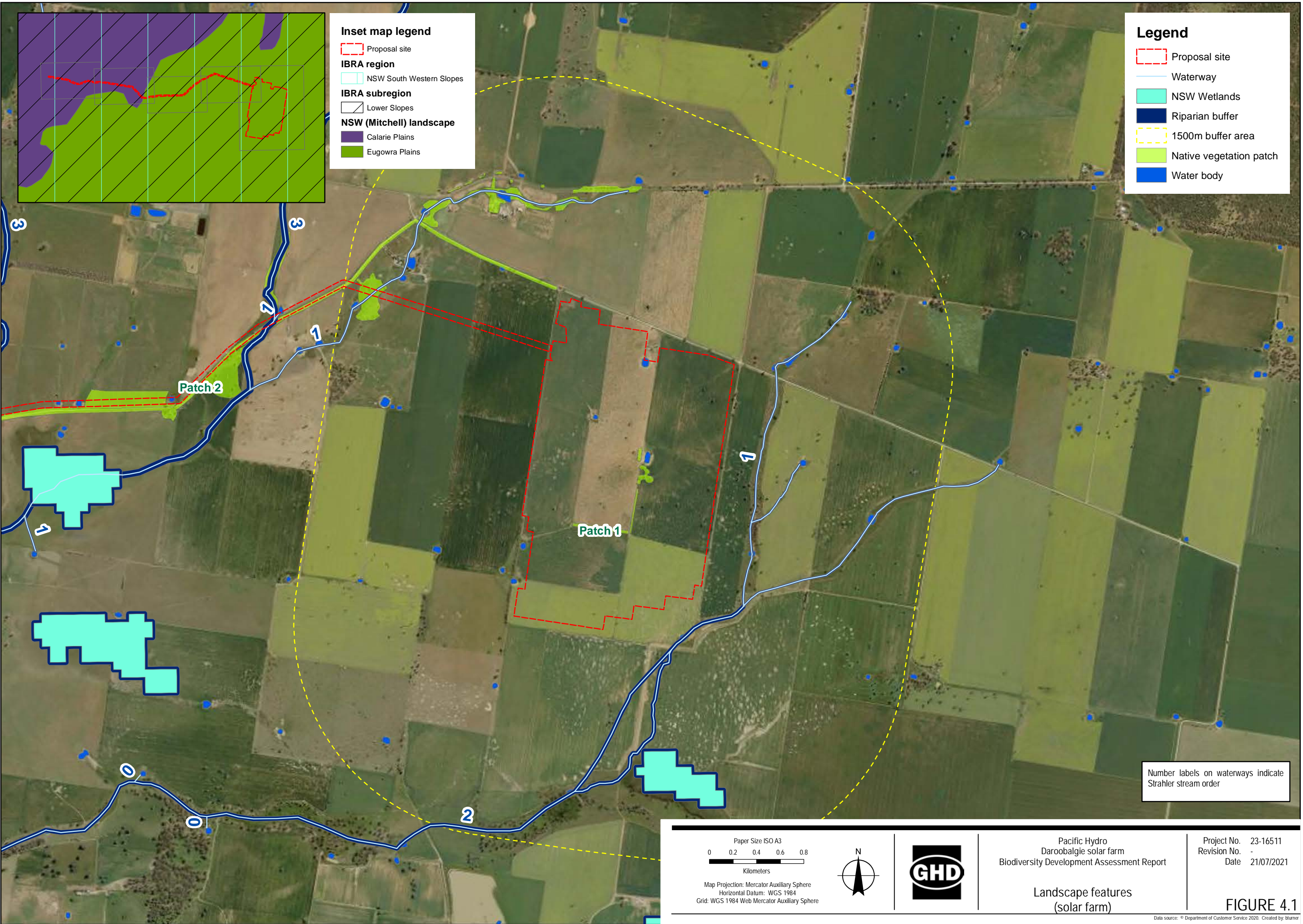
Patch size may extend into adjoining land that is not part of a development site or a biodiversity stewardship site. Patch size area is assigned to each vegetation zone as a class, being < 5 hectares, 5-<25 hectares, 25-<100 hectares or ≥ 100 hectares.

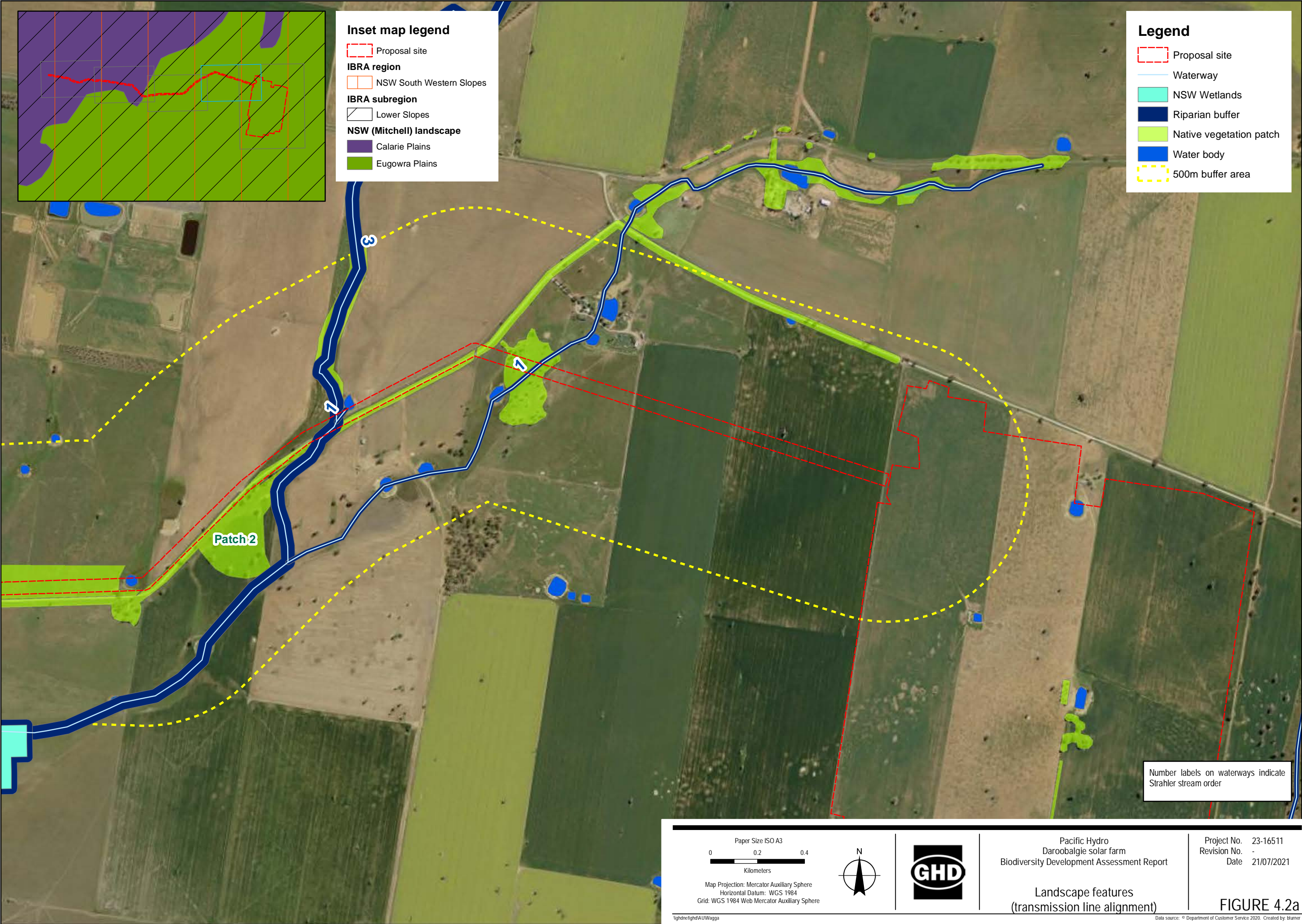
Three different patches were identified as occurring within the proposal site and extending beyond the proposal site (see Table 4-3, Figure 4.1 and Figure 4.2). These patch size polygons are associated with vegetation zones in the proposal site and include remanent woodland, derived scrub and derived native grasslands.

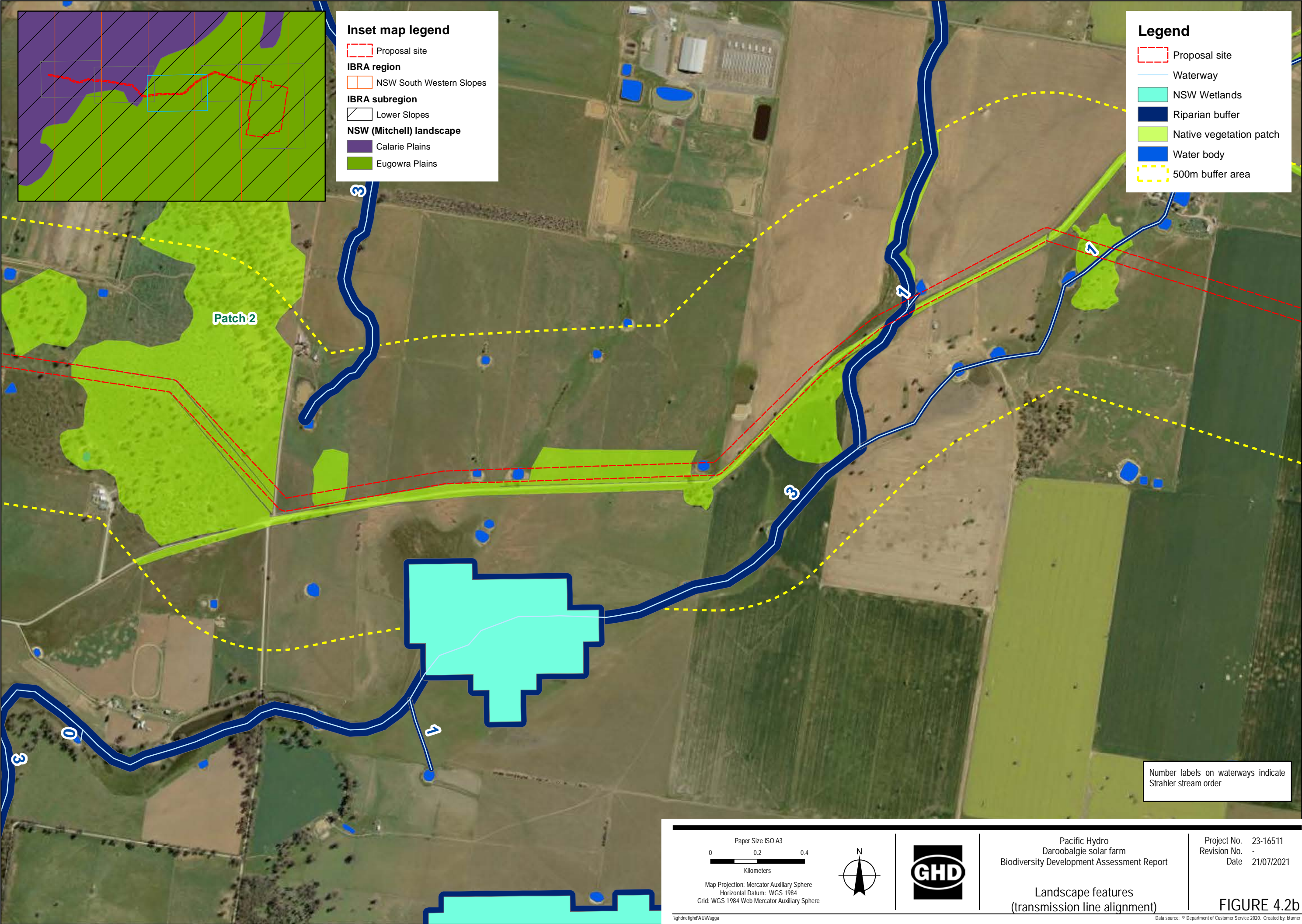
Two of the patch sizes were greater than 100 hectares and therefore patch size for these zones was entered as 101. Discontinuous vegetation zones were all part of the same patch.

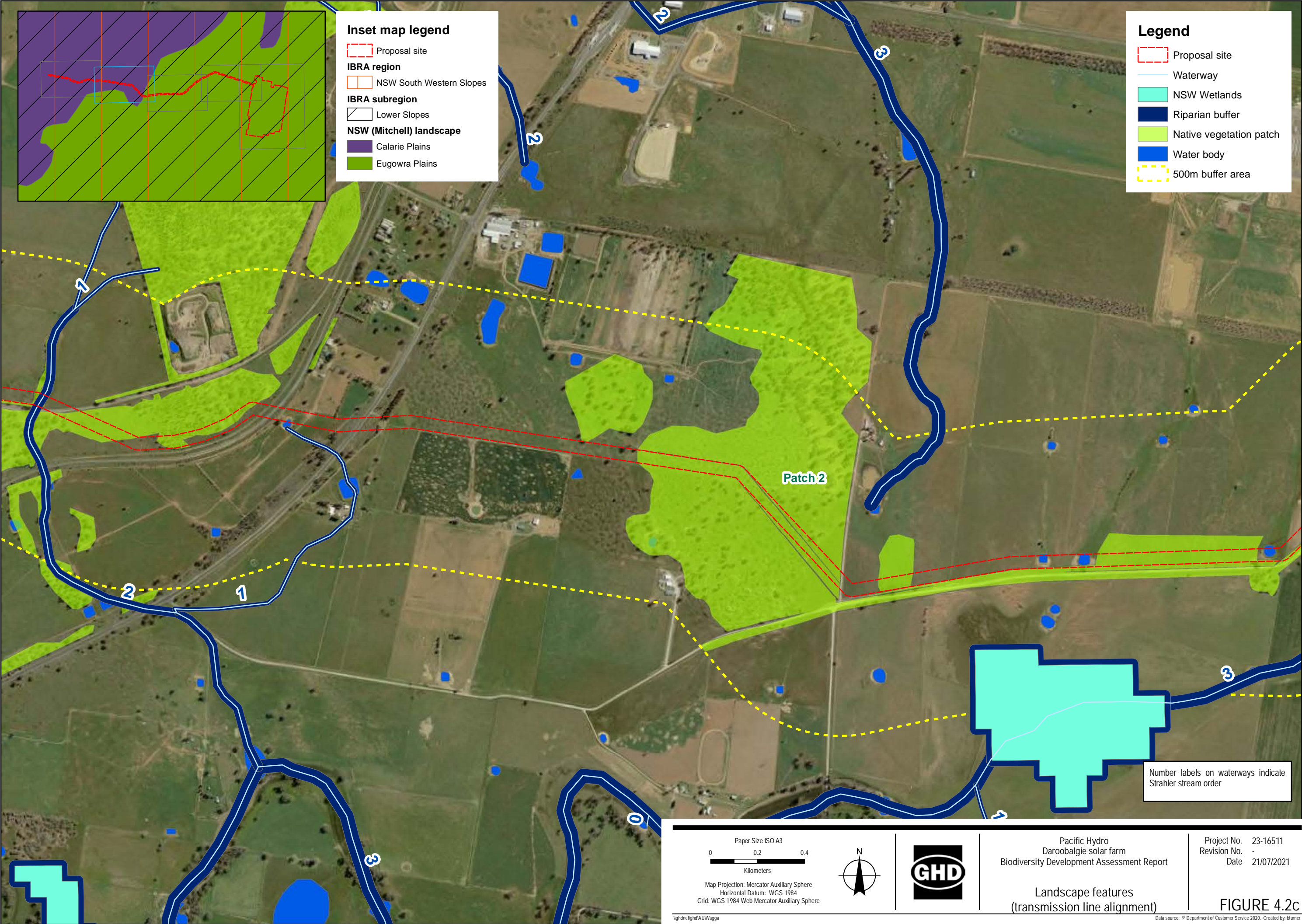
Table 4-3: Patch sizes at the proposal site

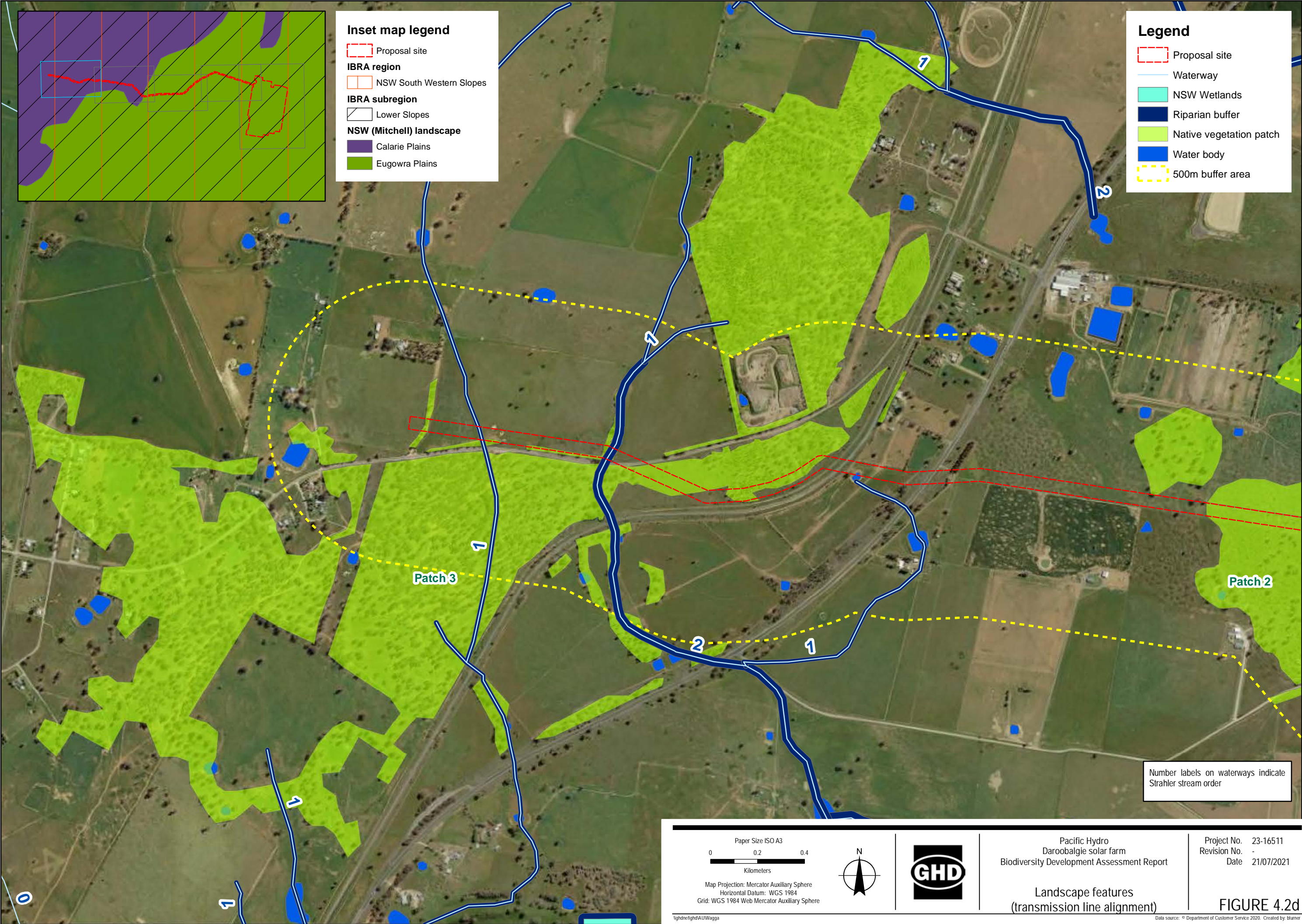
Patch	Size (nearest whole hectare)	Patch size class
1	2	<5
2	126	≥100
3	218	≥100











5. Native vegetation

5.1 Flora species

A total of 215 species from 55 families were identified within the study area during the field survey, including 134 native species and 81 exotic species (Appendix B). The most species diverse families recorded were Poaceae (51 species, 35 native and 16 exotic), Asteraceae (24 species, 11 native and 13 exotic), Chenopodiaceae (15 species all native) and Fabaceae (15 species, 1 native and 14 exotic).

No threatened flora species were identified within the proposal site during field surveys of the solar farm, transmission line easement and switchyard. Targeted threatened flora survey effort was largely limited to the transmission line easement because the majority of the solar farm site contains cleared, cropped and/or grazed land that is unlikely to provide suitable habitat for the threatened species with the potential to occur in the locality. Threatened flora survey effort within the solar farm site was restricted to the small areas of native vegetation.

5.1.1 Priority and high threat species

There were no priority weeds listed in the Central West region (which includes the Forbes local council area) recorded within the proposal site during the field surveys.

The following exotic species recorded in the proposal site are classified as high threat weeds for the purposes of the BAM:

- *Xanthium spinosum* (Bathurst Burr)
- *Phalaris aquatica* (Phalaris)
- *Carthamus lanatus* (Saffron Thistle)
- *Paspalum dilatatum* (Paspalum)
- *Romulea rosea* (Onion Grass)
- *Hypericum perforatum* (St John's Wort).

5.2 Vegetation in the region

The Forbes region is located on the Lower Slopes, ranging from undulating to hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans. The geology of the region features Ordovician to Devonian folded and faulted sedimentary sequences with inter-bedded volcanic rocks and large areas of intrusive granites and Tertiary and Quaternary alluvium. Soils are characterised by shallow stony soils on steep slopes, texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. There are extensive red-brown earths on undulating plains and grey clays on alluvium (OEH 2016a).

The region supports a wide variety of vegetation types from semi-arid woodland to grassy woodlands. Typical species in the lower parts of the region are dominated by *Eucalyptus microcarpa* (Grey Box) with *Eucalyptus melliodora* (Yellow Box), *Casuarina cristata* (Belah) and *Callitris glaucophylla* (White Cypress Pine) with *Eucalyptus dwyeri* (Dwyer's Red Gum) on granite, *Eucalyptus sideroxylon* (Mugga Ironbark) on sedimentary and *Eucalyptus dealbata* (Tumbledown Red Gum), White Cypress Pine and *Eucalyptus macrorhyncha* (Red Stringybark) in the ranges. *Eucalyptus populnea* (Poplar Box), *Brachychiton populneus* (Kurrajong), *Geijera parviflora* (Wilga) and *Eucalyptus polyanthemus* in the northern part of the subregion, with limited areas of mallee species in the central west. *Acacia pendula* (Weeping Myall), *Alectryon*

oleifolius (Rosewood) and *Acacia homalophylla* (Yarran) occur on grey clays with Yellow Box, Poplar Box and Belah occurring on alluvial loams. *Eucalyptus camaldulensis* (River Red Gum) occurs on all streams, with *Eucalyptus largiflorens* (Black Box) occurring in the west with some *Duma florulenta* (Lignum) and *Acacia stenophylla* (River Cooba) (OEH 2016a).

The discovery of gold in the region saw the widespread felling of local box and stringybark timber, which was used for fuel for steam dredges (OEH 2016b). By the 1820s, pastoralists were making their mark on the landscape, with cattle stations prominent in the region (OEH 2016b). As such, much of the original vegetation in the region has been cleared to support agriculture, both cropping and grazing, with remaining intact or remnant woodland vegetation on the flats occurring as scattered patches within a predominantly agricultural landscape.

5.3 Vegetation in the proposal site

5.3.1 Native vegetation extent

The majority of the proposal site has been cleared and used for agriculture (sheep and cattle grazing, and cropping). The majority of the vegetation is exotic pastures and cropping land. The solar farm site has been extensively cleared and cultivated, with cropping and improved pasture dominated by exotic species comprising 267.43 hectares of the site and native vegetation just 0.2 hectares.

The transmission line route and switchyard site has also been predominantly cleared of remnant woodland vegetation, however native grassland species have persisted in the central portion of the alignment with derived native grassland dominating. There are small patches of Gilgai wetland dominated by *Eleocharis* spp. with native grass species such as *Cynodon dactylon* (Couch) and *Enteropogon acicularis* (Curly Windmill Grass) surrounding the gilgais, and Weeping Myall woodland. The western section of the alignment traverses the edge of a Crown Reserve, which is predominantly comprised of woodland dominated by Grey Box, with the alignment also crossing two narrow plantings of non-local native eucalypts.

There is a total extent of 19.95 hectares of native vegetation mapped within the solar farm site boundary and transmission line easement corridor (including the switchyard site). Of this, 3.9 hectares is within the area of impact, with 0.2 hectares comprised of planted native trees within the solar farm site, and 3.98 hectares, comprised of remnant native woodland patches and derived native grassland within the transmission alignment (see Table 5-1).

5.3.2 Plant community types

Several small patches of remnant woodland, three native tree plantings, and several moderately sized patches of derived native grassland are present in the proposal site. Woodland that is connected to larger patches, such as the Crown Reserve in the western section of the study area, and Weeping Myall woodland in the central section, generally feature higher native groundcover probably due to the lower level of ongoing disturbance. Planted native trees in the solar farm site feature native species in the groundcover, however the relative cover of exotic species is higher, probably due to the ongoing disturbance and modification of the surrounding area by grazing and cropping activities. These areas of native vegetation have been mapped and described in the proposal site in accordance with the BAM. The remnant woodland, native planting and derived native grassland patches correspond to six PCTs; one within the solar farm site and five within the transmission line alignment. The vegetation types (including PCTs, derived grassland and non-native or non-indigenous vegetation) mapped within the study area are summarised in Table 5-1.

The derived native grasslands that occur at the proposal site are generally continuous with the understories of the surrounding remnant woodland patches and are considered to be derived from the clearing of the original woodland PCT. For this reason, different areas of derived native grassland have been assigned to the woodland PCTs that are likely to have originally occurred based on their landscape position. In determining the original woodland PCT that would have occurred at a location, consideration was given to nearby woodland patches (within and outside of the proposal site) and any scattered paddock trees present. Native plantings that are comprised of NSW endemic species were placed into the closest matching PCT based on species, landform and soil type.

Three of the PCTs identified within the proposal site comprise occurrences of threatened ecological communities under the EPBC Act and/or the BC Act (see section 6.2.3).

Table 5-1: Vegetation in the proposal site

Vegetation type	BC Act status	EPBC status	Extent in proposal site (ha)
<i>Solar farm</i>			
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - planted	Endangered ecological community	Does not meet the key diagnostic characteristics in the listing advice	0.23
Cropped/predominantly exotic grassland and category 1 plantings	Not listed	Not listed	267.43
<i>Transmission line</i>			
PCTID 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Endangered ecological community	Endangered ecological community	0.65
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - good	Endangered ecological community	Endangered ecological community	0.59
PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - derived native grassland	Endangered ecological community	Endangered ecological community	0.01
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - good	Endangered ecological community	Endangered ecological community	0.38
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - derived native grassland	Endangered ecological community	Endangered ecological community	0.0025

Vegetation type	BC Act status	EPBC status	Extent in proposal site (ha)
PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - derived scrub	Endangered ecological community	Endangered ecological community	1.40
PCTID 244 – Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	Not listed	Does not meet the key diagnostic characteristics in the listing advice	0.68
PCTID 360 – Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion	Not listed	Not listed	0.004
Planted vegetation	Not listed	Not listed	0.37
Cropped/predominantly exotic grassland, plantings	Not listed	Not listed	0.5
Total			272.27

5.3.3 Vegetation zones

The historical clearing and management for agricultural practices versus differing management practices for Crown Reserve meant that some PCTs had multiple condition states across the proposal site. Where appropriate, PCTs were split into multiple vegetation zones according to different vegetation condition classes. Many areas of native vegetation within the proposal site retained a layer of native canopy with a predominantly native understorey and were assigned to a 'good' condition. Obvious changes to condition were separated into different zones and included areas of grassland derived from clearing of the over storey or planted trees.

A total of nine vegetation zones were identified at the proposal site, comprising one at the solar farm site and eight within the transmission line alignment. The vegetation zones identified within the proposal site are detailed in Table 5-2 and shown on Figure 5.1 and Figure 5.2.

Table 5-2: Vegetation within the proposal site

Vegetation zone	PCT ID	PCT	Condition	Area	Patch size (ha)	Patch size class
<i>Solar farm</i>						
1	76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - planting	Planting	0.23	2	<5
-	-	Non-native vegetation (cropped/predominantly exotic grassland and category 1 plantings)	-	267.43	-	-
<i>Transmission line</i>						
2	26	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion - good	Good	0.6500	126	≥100
3	76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Good	0.5900	126	≥100
4*	76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Derived native grassland	0.0098	126	≥100
5	80	Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Good	0.3800	218	≥100
6*	80	Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Derived native grassland	0.0025	218	≥100

Vegetation zone	PCT ID	PCT	Condition	Area	Patch size (ha)	Patch size class
7	80	Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Derived scrub	1.4000	218	≥100
8	244	Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	Planting	0.6800	218	≥100
9*	360	Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion	Good	0.0040	126	≥100
-	-	Non-native vegetation (cropped/predominantly exotic grassland, plantings)	-	0.5000	-	-

* These vegetation zones were removed from the BAM calculator. Due to their very small size the BAM calculator defaulted the impact area to 0 for each of the zones and a change in VI score could not be calculated. See section 3.2.2 for further information.

5.3.4 Vegetation profiles

Description profiles of the PCTs present in the study area are provided in Table 5-3 to Table 5-7. Planted and non-native vegetation are described in Table 5-8 and Table 5-9, respectively. Vegetation zones 4, 6 and 9 are described below, despite being subsequently removed from the BAM calculator due to their very small area.


Table 5-3 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

Attribute	Description
Vegetation Formation	Semi-arid Woodlands (grassy sub-formation)
Vegetation Class	Riverine Plain Woodlands
PCT ID	26
PCT % Cleared	90%
Plots sampled	2 (vegetation zone 2)
Floristic description	Mid-high open woodland up to eight metres high dominated by Weeping myall (<i>Acacia pendula</i>). Other tree species include Belah (<i>Casuarina cristata</i>), while Black Box (<i>E. largiflorens</i>) and River Red Gum may occur in depressions. Chenopod shrubs may be absent but if present include <i>Rhagodia spinescens</i> , <i>Maireana decalvans</i> , <i>Atriplex nummularia</i> , <i>Maireana aphylla</i> and <i>Chenopodium nitrariaceum</i> . Other shrub species that occur include <i>Hakea leucoptera</i> , <i>Santalum lanceolatum</i> and <i>Exocarpos aphyllus</i> . The groundcover is dominated by grass species and includes <i>Rytidosperma caespitosum</i> , <i>Rytidosperma setaceum</i> , <i>Austrostipa aristiglumis</i> , <i>Austrostipa scabra</i> , <i>Austrostipa nodosa</i> and <i>Sporobolus caroli</i> . Saltbush species include <i>Atriplex spinibractea</i> , <i>Atriplex leptocarpa</i> and <i>Atriplex semibaccata</i> . Forb species include <i>Alternanthera denticulata</i> , <i>Myriocephalus rhizocephalus</i> , <i>Centipeda cunninghamii</i> , <i>Rhodanthe corymbiflora</i> and <i>Vittadinia cuneata</i> .
Justification for PCT selection	The PCT was dominated by Weeping Myall on loam soils on alluvial plains north of Forbes consistent with the landform position, dominant canopy, soil types and location attributes described for this PCT in the BioNet Vegetation Classification database. Multiple small shrub and ground cover species listed in BioNet for this PCT occurred in the plot.
Conservation significance	The woodland occurrences of this community at the proposal site are consistent with the final determination for the EEC <i>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions</i> (BC Act). The woodland occurrences are also consistent with the related EEC <i>Weeping Myall Woodlands</i> as listed under the EPBC Act.

Attribute	Description
Photograph	 <p>Photograph 1 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.</p>

Table 5-4 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions


Attribute	Description
Vegetation Formation	Grassy Woodlands
Vegetation Class	Floodplain Transition Woodlands
PCT ID	76
PCT % Cleared	92%
Plots sampled	P3 (planting form, vegetation zone 1 – plantings in central section of solar farm site are consistent. Part of the planting has been classified as Category 1 land due its absence prior to 1990) P4 (woodland form, vegetation zone 3) P9 (derived native grassland form, vegetation zone 4)
Floristic description	This community is a tall woodland to 25 metres high dominated by Western Grey Box (<i>Eucalyptus microcarpa</i>), often as the only tree species. Other canopy species that may occur include Yellow Box (<i>E. melliodora</i>), White Cypress Pine (<i>Callitris glaucophylla</i>) and minor Buloke (<i>Allocasuarina leuhmannii</i>). The shrub layer if present is sparse and includes <i>Dodonaea viscosa subsp. cuneata</i> , <i>Acacia buxifolia</i> , <i>Acacia acinacea</i> , <i>Acacia hakeoides</i> , <i>Bursaria spinosa</i> . A mid-dense or dense, grassy ground cover is present composed of <i>Rytidosperma caespitosum</i> , <i>Rytidosperma setaceum</i> , <i>Austrostipa scabra</i> , <i>Paspalidium constrictum</i> , <i>Themeda australis</i> , <i>Austrostipa aristiglumis</i> , <i>Aristida behriana</i> and <i>Anthosachne scabra</i> . The small scrambler <i>Einadia nutans</i>

Attribute	Description
	<p>is usually present. Native forbs include <i>Sida corrugata</i>, <i>Wahlenbergia gracilis</i>, <i>Vittadinia gracilis</i>, <i>Dianella porracea</i>, <i>Oxalis perennans</i> and <i>Chamaesyce drummondii</i>.</p>
Justification for PCT selection	<p>The PCT was dominated by a canopy of Western Grey Box on clay soils on undulating alluvial plains north of Forbes, which is the northern extent of the community consistent with the landform position, dominant canopy, soil types and location attributes described for this PCT in the BioNet Vegetation Classification database. Multiple ground cover species consistent described for this PCT in the BioNet occurred in the plot. The grassland form of the community is consistent with these attributes, other than absence of a Western Grey Box canopy and occurs adjacent to the woodland form of the community.</p> <p>The planting within the solar farm site is a mixed planting including Western Grey Box, River Red Gum and River Oak (<i>Casuarina cunninghamiana</i>). Given the presence of planted Western Grey Box, and connectivity with remnant Western Grey Box woodland patches, in an equivalent landscape position, the planting has been placed in this PCT as the closest fit PCT.</p>
Conservation significance	<p>Occurrences of this community within the study area are consistent with the final determination for the EEC <i>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions</i>. These patches are also commensurate with the related EEC listed under the EPBC Act as <i>Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia</i>.</p> <p>The derived grassland form of the community also classifies for listing under the BC and EPBC Acts due to being dominated by native species, patches being of an appropriate size and the ground layer containing at least 12 native species.</p> <p>The planting form of the community classifies for listing under the BC Act, however does not meet the key diagnostic characteristics in the listing advice for the EPBC Act form of the community due to the low canopy cover and small size class of the trees in the planted areas.</p>
Photograph	

Attribute	Description
	<p>Photograph 2 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (planting)</p>  <p>Photograph 3 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (remnant woodland)</p>  <p>Photograph 4 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (derived native grassland)</p>

Table 5-5 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion

Attribute	Description
Vegetation Formation	Grassy Woodlands
Vegetation Class	Floodplain Transition Woodlands
PCT ID	80
PCT % Cleared	83%
Plots sampled	PD (woodland form, vegetation zone 5) PF (derived native grassland form, vegetation zone 6) 3 (derived scrub form, vegetation zone 7)
Floristic description	This community is a tall woodland up to 25 metres high but averaging about 20 metres and co-dominated by Western Grey Box and White Cypress Pine. Other trees may include Yellow Box, Buloke, <i>Pittosporum angustifolium</i> and Kurrajong (<i>Brachychiton populneus</i>). If present, a sparse layer of shrubs includes Wilga (<i>Geijera parviflora</i>), <i>Eremophila deserti</i> , Quandong (<i>Santalum acuminatum</i>) and wattles such as <i>Acacia deanei</i> subsp. <i>deanei</i> , <i>Acacia hakeoides</i> , <i>Acacia brachybotrya</i> and <i>Acacia buxifolia</i> . The low shrub <i>Maireana microphylla</i> is often the most common shrub present where tall shrubs are absent. A sparse to mid-dense ground cover includes sub shrubs such as <i>Einadia nutans</i> and <i>Eremophila debilis</i> with grass species such as <i>Austrostipa scabra</i> , <i>Rytidosperma setaceum</i> , <i>Rytidosperma fulvum</i> , <i>Anthosachne scabra</i> , <i>Enteropogon acicularis</i> and <i>Aristida ramosa</i> . Forb species include <i>Calotis cuneifolia</i> , <i>Sida corrugata</i> , <i>Dichondra</i> sp. A, <i>Daucus glochidiatus</i> , <i>Oxalis perennans</i> , <i>Arthropodium minus</i> , <i>Bulbine</i> spp. and <i>Goodenia pinnatifida</i> . The rock fern <i>Cheilanthes sieberi</i> is common along with the graminoid <i>Lomandra filiformis</i> .
Justification for PCT selection	The PCT was dominated by a canopy of Western Grey Box and to a lesser extent White Cypress Pine on clay-loam soils on alluvial plains consistent with the attributes described for this PCT in the BioNet Vegetation Classification database (landform position, dominant canopy, soil types, location). Multiple shrub and ground cover species listed in BioNet for this PCT occurred in the plots sampled. The grassland form of the community is consistent with these attributes, other than the absence of canopy species and occurs adjacent to the woodland form of the community. The derived scrub form of the community is dominated by White Cypress Pine as a small tree layer due to historical clearing of the community.
Conservation significance	Occurrences of this community within the study area are consistent with the final determination for the EEC <i>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions</i> . These patches are also commensurate with the related EEC listed under the EPBC Act as <i>Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia</i> . The derived grassland and derived scrub forms of the community also classifies for listing under the BC and EPBC Acts due to being dominated by native species, patches being of an appropriate size and the ground layer containing at least 12 native species. These forms of the community are connected to the woodland form and part of the same patch.

Attribute	Description
<p>Photograph</p>	 <p>Photograph 5 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion (remnant woodland)</p>



Attribute	Description
	 <p>Photograph 6 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion (derived native grassland)</p>  <p>Photograph 7 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion (derived scrub)</p>

Table 5-6 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)

Attribute	Description
Vegetation Formation	Grassy Woodlands
Vegetation Class	Floodplain Transition Woodlands
PCT ID	244
PCT % Cleared	73%
Plots sampled	4 (vegetation zone 8)
Floristic description	This community is a mid-high to tall woodland or open woodland, averaging 13 metres high, dominated by <i>Eucalyptus populnea subsp. bimbil</i> (Poplar Box). The small trees Belah or Western Rosewood (<i>Alectryon oleifolius</i>) may be present but not co-dominant. Tall shrub species include Wilga, Warrior Bush (<i>Apophyllum anomalum</i>) and Budda (<i>Eremophila mitchellii</i>). Low shrubs include <i>Maireana microphylla</i> , <i>Maireana decalvans</i> and Thorny Saltbush (<i>Rhagodia spinescens</i>). The ground cover is mid-dense to sparse and contains sub shrubs such as <i>Sclerolaena birchii</i> and <i>Sclerolaena muricata</i> and a range of grass species including <i>Rytidosperma setaceum</i> , <i>Enteropogon acicularis</i> , <i>Austrostipa scabra</i> , <i>Anthosachne scabra</i> , <i>Eragrostis parvifolia</i> , <i>Chloris truncata</i> , <i>Rytidosperma fulvum</i> and <i>Sporobolus caroli</i> . Herb species include <i>Calotis cuneifolia</i> , <i>Sida corrugata</i> , <i>Vittadinia dissecta</i> , <i>Dichondra repens</i> , <i>Rostellularia adscendens</i> subsp. <i>adscendens</i> , <i>Oxalis perennans</i> and <i>Rumex brownii</i> . Sedges such as <i>Eleocharis plana</i> and <i>Carex inversa</i> , rushes (<i>Juncus</i> spp.) and the wetland fern Nardoo (<i>Marsilea drummondii</i>) grow in slight depressions.
Justification for PCT selection	In the proposal site this PCT occurs as a planting with the dominant canopy species being Poplar Box. Although the groundcover is dominated by introduced species, many of the native species that occur are consistent with those in the PCT description. This was the closest fit PCT based on the distribution information in the PCT database (lower slopes subregion and occurrence on flats on alluvial plains).
Conservation significance	The occurrence of this community within the study area does not meet the key diagnostic characteristics in the listing advice for <i>Poplar Box Grassy Woodland on Alluvial Plains</i> as listed under the EPBC Act due to the absence of mature trees or a range of tree ages in the patch.


Attribute	Description
Photograph	 <p>Photograph 8 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)</p>

Table 5-7 Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Attribute	Description
Vegetation Formation	Freshwater Wetlands
Vegetation Class	Inland Floodplain Swamps
PCT ID	360
PCT % Cleared	90%
Plots sampled	PA
Floristic description	<p>This community occurs as small open wetlands in gilgai depressions dominated by wetland grasses such as <i>Amphibromus macrorhinus</i> and <i>Amphibromus nervosus</i> and wetland herbs such as <i>Craspedia variabilis</i>, <i>Myriophyllum papillosum</i>, <i>Neopaxia australasica</i>, <i>Triglochin striatum</i>, <i>Swainsona procumbens</i>, <i>Utricularia dichotoma</i> and <i>Ranunculus inundatus</i>. On higher ground within the depressions grass species include <i>Themeda triandra</i>, <i>Rytidosperma caespitosa</i>, <i>Anthosachne scabra</i> and <i>Bothriochloa macra</i> and forb species such as <i>Goodenia hederacea</i>, <i>Bulbine bulbosa</i>, <i>Burchardia umbellata</i>, <i>Leptorhynchus squamatus</i>, <i>Wurmbea dioica</i> and <i>Eryngium ovium</i>. Sedges such as <i>Eleocharis acuta</i>, <i>Carex appressa</i> and <i>Carex tereticaulis</i> are often present. There was no canopy or shrub layer, which are often characteristic of the PCT on its edges.</p> <p>The survey period was following a period of high rainfall, with gilgais containing water and wetland species being prevalent in and surrounding the depressions, including <i>Eleocharis</i> spp. <i>Juncus</i> spp. and <i>Carex</i> spp. Disturbance adjacent to the community due to agricultural practices has modified the surrounding grassland with introduced species more prevalent in more open areas.</p>
Justification for PCT selection	The occurrence of this PCT within the study area is consistent with the attributes described for this PCT in the BioNet Vegetation Classification

Attribute	Description
	database (landform position, dominant canopy, soil types, location), notably including its occurrence on heavy clay gilgaied soils on alluvial terraces, which are a key diagnostic feature of the community and readily identified in the field.
Conservation significance	Not listed
Photograph	 <p>Photograph 9 Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion.</p>

Table 5-8 Planted vegetation

Attribute	Description
Vegetation Formation	N/A
Vegetation Class	N/A
PCT ID	N/A
PCT % Cleared	N/A
Plots sampled	N/A
Floristic description	The plantings in the western section of the proposal site are comprised of non-locally native eucalypts including Sugar Gum (<i>Eucalyptus cladocalyx</i>) and mallee species not native to NSW. For this reason, these planting do not conform to any NSW PCT and are therefore not required to be further assessed as native vegetation.
Justification for PCT selection	N/A
Conservation significance	N/A

Attribute	Description
Photograph	 <p>Photograph 10 Planted mallee in the western section of the transmission line alignment.</p>  <p>Photograph 11 Planted Sugar Gum in the western section of the transmission line alignment.</p>

Table 5-9 Non-native vegetation

Attribute	Description
Vegetation Formation	N/A
Vegetation Class	N/A
PCT ID	N/A
PCT % Cleared	N/A

Attribute	Description
Plots sampled	N/A
Floristic description	Non-native vegetation in the study area is dominated by exotic grasslands comprising pastures or cropping. The dominant introduced species recorded within these areas and other exotic grasslands, including disturbed roadsides, include Wimmera Ryegrass (<i>Lolium rigidum</i>), Capeweed (<i>Arctotheca calendula</i>), Barley Grass (<i>Hordeum leporinum</i>), Paterson's Curse (<i>Echium plantagineum</i>), Small-flowered Mallow (<i>Malva parviflora</i>), St John's Wort (<i>Hypericum perforatum</i>) and Winter Grass (<i>Poa annua</i>).
Justification for PCT selection	N/A
Conservation significance	N/A
Photograph	

Attribute	Description
	<p>Photograph 12 Non-native vegetation (exotic grassland) along the transmission alignment.</p>  <p>Photograph 13 Non-native vegetation (cropped) within the solar farm site.</p>

5.3.5 Groundwater dependent ecosystems

The *NSW State Groundwater Dependent Ecosystems Policy* defines groundwater dependent ecosystems (GDEs) as ecosystems which have their species composition, and their natural ecological processes determined by groundwater (DLWC 2002). Ecosystems vary dramatically in the degree of dependency of groundwater, from having no apparent dependence through to being entirely dependent on it (DLWC 2002).

Dependence (or interaction) of the vegetation communities identified within the proposal site on groundwater was determined by searching the Atlas of GDEs (BOM 2021a). This Atlas predicts the occurrence of groundwater dependent ecosystems and ecosystems that potentially use groundwater. It shows ecosystems that interact with the subsurface expression of groundwater (including vegetation ecosystems) or the surface expression of groundwater (such as rivers and wetlands). The Atlas also shows the likelihood that landscapes are accessing water in addition to rainfall, such as soil water, surface water or groundwater.

Native vegetation within the proposal site is mapped as having a low potential for being reliant on the subsurface presence of groundwater (BOM 2021a). There are some areas of low potential for terrestrial GDEs, predominantly in the western section of the study area and includes some corresponding areas of mapped Grey Box dominated woodland. In addition, there is an area in the central section of the transmission alignment mapped as having high potential for a terrestrial GDE, however the GDE database has the area mapped as River Red Gum – Lignum woodland. Field surveys did not identify this vegetation type in the corresponding area, which is comprised of Grey Box dominated woodland and therefore unlikely to represent a high potential GDE. The gilgai wetland areas are not mapped as GDEs, which is likely a reflection of their dependence on rainfall and the impeded drainage within the

wetland areas. The gilgai depressions fill and empty in response to rainfall events and subsequent dry periods.

5.4 Fauna habitat resources

5.4.1 Fauna species

A total of 62 species of fauna were recorded during the field survey. These included 57 bird species (including one introduced species), two mammal species (comprising one introduced species and one microbat species), and three frog species (see Appendix B).

5.4.2 Fauna habitats

Better quality fauna habitat resources at the proposal site are associated with patches of good quality woodland dominated by Grey Box and containing hollow-bearing trees, and a smaller patch of woodland dominated by Weeping Myall. Locally native tree plantings dominated by Poplar Box and a mixed planting comprised of Grey Box/River Red Gum/River Oak also provide habitat resources for native fauna species. There are areas of derived native grassland and wetland areas that also provide potential fauna habitat.

There are no caves or culverts, cliff lines, substantial rock outcrops, important wetlands or waterbodies within the proposal site. Fauna habitats present at the site are detail in Table 5-10 to Table 5-12.

Table 5-10 Fauna habitats: native grassland

Native grassland	
Description	Dominated by native grass species within the central and western section of the transmission alignment. Occasional isolated paddock trees, some containing hollows, are present and some areas of grassland occur adjacent to patches of woodland. Paddock tree species mostly comprise Western Grey Box with some Buloke occurring in the eastern section of the proposal site. Commonly occurring native groundcover species include Windmill Grass (<i>Chloris truncata</i>), <i>Digitaria</i> spp., Purple Wiregrass (<i>Aristida ramosa</i>) and Curly Windmill Grass (<i>Enteropogon acicularis</i>).
Fauna recorded	A number of bird species typically associated with open grazing country were recorded. Galahs (<i>Eolophus roseicapillus</i>), Red-rumped Parrot (<i>Psephotus haematonotus</i>) and Eastern Rosella (<i>Platycercus eximius</i>) were recorded in remnant roadside vegetation and scattered paddock trees amongst grassland habitat, often near hollows. The introduced Common Starling (<i>Sturnus vulgaris</i>) is likely to compete with native bird species for hollows. Small flocks of the Noisy Miner (<i>Manorina melanocephala</i>) were observed. Ravens (<i>Corvus spp.</i>) Australian Magpies (<i>Cracticus tibicen</i>) and Pied Butcherbirds (<i>Cracticus nigrogularis</i>) were frequently seen perching on fences and powerlines. Flocks of Welcome Swallows (<i>Hirundo neoxena</i>) were seen foraging above and in the pasture and grassland, and Rufous Songlarks (<i>Cincloramphus mathewsi</i>) were observed and heard singing in open grassland areas. Black Kites (<i>Milvus migrans</i>) were observed hunting over open paddock grasslands in the study area. The introduced Brown Hare (<i>Lepus capensis</i>) was observed in open paddocks.
Threatened species	Superb Parrots (<i>Polytelis swainsonii</i>) were observed traversing the paddocks and open grassland area within the proposal site during multiple site survey periods. Additionally, they were recorded perching and foraging in Western Grey Box trees in woodland adjacent to grassland areas within the proposal site (see Figure 6.1).

Native grassland



Photograph 14 Derived native grassland habitat

Table 5-11 Fauna habitats: woodland patches

Roadside vegetation	
Description	Features a canopy of Western Grey Box throughout the study area, with some patches also containing White Cypress Pine. A small patch of Weeping Myall woodland is present in the central section of the transmission alignment. Hollow-bearing trees are present within the woodland patches, including narrow remnants along road corridors. Leaf litter and fallen timber is present to varying degrees throughout patches, with higher abundances occurring in Western Grey Box dominated woodland where cypress pine is absent. Regeneration is occurring throughout most patches of woodland. There is some connectivity along roadside corridors extending into adjacent private property and in the western section of the study area vegetation is well connected to the large patch of woodland in the adjacent Crown Reserve. Groundcover is a mixture of native and introduced species and dominated by grass and forb species.
Fauna recorded	A number of woodland bird species were recorded in these areas, including the Eastern Rosella (<i>Platycercus eximius</i>), Australian Magpie (<i>Cracticus tibicen</i>) and Yellow-rumped Thornbill (<i>Acanthiza chrysorrhoa</i>). Cockatiels (<i>Nymphicus hollandicus</i>) were recorded within Western Grey Box woodland along Forest road on multiple occasions and observed entering hollows within the woodland. A single microbat species – the White-striped Freetail-bat (<i>Austronomus australis</i>) was recorded on the edge of woodland habitat at the far-western extent of the proposed transmission line (see Figure 6.1).
Threatened species	The Grey-crowned Babbler was recorded calling in a patch of Western Grey Box – White Cypress Pine woodland in the western portion of the site (see Figure 6.1).



Photograph 15 Native woodland

Table 5-12 Fauna habitats: farm dams and wetlands

Farm dams	
Description	<p>There are small patches of Gilgai wetland dominated by <i>Eleocharis</i> spp in the central portion of the study area (see Table 5-7). Gilgai wetlands comprise 'Type 2 – moderately sensitive key fish habitat (DPI 2013).</p> <p>Each of the other waterbodies in the study area are not considered key fish habitat comprising either: first streams on gaining streams (based on the Strahler method of stream ordering); farm dams on first and second order streams or unmapped gullies; or agricultural and urban drains (DPI 2013).</p> <p>Along Forest Road there are depressions and table drains within the road reserve that would hold water for periods following rainfall, which was evident during the survey period. These flooded areas contained emergent and fringing vegetation typical of wetland areas, including <i>Eleocharis</i> spp., rushes and sedges (see Photograph 16).</p> <p>Seven farm dams are present in the proposal site. Farm dams contained no emergent vegetation and fringing vegetation was generally limited to common grass species and would have limited habitat value for fish and other aquatic fauna. These waterbodies are used as watering points by stock (see Photograph 17).</p> <p>Small, undefined drainage lines are also present, some leading to and from these dams. Some of these drainage lines eventually flow into the Lachlan River to the south via a network of drainage lines. These drainage lines tended to be depressions in the grassland, with some merging with the table drains along Forest Road. No woody debris or snags are present.</p> <p>There is no key fish habitat mapped at the proposal site or any adjacent or downstream areas that could be affected by the proposal (DPI, 2007).</p>

Farm dams

Fauna recorded

Common frogs such as the Eastern Sign-bearing Froglet (*Crinia parinsignifera*) and Bibron's Toadlet (*Pseudophryne bibronii*) were heard calling within the gilgai habitat in the central section of the transmission alignment. Bird species typical of wetland habitats such as ducks and herons were recorded at the dams in the study area and gilgai habitat, including Plumed Whistling Duck (*Dendrocygna eytoni*), Australian Wood Duck (*Chenonetta jubata*) and White-necked Heron (*Ardea pacifica*). The dams and gulgais would provide a source of water for other birds, microbats and macropods. Microbats are also likely to forage for insects above water habitat.

Threatened species

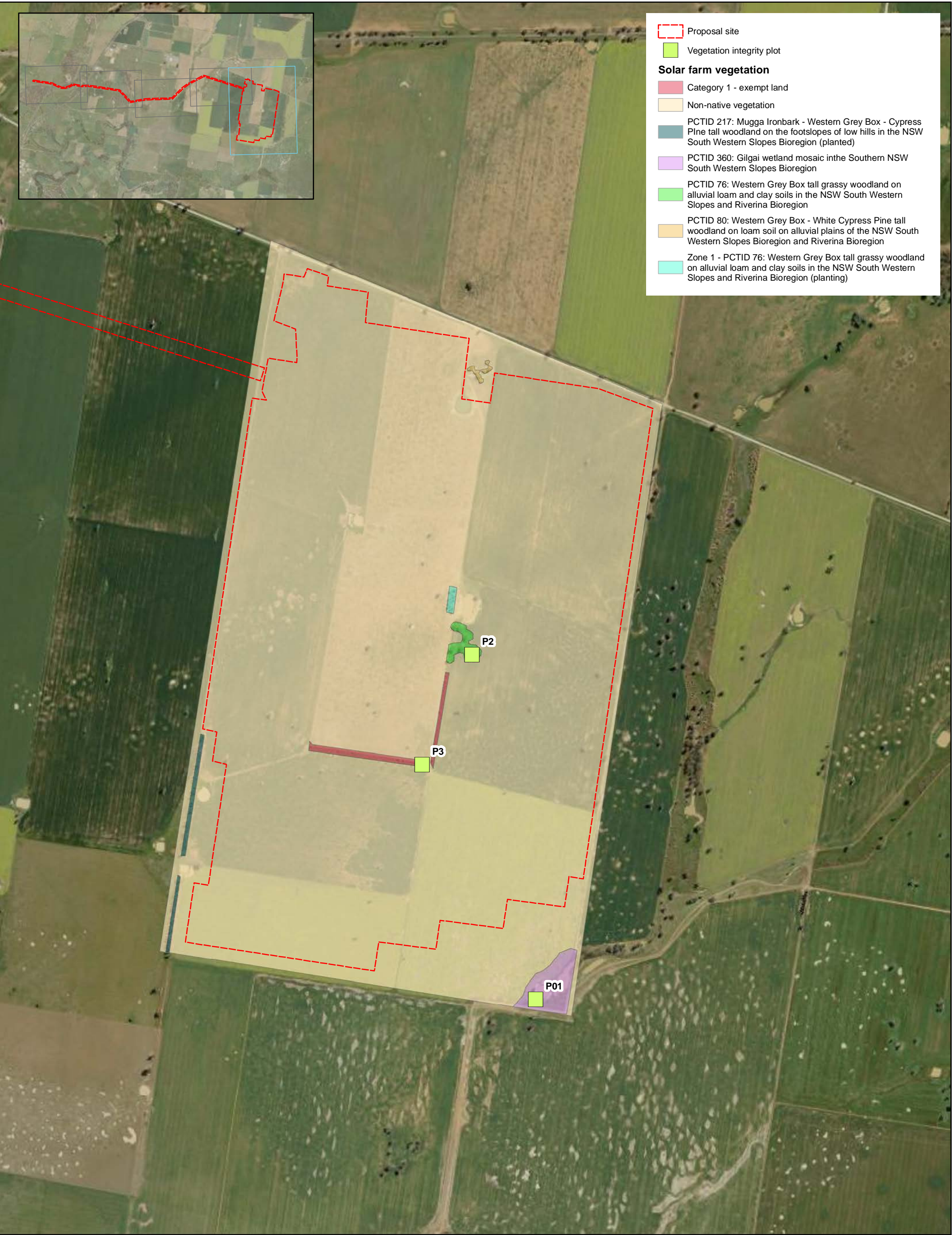
Targeted surveys for Sloan's Froglet were undertaken over two survey periods in August and the species was not recorded. No other threatened species are likely to occur in this habitat type. Threatened bird species likely to occur occasionally use water habitats as a drinking source.

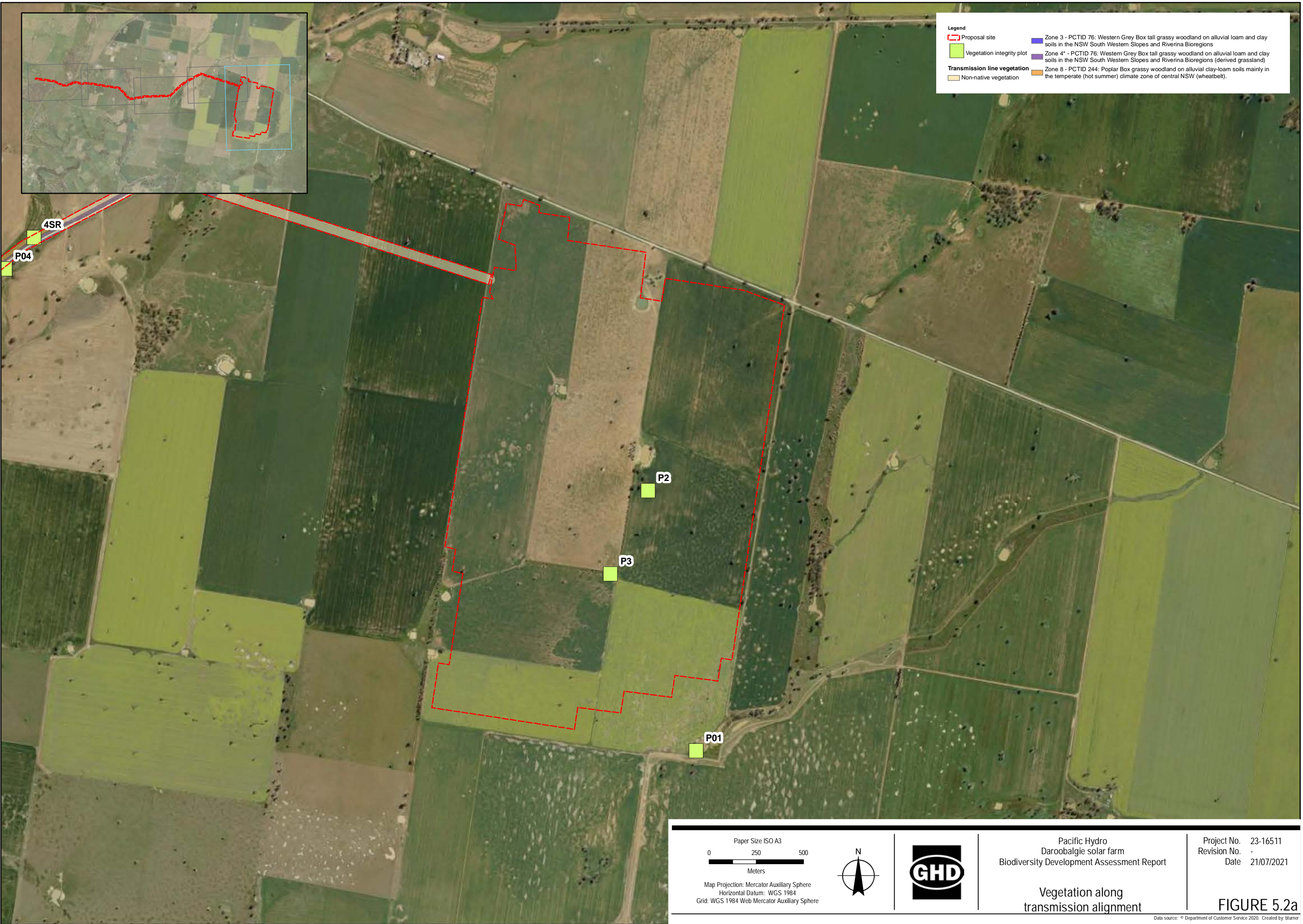


Photograph 16 Gilgai wetland



Photograph 17 Farm dam

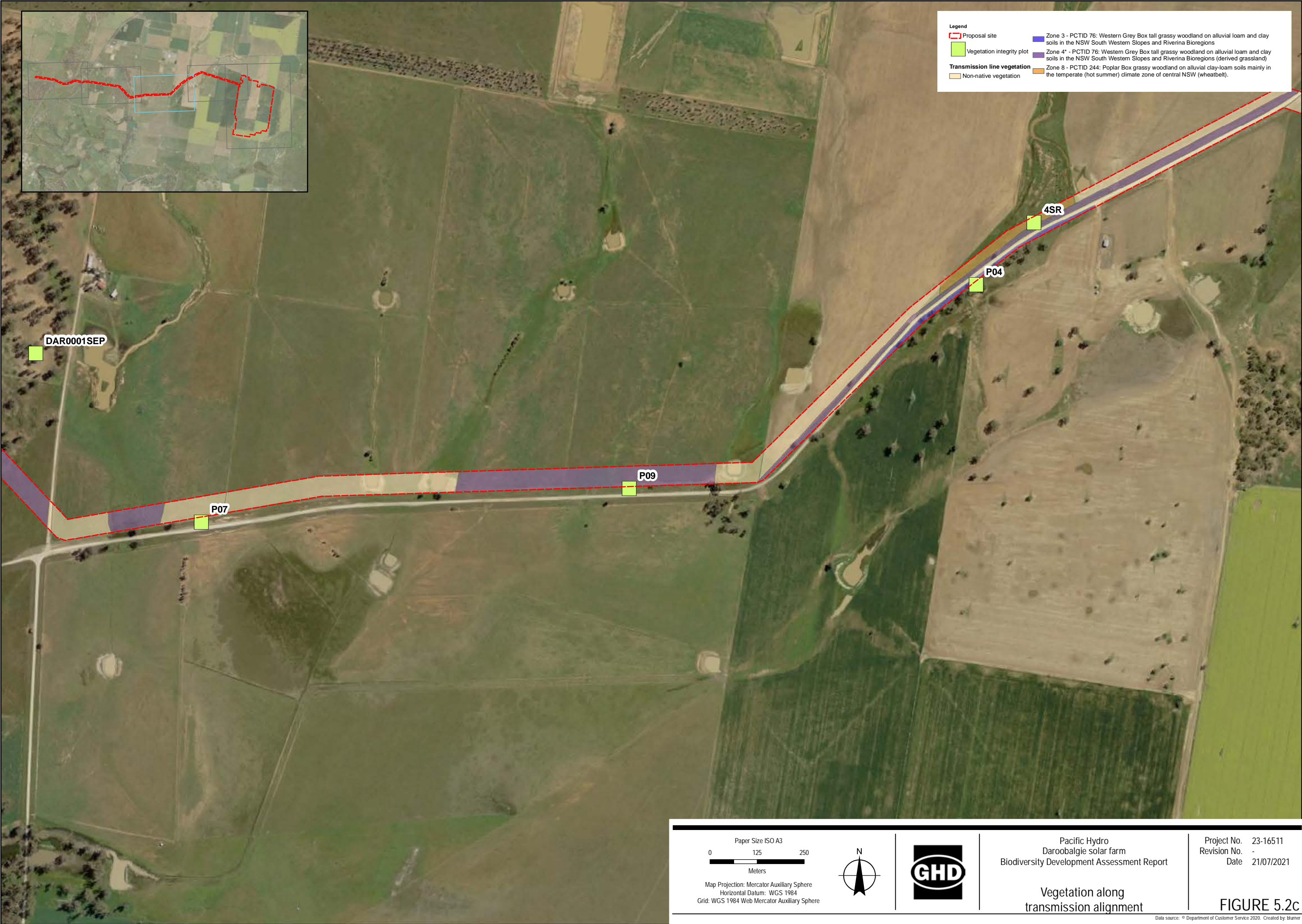




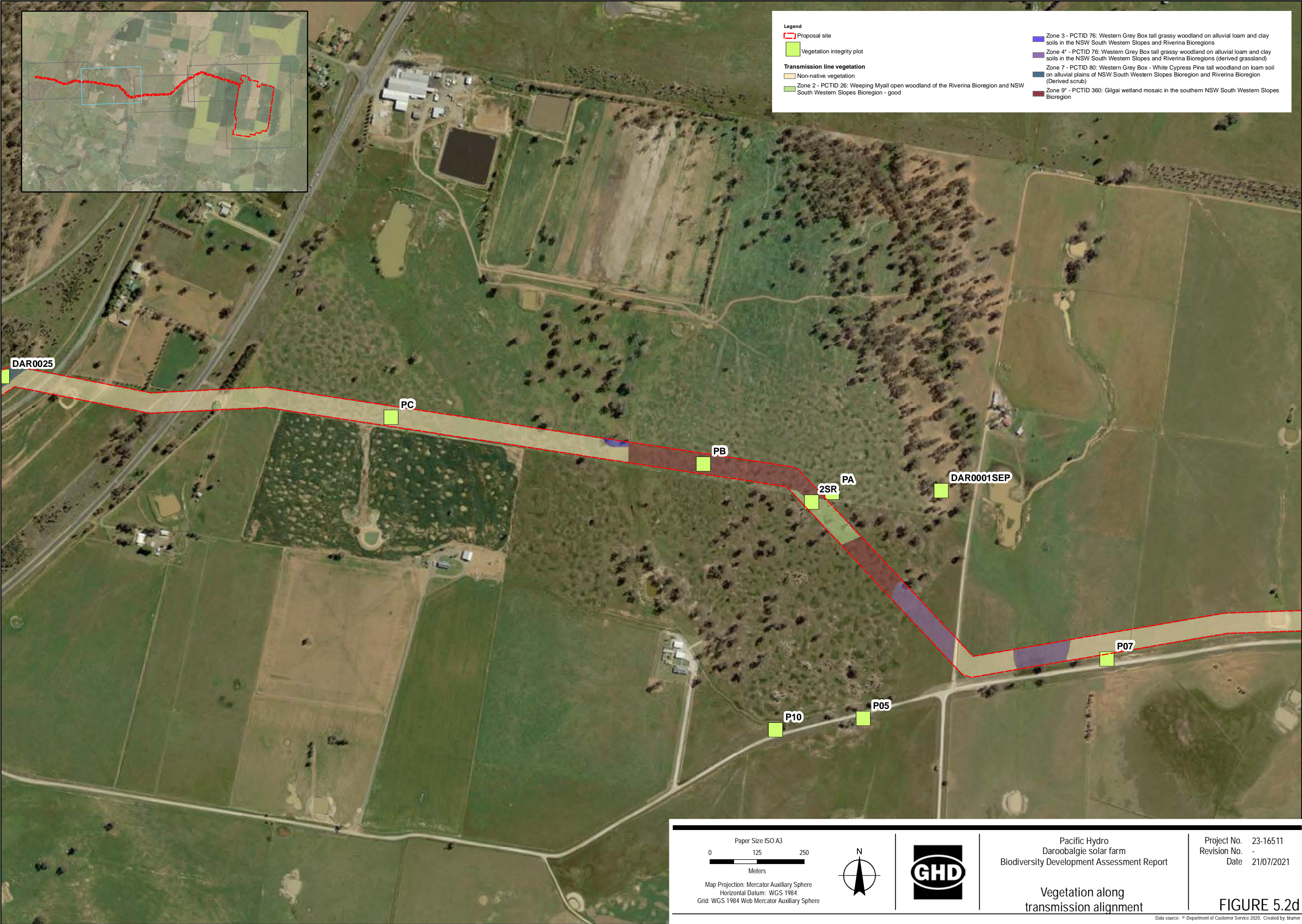
Data Disclaimer: Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2019, NSW Department of Lands, Geoscience Australia) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.



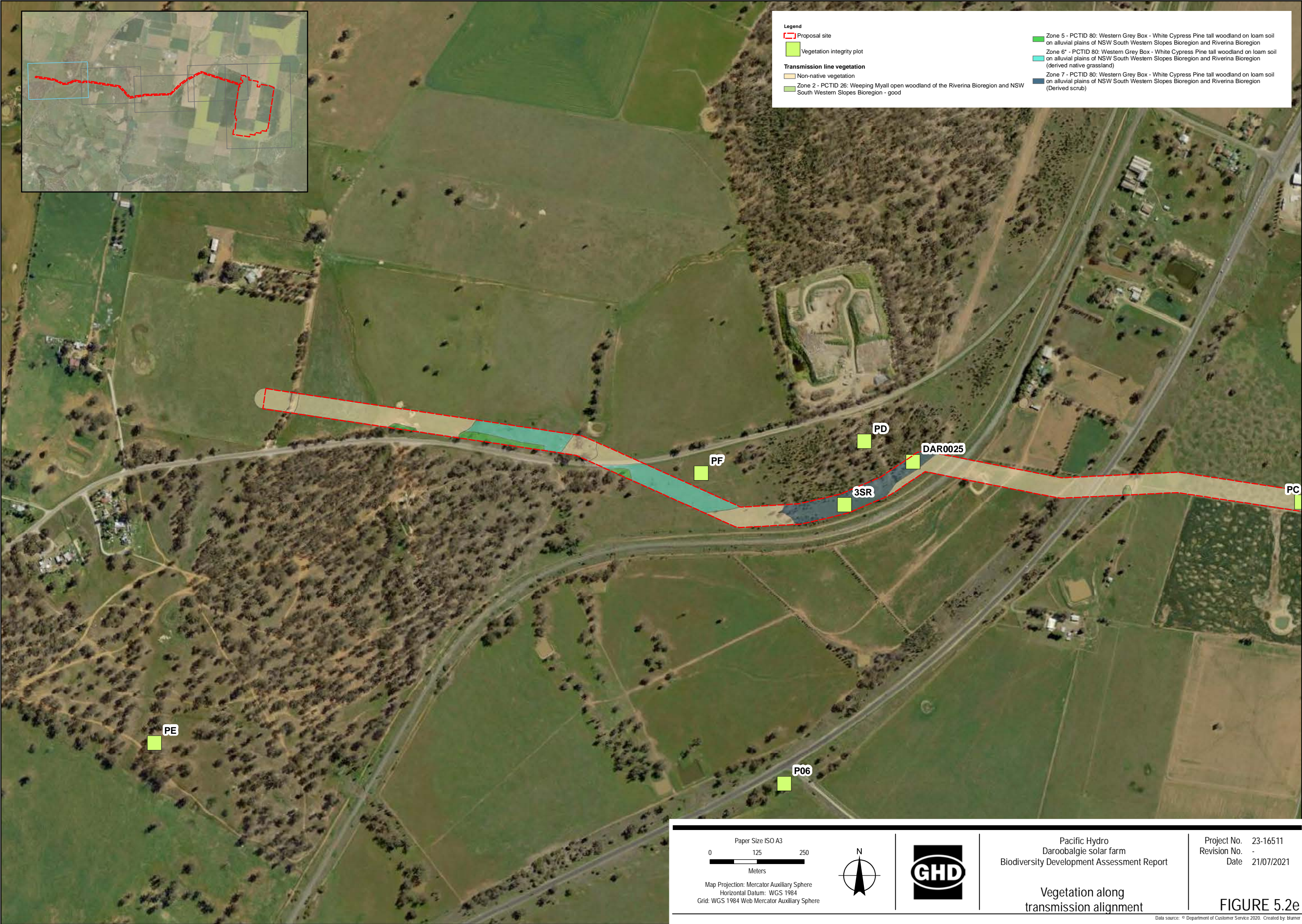
Data Disclaimer: Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2019, NSW Department of Lands, Geoscience Australia) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.



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6. Conservation significance

6.1 Identification of threatened species under the BAM

6.1.1 Predicted threatened species (ecosystem credit entities)

Based on the bioregional context for the assessment and the PCTs, patch size, vegetation cover and habitat resources present at the proposal site, the BAM calculator generates a list of threatened fauna species that are associated with native vegetation at the proposal site (i.e. potential 'predicted threatened species', or potential 'ecosystem credit entities'). The potential for these predicted threatened species to occur within the site were further refined based on the desktop assessment, habitat resources observed during field surveys and the knowledge and experience of the assessor.

The suite of 'confirmed' predicted threatened species associated with ecosystem credits required for the proposal site, and with relevant habitat resources present on the site, are listed in Table 6-1. For each confirmed predicted threatened species, the vegetation zone association is provided. Targeted surveys are not required under the BAM for these species as they are assumed to be present. It is noted that two of these species were recorded in the study area during surveys.

It should be noted that several of these species would only occur in the woodland form of the PCTs present at the proposal site and are only associated with ecosystem credits generated for impacts to woodland vegetation zones. Notably many threatened species of woodland birds would only occur in vegetation with canopy vegetation, as part of relatively extensive patch and/or with habitat resources such as abundant fallen woody debris (see Appendix A for further detail and justification).

The sensitivity to gain class is based on the species life history characteristics and ecological information. It estimates the ability of a species to respond to improvements in habitat condition at an offset site.

Table 6-1: Confirmed predicted threatened species

Common name	Scientific name	Sensitivity to gain class	Vegetation zone association
Barking Owl (foraging habitat)	<i>Ninox connivens</i>	High	76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 244 - Poplar Box grassy woodland – good
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	Moderate	76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 244 - Poplar Box grassy woodland – good
Black Falcon	<i>Falco subniger</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub

Common name	Scientific name	Sensitivity to gain class	Vegetation zone association
			244 - Poplar Box grassy woodland – good
Brolga	<i>Grus rubicunda</i>	Moderate	26 - Weeping Myall open woodland
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	High	76 - Western Grey Box tall grassy woodland – planting 76 - Western Grey Box tall grassy woodland – good 244 - Poplar Box grassy woodland – good
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>	High	80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Diamond Firetail	<i>Stagonopleura guttata</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Flame Robin	<i>Petroica phoenicea</i>	Moderate	76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub
Gilbert's Whistler	<i>Pachycephala inornata</i>	Moderate	80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub
Glossy Black-Cockatoo (foraging habitat)	<i>Calyptorhynchus lathami</i>	High	76 - Western Grey Box tall grassy woodland - planting

Common name	Scientific name	Sensitivity to gain class	Vegetation zone association
Grey Falcon	<i>Falco hypoleucos</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Grey-headed Flying-fox (foraging habitat)	<i>Pteropus poliocephalus</i>	High	76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 244 - Poplar Box grassy woodland – good
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Little Eagle (foraging habitat)	<i>Hieraaetus morphnoides</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Little Pied Bat	<i>Chalinolobus picatus</i>	High	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 244 - Poplar Box grassy woodland – good
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good

Common name	Scientific name	Sensitivity to gain class	Vegetation zone association
(foraging habitat)			76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Pied Honeyeater	<i>Certhionyx variegatus</i>	Moderate	26 - Weeping Myall open woodland 80 - Western Grey Box – White Cypress Pine tall woodland - good 244 - Poplar Box grassy woodland – good
Scarlet Robin	<i>Petroica boodang</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Speckled Warbler	<i>Chthonicola sagittata</i>	High	76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Spotted Harrier	<i>Circus assimilis</i>	Moderate	26 - Weeping Myall open woodland 244 - Poplar Box grassy woodland – good
Square-tailed Kite (foraging habitat)	<i>Lophoictinia isura</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 244 - Poplar Box grassy woodland – good
Superb Parrot (foraging habitat)	<i>Polytelis swainsonii</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Swift Parrot (foraging habitat)	<i>Lathamus discolor</i>	Moderate	76 - Western Grey Box tall grassy woodland – planting 76 - Western Grey Box tall grassy woodland – good

Common name	Scientific name	Sensitivity to gain class	Vegetation zone association
			80 - Western Grey Box – White Cypress Pine tall woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub
Turquoise Parrot	<i>Neophema pulchella</i>	High	76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Varied Sittella	<i>Daphoenositta chrysoptera</i>	Moderate	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
White Bellied Sea-Eagle (foraging habitat)	<i>Haliaeetus leucogaster</i>	High	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 76 - Western Grey Box tall grassy woodland – planting 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
White-throated Needletail (EPBC Act listed only)	<i>Hirundapus caudacutus</i>	High	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good
Yellow-bellied Sheathtail-bat	<i>Saccolaimus flaviventris</i>	High	26 - Weeping Myall open woodland 76 - Western Grey Box tall grassy woodland – good 80 - Western Grey Box – White Cypress Pine tall woodland - good 80 - Western Grey Box – White Cypress Pine tall woodland - derived scrub 244 - Poplar Box grassy woodland – good

Species indicated by **bold text** were recorded within the study area

The potential predicted threatened species listed in Table 6-2 were assessed as unlikely to occur and were excluded from the list of confirmed predicted threatened species.

Table 6-2: Excluded predicted threatened species

Common name	Scientific name	Justification
Species common to solar farm and transmission line		
Koala (foraging)	<i>Phascolarctos cinereus</i>	No habitat constraint listed in the Threatened Biodiversity Data Collection. However, this species has not been recorded in the region for an extended period and are not known to occur according to mapping of Areas of Regional Koala Significance (ARKS).
Species excluded from solar farm site		
Speckled Warbler	<i>Chthonicola sagittata</i>	No habitat constraint listed in the Threatened Biodiversity Data Collection. However, this species is known to prefer vegetation remnants larger than 100 hectares in size. Vegetation in the proposal site is comprised of an immature planting with minimal connected remnant vegetation.
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	No habitat constraint listed in the Threatened Biodiversity Data Collection. However, this species is known to prefer structurally diverse habitat. No suitable habitat for this species is present in the proposal site.
Scarlet Robin	<i>Petroica boodang</i>	No habitat constraint listed in the Threatened Biodiversity Data Collection. However, this species is known to prefer structurally diverse habitat. No suitable habitat for this species is present in the proposal site.
Species excluded from transmission line site		
Glossy Black-Cockatoo (foraging habitat)	<i>Calyptorhynchus lathami</i>	Listed habitat constraint – No Allocasuarina and Casuarina species of trees in the transmission line alignment to provide foraging habitat for the species.
Masked Owl (foraging habitat)	<i>Tyto novaehollandiae</i>	Proposal site is outside the known range for the species as mapped in the BioNet Atlas
Painted Honeyeater	<i>Grantiella picta</i>	Listed habitat constraint – No mistletoes present at a density of five per hectare.
Striped-faced Dunnart	<i>Sminthopsis macroura</i>	Proposal site is outside the known range for the species as mapped in the BioNet Atlas

6.1.2 Candidate threatened species (Species credit entities)

Threatened species that cannot reliably be predicted to occur on a development site based on PCT, distribution and habitat criteria are identified by the Threatened Biodiversity Data Collection as 'species credit' entities. In some circumstances, the particular habitat components of species assessed for ecosystem credit species, such as the breeding habitat of a cave roosting bat or forest owls, are also assessed for species credits. The credit calculator references geographic, vegetation and habitat data for the proposal site to generate a list of the species credit entities that are predicted to occur (i.e. the '*potential* candidate threatened species').

Searches of threatened species databases were also completed to identify any additional potential candidate threatened species (to those generated by the credit calculator) that are known or predicted to occur in the locality (refer to likelihood of occurrence table in Appendix A). The likelihood of occurrence of these additional potential candidate threatened species were reviewed, giving consideration to the habitats available in the study area.

Potential candidate threatened species that could occur in the study area based on the habitat resources observed during field surveys were confirmed as candidate threatened species. 'Confirmed' candidate threatened species require targeted survey in accordance with Section 5.3 of the BAM (DPIE 2020). The list of confirmed candidate threatened species is presented in Table 6-3; these species were subjected to targeted survey. Surveys were conducted in the appropriate season for all confirmed candidate threatened species and so the targeted survey results can be considered a reliable indicator of their presence or absence at the proposal site (see Table 6-3).

Table 6-3: Confirmed candidate species credit species for which surveys were conducted

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification and location
Fauna					
Barking Owl (breeding habitat)	<i>Ninox connivens</i>	None	May-Dec	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September, August and December (transmission line)
Bush Stone-curlew	<i>Burhinus grallarius</i>	None	All year	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September, August and December (transmission line)
Glossy Clack-Cockatoo	<i>Calyptrorhynchus lathamii</i>	None	April-Aug	No - surveyed	No evidence of the species was recorded at the site despite targeted

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification and location
(breeding habitat)					surveys in August (solar farm & transmission line)
Major Mitchell's Cockatoo (breeding habitat)	<i>Lophochroa leadbeateri</i>	None	Sep-Dec	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September and December (solar farm & transmission line)
Sloan's Froglet	<i>Crinia sloanei</i>	None	Jul-Aug	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in August (solar farm & transmission line)
Square-tailed Kite (breeding habitat)	<i>Lophoictinia isura</i>	None	Sep-Jan	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September and December (transmission line). No candidate nest trees with evidence of previous nesting activity by larger raptors were observed in the proposal site or surrounding area
Squirrel Glider	<i>Petaurus norfolcensis</i>	None	All year	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in August, September and December (transmission line)
Superb Parrot (breeding habitat)	<i>Polytelis swainsonii</i>	5 records	Sep-Nov	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September (solar farm & transmission line)
White-bellied Sea-Eagle (breeding habitat)	<i>Haliaeetus leucogaster</i>	None	Jul-Dec	No - surveyed	No evidence of the species was recorded at the site despite targeted

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification and location
					surveys in September, August and December (solar farm & transmission line). No candidate nest trees with evidence of previous nesting activity by larger raptors were observed in the proposal site or surrounding area
Flora					
Speargrass	<i>Austrostipa metatoris</i>	None	Oct-Nov	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September and December. The survey period was outside the specified survey months, however due to the substantial rainfall prior to surveys and the flowering of other <i>Austrostipa</i> spp. at the time, the survey period was determined to be suitable for detection of the species if present (transmission line)
Austral Pillwort	<i>Pilularia novae-hollandiae</i>	None	Oct-Dec	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in December (transmission line)
Oaklands Diuris	<i>Diuris</i> sp. (Oaklands, D.L. Jones 5380)	None	Nov	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in December. The survey period was outside the specified survey month, however due to the flowering of other <i>Diuris</i> spp. in the area at the time, the survey period was

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification and location
					determined to be suitable for detection of the species if present (transmission line)
Pine Donkey Orchid	<i>Diuris tricolor</i>	None	Sep-Oct	No - surveyed	No evidence of the species was recorded at the site in surveys in September (solar farm & transmission line)
Spike-Rush	<i>Eleocharis obicis</i>	None	Oct-Nov	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September and December. The survey period was outside the specified survey months, however due to the substantial rainfall prior to surveys and the flowering of other <i>Eleocharis</i> spp. at the time, the survey period was determined to be suitable for detection of the species if present (solar farm & transmission line)
Spiny Peppercress	<i>Lepidium aschersonii</i>	None	Nov-April	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in December (solar farm & transmission line)
Slender Darling Pea	<i>Swainsona murrayana</i>	None	September	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September (solar farm & transmission line)
Small Purple-pea	<i>Swainsona recta</i>	None	Sept-Oct	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September (solar

Common name	Scientific name	BioNet records in locality	Survey months	Presence	Justification and location
					farm & transmission line).
Silky Swainson-pea	<i>Swainsona sericea</i>	None	Sept-Oct	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in September (solar farm & transmission line).
Winged Peppergrass	<i>Lepidium monoplacoides</i>	None	Nov-Feb	No - surveyed	No evidence of the species was recorded at the site despite targeted surveys in December (transmission line)

A number of species could be reliably discounted as occurring within the study area based on the habitat types present and/or the known distribution of the species. A number of dual credit fauna species have foraging habitat present but either no potential breeding habitat was identified during the field surveys, or the species does not breed in the area. These species are **not** 'confirmed candidate threatened species' for the purposes of this assessment and do not require further assessment. Detailed justification for the conclusion is provided in Table 6-4 and/or the 'habitat/constraints' fields in the credit calculator.

Table 6-4: Excluded candidate species

Common name	Scientific name	Justification and location
Fauna		
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Proposal site is outside the known range for the species as mapped in the BioNet Atlas (transmission line*)
Glossy Black-Cockatoo – endangered population (Riverina population)	<i>Calyptorhynchus lathami</i>	Proposal site is located outside the geographic limitations of the endangered population (i.e. Carrathool, Griffith, Leeton and Narrandera LGAs) (transmission line*)
Grey-headed Flying-fox (breeding habitat)	<i>Pteropus poliocephalus</i>	No suitable breeding habitat. No breeding camps present in the area (solar farm & transmission line*)
Koala (breeding habitat)	<i>Phascolarctos cinereus</i>	No suitable breeding habitat. No core habitat present according to mapping of Areas of Regional Koala Significance (ARKS) (solar farm & transmission line*)
Masked Owl	<i>Tyto novaehollandiae</i>	Proposal site is outside the known range for the species as mapped in the BioNet Atlas (transmission line*)

Common name	Scientific name	Justification and location
Squirrel Glider	<i>Petaurus norfolcensis</i>	No suitable habitat. Vegetation in the proposal site is not connected to other areas of potential habitat (solar farm)
Swift Parrot (important area)	<i>Lathamus discolor</i>	The proposal site is outside the mapped breeding habitat and important habitat for the species (solar farm & transmission line*). Mapped important habitat occurs to the west within Back Yamma State Forest, but this area will not be impacted by the proposal.
White-browed Treecreeper – endangered population (Carrathool LGA)	<i>Climacteris affinis</i>	Proposal site is located outside the geographic limitations of the endangered population (i.e. Carrathool LGA south of the Lachlan River and Griffith LGA) (transmission line*)
Flora		
A spear-grass	<i>Austrostipa wakoolica</i>	Proposal site is located outside the geographic limitations of the species (i.e. south of Narrandera) (solar farm & transmission line*)
Lanky Buttons	<i>Leptorhynchos orientalis</i>	Proposal site is located outside the geographic limitations of the species (i.e. west of Narrandera/Lockhart Road and north of Urana/Lockhart Road) (transmission line*)
Mossgiel Daisy	<i>Brachyscome papillosa</i>	Proposal site is located outside the geographic limitations of the species (i.e. south and west of the Coolamon to Ardlethan Road, west of Lockhart and north of Rand) (solar farm & transmission line*)
Sand-hill Spider Orchid	<i>Caladenia arenaria</i>	Proposal site is located outside the geographic limitations of the species (i.e. west of Lockhart and north of Rand) (solar farm & transmission line*)

* Transmission line location also includes the switchyard

6.2 Threatened species survey results

6.2.1 Threatened flora

No threatened flora species were recorded in the proposal site during field surveys conducted in September or December, the nominated survey months for the seven candidate threatened flora species listed in Table 6-3, that would be more likely to occur in the study area.

All potential threatened plant habitat associated with native vegetation in the solar farm site and along the transmission alignment was traversed on foot, with no notable barriers to human movement or visibility encountered during the field survey. Field staff were able to traverse all areas of potential threatened flora habitat on foot, in a manner that reflected threatened species survey guidelines (DPIE 2020b, 2016; Cropper, 1993). The candidate threatened flora species can be excluded from occurring at the proposal site, given they were not located despite targeted, seasonally appropriate survey by experienced botanists familiar with each of the species.

6.2.2 Threatened fauna

Two threatened fauna species listed under the BC Act were recorded during surveys, one of which is an ecosystem credit species and the other a dual credit species (see Figure 6.1):

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) – ecosystem credit species
- Superb Parrot (*Polytelis swainsonii*) – dual credit species. This species is an ecosystem credit species for foraging habitat and a species credit species for breeding habitat.

The Superb Parrot was recorded outside the proposal site on an alternate potential transmission alignment option, and foraging adjacent to the current alignment. The species were observed foraging in remnant Western Grey Box trees. There was no evidence of breeding behaviour such as males returning to hollows to feed females or presence of fledglings despite the presence of candidate nest trees with potentially suitable hollows. No individuals were observed in the proposal site. Targeted field surveys were undertaken at a suitable time of year to detect the Superb Parrot during the breeding period, therefore it can reliably be discounted as breeding within the proposal site based on the survey effort employed.

The proposal site contains broadly suitable habitat for the additional candidate threatened species listed in Table 6-3. Targeted field surveys were undertaken at a suitable time of year to detect each of these species if present at the proposal site. None of these species were observed and there have been no local records of the species (DPIE 2021a).

The candidate threatened fauna species can be excluded from occurring at the proposal site, given they were not located despite targeted, seasonally appropriate survey by experienced ecologists familiar with each of the species and the habitat resources associated with breeding activity.

None of the waterbodies at the proposal site contain potential habitat for any threatened species listed under the FM Act (see Table 5-12).

6.2.3 Threatened ecological communities

Three of the PCTs identified within the transmission line alignment, and the PCT within the solar farm site, comprise occurrences of threatened ecological communities under the BC Act:

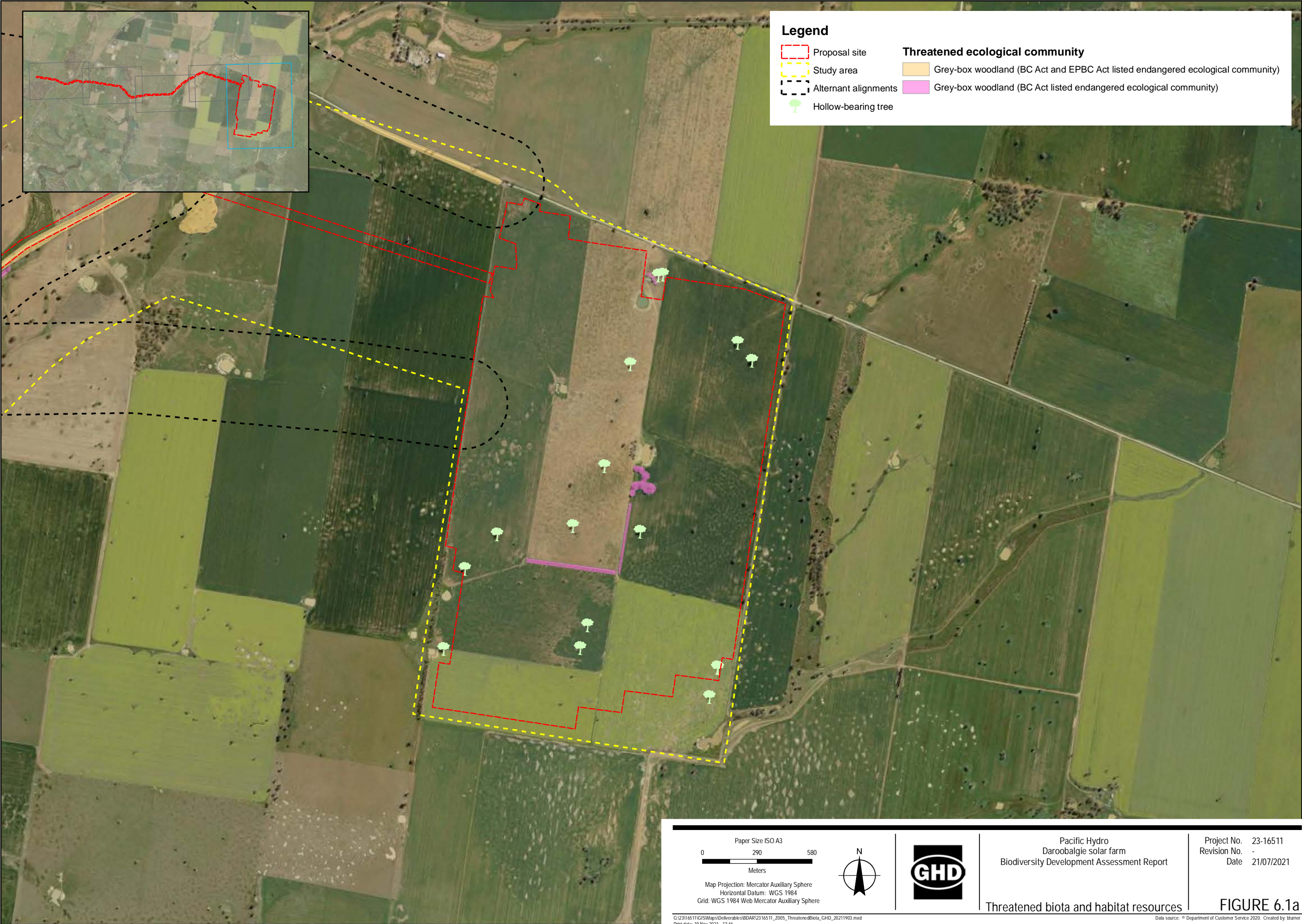
- PCTID 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- PCTID 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregion
- PCTID 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion

Weeping Myall Woodland (PCTID 26) comprises a local occurrence of the endangered ecological community (EEC) Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions. It is also commensurate with the related EEC listed under the EPBC Act as Weeping Myall Woodlands and occurs in the central section of the transmission line alignment (see Figure 6.1).

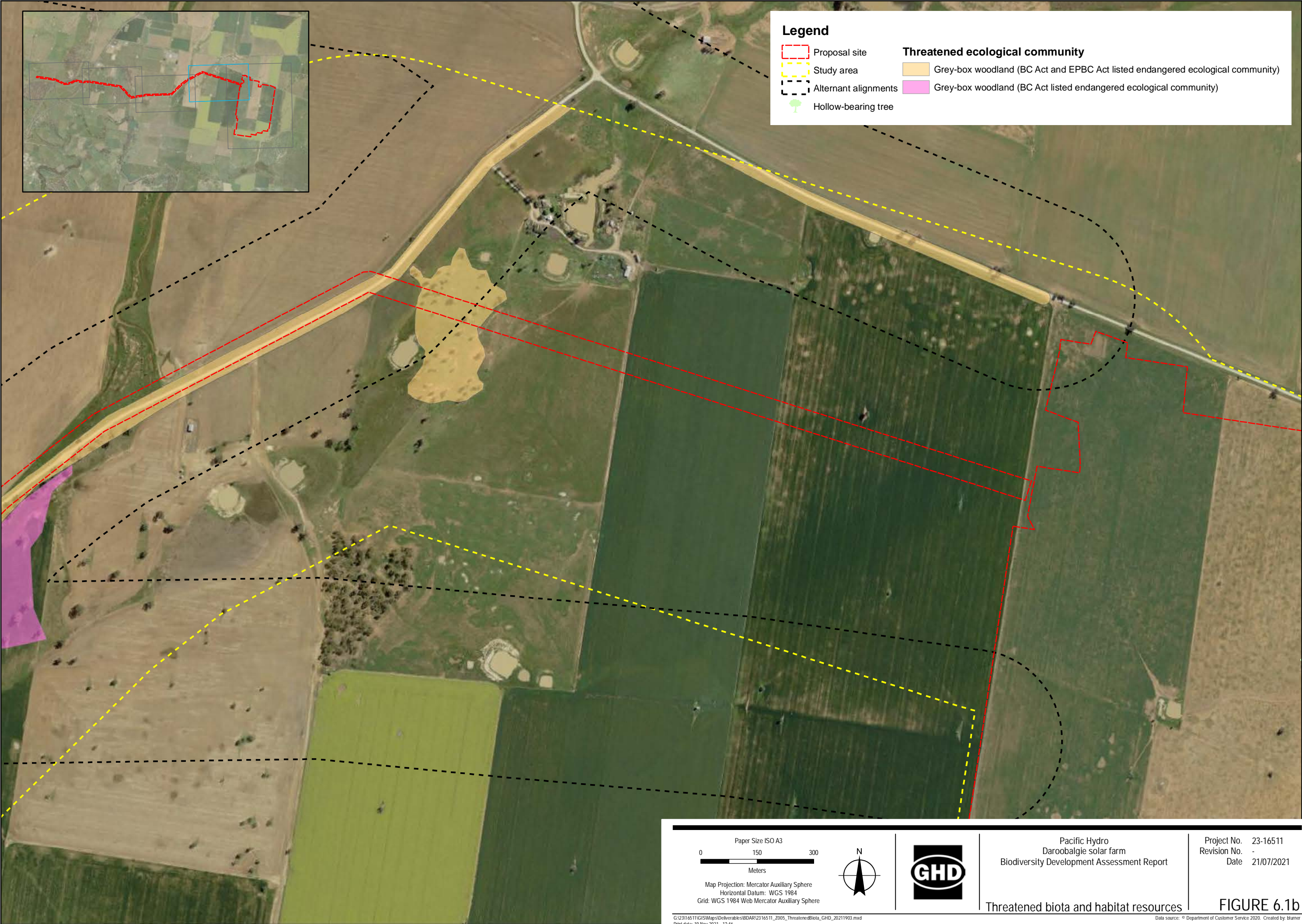
Areas dominated by a canopy of Grey Box or areas of native grassland that are derived from a community once dominated by Grey Box (PCTID 76 and PCTID 80) comprise local occurrences of the EEC Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar

Penneplain, Nandewar and Brigalow Belt South Bioregions. These patches are also commensurate with the related EEC listed under the EPBC Act as Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia. The community occurs as scattered patches along the length of the transmission alignment, with woodland in the western section of the alignment connected to larger patches within Crown Reserve (see Figure 6.1). The planting in the solar farm site classifies for listing under the BC Act however does not meet the key diagnostic characteristics in the listing advice for the EPBC Act form of the community due to the low canopy cover and small size class of the trees in the planted areas.

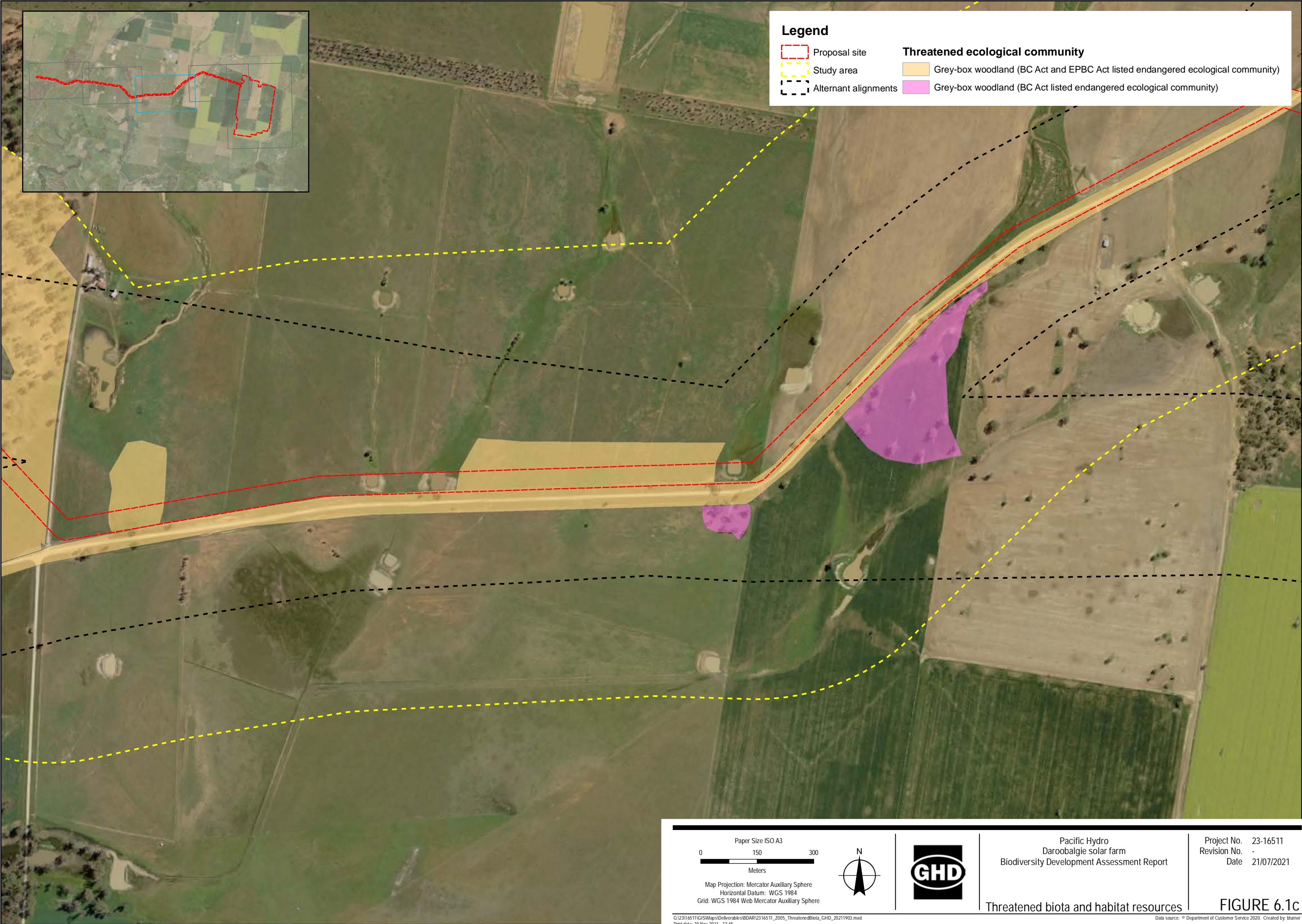
The occurrence of PCT 244 in the proposal site does not meet the key diagnostic characteristics in the listing advice for *Poplar Box Grassy Woodland on Alluvial Plains* as listed under the EPBC Act due to the absence of mature trees or a range of tree ages in the patch.



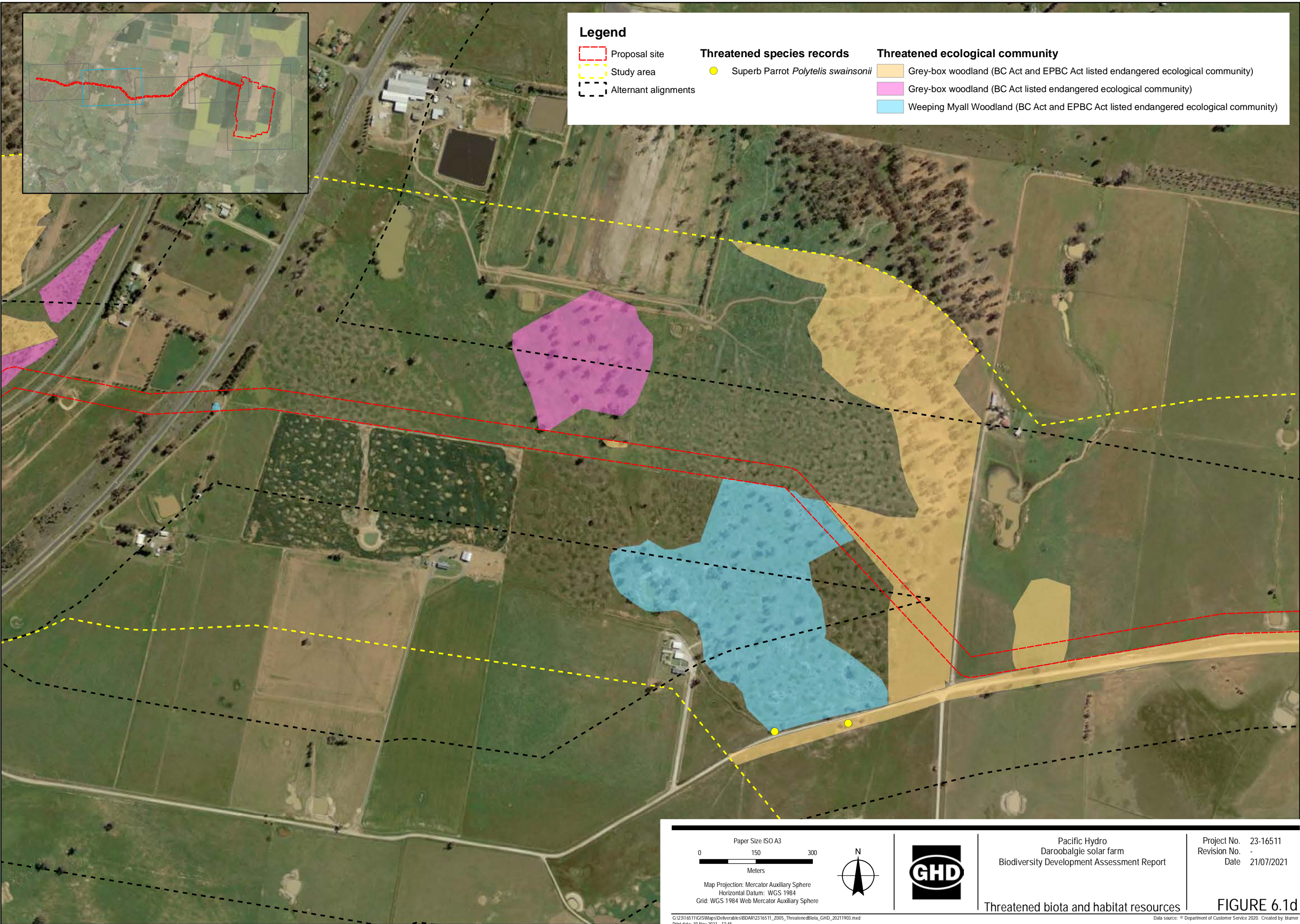
Data Disclaimer: Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2019, NSW Department of Lands, Geoscience Australia) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

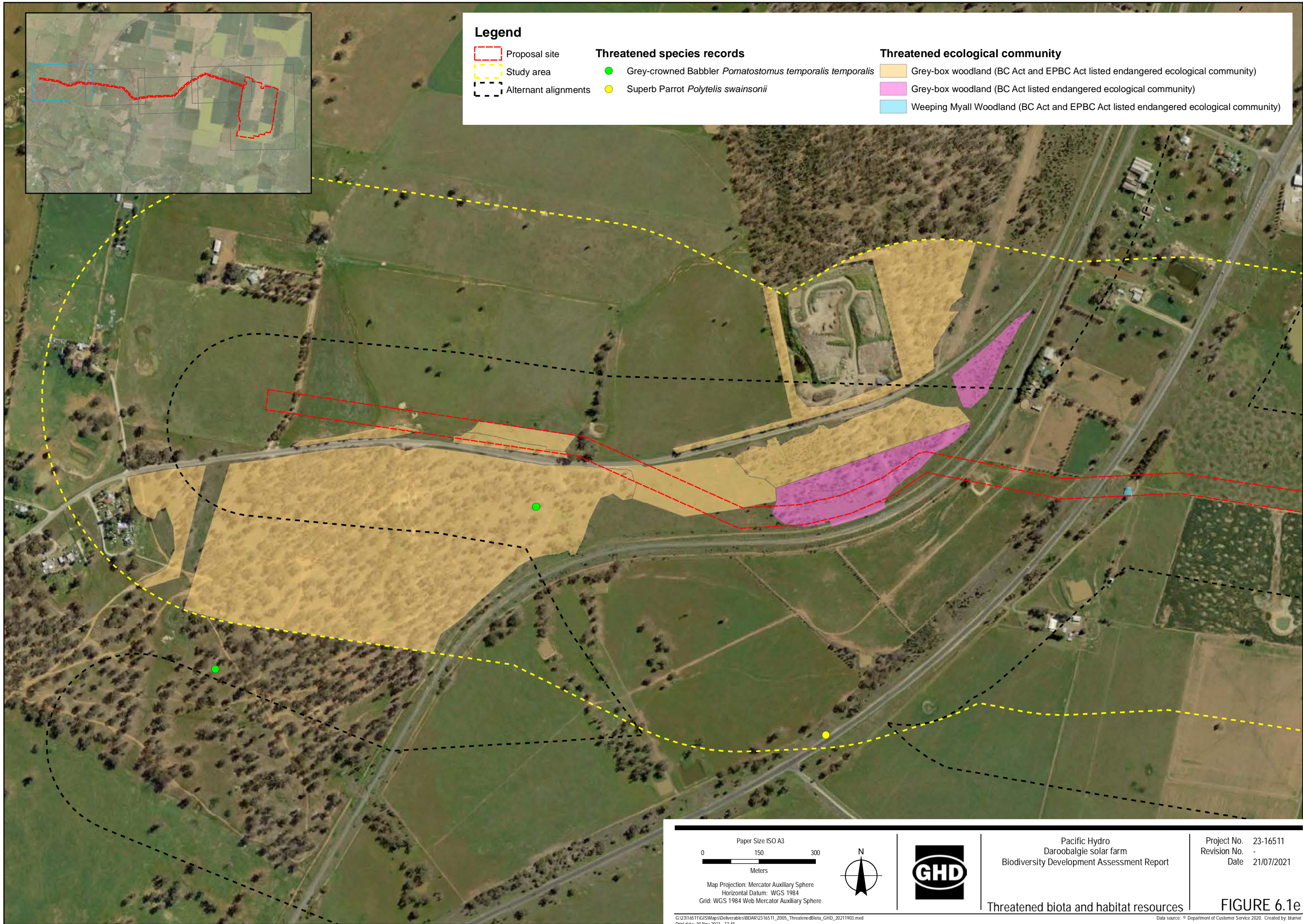


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7. Avoid and minimise impacts

7.1 Measures to avoid and minimise impacts

7.1.1 Avoidance measures

During the development of the proposal, a number of alternative transmission line alignment options and solar farm site layouts were investigated. These options were developed in response to ongoing environmental investigations, which included habitat constraints mapping, consultation with landowners, and consideration of constructability. The proposal was purposefully modified to avoid impacts to biodiversity values and especially threatened biota as follows:

- Avoidance of areas of threatened ecological communities as far as practicable, including the remnant Grey Box Woodland within the solar farm site
- Avoidance of gilgai wetland habitat within the south-eastern corner of the solar farm site
- Avoiding fragmentation of the large woodland patches within the Crown Reserve in the western section of the transmission alignment
- Avoidance of woodland vegetation and large remnant trees as a priority when selecting the transmission line alignment.

The following additional changes to the proposal site layout were made to reduce social or other environmental impacts of the proposal and further reduced impacts to biodiversity values:

- Inclusion of buffers around the edge of the solar farm site for potential planting of vegetation to provide visual screening.

7.1.2 Mitigation measures

A Construction Environmental Management Plan (CEMP) (or equivalent) would be required for the construction phase of the proposal, and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, and planting of vegetated screens (see Section 9).

Planting of vegetated screens are proposed along a portion of the boundary of the proposal site, where shading of the solar panels is unlikely to occur. These would include locally sourced species typical of the PCTs present on site.

At the end of its operational life, the solar farm would be decommissioned. Pacific Hydro would remove all above ground structures while underground infrastructure would be left in-situ. A decommissioning and rehabilitation plan would be prepared detailing the actions required for Pacific Hydro to return the operational portions of the site to a condition suitable for agricultural use (see Section 9.3). Native vegetation that is avoided through the design of the proposal and visual screening plantings would be retained and excluded from any agricultural activities that would reduce their value as habitat.

8. Impact assessment

8.1 Direct impacts

Removal or modification of vegetation

The construction of the proposed solar farm would predominantly comprise impacts on areas of cropped land and exotic grassland, with a small area of native tree plantings (predominantly category 1 land, and exempt from the BAM) to also be removed. In total, the proposal would remove or modify about 3.9 hectares (0.2 hectares for the solar farm) of native remnant woodland and native plantings as summarised in Table 8-1. Remnant woodland in the solar farm site would be retained, with appropriate buffers established around these trees.

An area of 0.0042 hectares of derived native grassland and gilgai wetland habitat would also be directly impacted for pole placement along the transmission line route, however, due to the very small area the BAM calculator defaulted the impact area over the three vegetation zones to 0 hectares each. A change in VI score could not be calculated, therefore these zones were removed from the BAM calculator.

Solar panels and associated infrastructure would be constructed within about 267.43 hectares of cropped land and exotic grassland category 1 exempt plantings, and a further 0.2 hectares of native planting. All paddock trees would be removed throughout the cropped and exotic grassland area and there would be short term impacts across the entire area during the construction period associated with the movement of vehicles and equipment and installation of infrastructure.

The most substantial impacts of construction would be associated with impacts to areas of woodland along the transmission line alignment. Impacts to derived native grassland, cropped and exotic grassland would be limited to the removal of vegetation for pole placement, an area of about four square metres per pole. Areas of woodland within the 45-metre-wide easement would be cleared of trees, and shrubs that grow to a height within 6.5 metres of the transmission line, with groundcover allowed to regenerate following disturbance at completion of construction. In total 3.7 hectares of native remnant woodland would be removed or modified for the transmission line.

Shrub species within woodland areas to be cleared for the transmission line easement that would not grow to a height within 6.5 metres of the transmission line spans and would therefore be retained include:

- Black Cotton Bush (*Maireana decalvans*)
- Wingless Bluebush (*Maireana enchylaenoides*)
- Grey Copperburr (*Sclerolaena diacantha*)
- *Salsola australis*
- Creeping Saltbush (*Atriplex semibaccata*)
- Black Rolypoly (*Sclerolaena muricata*)
- Wedge-leaf Hop-bush (*Dodonaea viscosa* subsp. *cuneata*)
- Ruby Saltbush (*Enchylaena tomentosa*)
- Silver Cassia (*Senna artemisioides*)
- *Myoporum* spp.

- Small-leaf Bluebush (*Maireana microphylla*)

These species typically grow to a height of less than three metres and would therefore not be within the 6.5 metre clearance of the transmission line span. *Myoporum* is known to grow to a height of up to eight metres, however, this species was recorded outside the transmission line easement during surveys and is unlikely to require management. The 6.5 metre clearance is based on the minimum vegetation clearances for span lengths between 200 and 300 metres, as contained in the *Guide for the management of vegetation in the vicinity of electricity supply infrastructure* (ISSC 2016). Spans for the proposed transmission line would be between 200 and 300 metres in length. Different span locations have different minimum vegetation clearance requirements, however for the purpose of consistency, the maximum vegetation clearance was used for all spans.

Small areas of groundcover vegetation, including grass and forb species, would be removed, and soil excavated within the immediate footprints of infrastructure such as solar panels and transmission line poles. There will be direct impacts associated with the installation of piles which would be driven or screwed into the ground, however groundcover will be retained under the panels. There would be temporary disturbance of groundcover during laying of cables, however trenches would be backfilled to the existing ground layer and groundcover would be able to regrow.

The majority of the understorey, soil profiles and other habitat features in the proposal site would be retained in a similar condition to their current state throughout the operational phase of the proposal, with the exception of the required removal of woodland for the transmission line, which would be routinely maintained to prevent encroachment into the easement. Within the solar farm site, groundcover would be modified through shading by solar panels and periodic operational activities such as infrastructure maintenance and slashing to reduce fuel loads. Groundcover in the transmission line easement would be retained in a similar condition to its current state, with periodic maintenance access, which is expected to be minimal. This would comprise a substantially lower impact on biodiversity values than complete or permanent vegetation removal. This partial removal of vegetation is reflected in the BAM calculations (see section 10.1).

Table 8-1: Direct impacts on native vegetation

Plant community type	Threatened ecological community	Area impacted (ha)
Solar farm		
Zone 1 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - planting	EEC – Grey Box Woodland (BC Act)	0.23 (total)
Non-native vegetation (cropped/predominantly exotic grassland and category 1 plantings)		267.43
Transmission line		

Plant community type	Threatened ecological community	Area impacted (ha)
Zone 2 – PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion - good	EEC – Weeping Myall Woodland (BC Act & EPBC Act)	0.65
Zone 3 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - good	EEC – Grey Box Woodland (BC Act & EPBC Act)	0.59
Zone 5 – PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - good	EEC – Grey Box Woodland (BC Act & EPBC Act)	0.38
Zone 7 – PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion – derived scrub	EEC – Grey Box Woodland (BC Act & EPBC Act)	1.40
Zone 8 – PCT 244 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt) - Planting	Does not meet condition criteria for EPBC Act EEC	0.68
Non-native vegetation (cropped/predominantly exotic grassland, plantings)		0.87
Total native vegetation (transmission line)		3.70
Total native vegetation (solar farm & transmission line)		3.93
Total proposal site		272.52

Removal of habitat and habitat resources

The vegetation that would be removed or modified provides habitat resources for native fauna species, including threatened species of fauna. The survey effort to date has been sufficient to exclude impacts on all candidate species credit entities.

The clearing of approximately 3.93 hectares of woodland and scattered paddock trees within a 272.52 hectare proposal site would include the removal of mature trees and hollow-bearing trees. Mature trees have value for fauna populations as sources of foraging resources such as leaves, nectar, sap or seed and substrate for invertebrate prey.

The proposal would involve the removal of a small number of hollow-bearing trees (11) or stags. Hollows are a limited resource, relied on by many native fauna for shelter and breeding. Galahs and Eastern Rosellas were observed during surveys at hollows in the wider study area. The removal of these hollows would reduce the extent of potential breeding habitat for native species in the area, and could potentially remove breeding habitat for threatened species such as the Turquoise Parrot (*Neophema pulchella*), which has the potential to breed in the locality.

In the context of the areas of remaining native woodland vegetation surrounding the proposal site, particularly in the Crown Reserve in the western section of the transmission line, the proposal would remove a very small proportion of available habitat resources for local populations of native fauna. It is unlikely that this would substantially impact on the available habitat resources of local fauna in the study area.

Fauna injury and mortality

As described above, the proposal site provides a variety of habitat resources for native fauna species, including foraging, roosting and shelter resources for threatened species as well as common native fauna. Groundcover vegetation, leaf litter and woody debris would provide shelter and foraging substrate for reptiles, frogs and invertebrates. Construction may result in the injury or mortality of some individuals of these less mobile fauna species and other small terrestrial fauna that may be sheltering in vegetation within the proposal site during clearing activities. There is a potential risk of injury or mortality to any species which may be using hollows, such as microbats, arboreal mammals or hollow-nesting birds. The potential for impacts on fauna utilising hollows would be reduced through pre-clearance surveys of habitat trees and protocols for less-impact felling of habitat trees (see Table 9-1). More mobile native fauna such as native birds, bats, terrestrial and arboreal mammals that may be sheltering in vegetation in the proposal site are likely to evade injury during construction activities.

Recommendations have been made in Section 7.1.2 above to minimise the risk of vegetation clearing activities resulting in the injury or mortality of resident fauna.

Fragmentation or isolation of habitat

The proposal site is mostly located in already cleared land. The majority of the solar farm proposal site is comprised of cropped and exotic grassland and that already comprises a gap in habitat for less mobile or shelter dependent native fauna. A small patch of native planting would be removed from the site. The proposal would remove woodland vegetation in the transmission line alignment, which is connected to surrounding vegetation in the western and central sections of the proposal site. However, tree removal is generally restricted to the edge of woodland patches, and would make a minor contribution to the degree of habitat fragmentation in the local area.

The maximum width of removal for the proposal would be due to the 45-metre easement requirement for the transmission line. The proposal would also remove paddock trees which may provide 'stepping stones' of connectivity between patches of vegetation throughout the proposal site and surrounding area for mobile species such as Galahs and other birds.

The proposal would not isolate any patches of habitat and no connecting links would be severed. Connectivity of groundcover vegetation would still be retained under solar panels and between transmission line poles. The study area contains extensively fragmented patches of remnant habitat within an agricultural landscape and would not support populations of shelter dependant or less mobile fauna species. In this context vegetation removal for the proposal is unlikely to comprise a significant barrier to the movement of any locally occurring fauna species.

8.2 Indirect impacts

Indirect impacts that may occur as a result of the proposal are described in Table 8-2.

Mitigation measures proposed to minimise the risk of these impacts are detailed in Section 9.2. Given the minor area and intensity of potential indirect impacts, proposed mitigation measures and substantially modified character of the receiving environment, indirect impacts

are not likely to result in any tangible negative impacts on native vegetation or other threatened species habitat. No biodiversity offsets have been calculated for indirect impacts.

Table 8-2: Indirect impacts

Impact	Description
Disturbance of native vegetation	In addition to the direct removal of native vegetation, the area within the transmission line easement is also likely to be indirectly disturbed during the construction period for the transmission line due to vehicle movement, material set-down in the vicinity of pole locations and general construction activity. Following completion of the proposal the groundcover would be allowed to regenerate to a condition similar to its existing state.
Reflected light and heat generated by solar panels	Reflected heat and light from the solar panel would increase the temperature of the microclimate around the infrastructure. This may alter the species composition and richness. It may also affect growth of plants. These impacts may then affect habitat for small fauna such as lizards that may occur in these areas.
Weed invasion and edge effects	‘Edge effects’ refer to increased noise and light or erosion and sedimentation at the interface of intact vegetation and cleared areas. Edge effects may result in impacts such as changes to vegetation type and structure, increased growth of exotic plants, increased predation of native fauna or avoidance of habitat by native fauna. Altered environmental conditions along new edges can allow invasion by pest animals specialising in edge habitats and/or change the behaviour of resident animals. Edge effects would result from construction activities and then continue to affect vegetation and habitats adjoining the proposal site. The majority of the proposal site and adjoining land has been extensively cleared for agricultural purposes. Small patches of woodland vegetation occur at scattered locations with larger patches occurring in the Crown Reserve in the western section of the transmission alignment and connected to vegetation in the proposal site. Various weeds and exotic pasture species are present throughout the site. Construction of the proposal would result in new edges along already fragmented woodland patches, and has the potential to introduce or spread weeds. Given the existing degree of vegetation clearing and ongoing disturbance from infrastructure and agricultural practices in the study area this would comprise a very minor increase in the degree of edge effects.
Pests and pathogens	Construction activities, in general, have the potential to introduce or spread pathogens such as <i>Phytophthora</i> (<i>Phytophthora cinnamomi</i>), Myrtle Rust (<i>Uredo rangelii</i>) and Chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) into native vegetation. The potential for impacts associated with these pathogens is low, given the disturbed nature of much of the study area, lack of permanent flowing water on site, and the environmental safeguards that would be implemented during the construction process.
Noise, light and vibration	Construction of the proposal would require the use of additional vehicles and plant in the site. Fauna that occupy habitats within the proposal site and adjacent areas are likely to be accustomed to some existing noise and vibration originating from vehicles, including trains, and agricultural machinery. There is limited light spill currently at the solar farm site. With light spill along the transmission alignment generally associated with traffic and lighting along the Newell Highway. Noise and vibration disturbance during construction could disturb resident fauna. While there would be localised increases in noise,

Impact	Description
	vibration and light that would temporarily create substantial disturbance, increases above existing background levels during construction are unlikely to result in a significant impact on fauna that occur in the study area.
Sedimentation and erosion	Construction of the proposal has the potential to result in sedimentation and erosion within the proposal site and adjoining native vegetation and aquatic habitats, through soil disturbance and construction activities. Sediment laden runoff to waterways can alter water quality and adversely affect aquatic life. Given the modified nature of drainage lines in adjacent areas and their ephemera nature, the potential for impacts is negligible.
Aquatic disturbance and pollution	Construction of the proposal has the potential to result in the mobilisation of contaminated sediments into waterways, or chemical spills from vehicles or plant. The introduction of pollutants from the proposal into the surrounding environment, if uncontrolled, could potentially impact on water quality further downstream. Given the modified nature of drainage lines in adjacent areas and their ephemeral nature, the potential for impacts is negligible. Management measures to prevent potential impacts on waterways would be included in the CEMP.

8.3 Assessment of serious and irreversible impacts

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles set out in Section 6.7 of the BC Regulation.

The principles are aimed at capturing impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These impacts 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, or
- 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, or
- 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, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

The decision-maker must determine whether or not an impact on biodiversity values is likely to be a serious and irreversible impact (SAII). The framework allows for decision-makers to take into account the scale of an impact and the potential for avoidance and mitigation. These factors are weighed against the status and vulnerabilities of the potential SAI entity to ultimately determine if a proposal would result in a SAI (DPIE 2019). If there is a SAI for a State Significant Development, the development may be approved but the approval authority must take those impacts into consideration and determine whether there are any additional and appropriate measures that would minimise those impacts if approval is granted.

The proposal site does not contain any threatened ecological communities or species that are listed as an SAI entity. The proposal would not result in any impacts to SAI entities or their habitat. Therefore no further consideration of potential SAIs is required.

8.4 Impacts on aquatic habitats

Two farm dams on the solar farm site are likely to be removed by the proposal. There is also the potential for some gilgai wetlands to be disturbed during the construction of the transmission line. It is anticipated that pole placement for the transmission line in the area of the gilgai wetlands would be micro-sited and avoid direct impacts on the gilgai wetlands themselves. There would be no direct impacts on the undefined drainage lines within the proposal site. There is potential for impacts to the depressions and table drains that retain water after periods of substantial rain, particularly along the road reserve of Forest Road. Given their ephemeral nature, these drainage lines provide negligible habitat for threatened species.

None of the aquatic habitats in the proposal site or study area are classified as Key Fish Habitat and would not provide potential habitat for threatened fish (see Appendix A). Aquatic habitats may provide limited breeding and shelter resources for common frog and reptile species.

No habitat for threatened biota listed under the FM Act would be directly impacted. Indirect impacts could include sedimentation and erosion during construction. Given the generally dry nature of these drainage lines and limited habitat resources for aquatic biota, the risk of indirect impacts is low. There would be no blockage of fish passage or removal of snags as a result of the proposal.

8.5 Prescribed impacts

Prescribed impacts relevant to the proposal are described below. Given the scale and context of the proposal there are unlikely to be any substantial impacts on threatened species and their habitats beyond those associated with the removal of vegetation and habitat in the proposal site.

8.5.1 Karst, caves, crevices, cliffs, rocks and other geological features of significance

No areas of geological significance are present. No caves suitable for roosting or breeding of bats are present.

8.5.2 Human made structures and non-native vegetation

No buildings, culverts, bridges or similar human-made structures of particular relevance to fauna would be removed for the proposal. The removal of farm dams is discussed below.

The proposal would remove or modify up to 267.43 hectares of non-native vegetation associated with cropped land, exotic grassland, plantings and dams.

Non-native vegetation does not comprise habitat for any threatened flora species (see section 6.1.2) and provides minimal habitat resources for threatened fauna species. Only mobile fauna species of open country would occur in non-native vegetation at the proposal site. Raptors may hunt over non-native grassland on occasion. Similarly, microchiropteran bats may forage above the non-native grassland. Bird species that forage in woodland areas may also forage in the adjacent non-native grassland on occasion. No threatened fauna species would rely on habitat resources in these areas for their survival in the locality, but may use these areas on occasion as part of a much larger home range.

Areas of exotic vegetation would be removed and soil excavated within the immediate footprint of infrastructure such as solar panels and transmission line poles. The majority of the non-native vegetation in the proposal site would be retained in a similar condition to its current state throughout the operational phase of the proposal. These areas would be

modified through shading by solar panels and periodic operational activities. This would comprise a substantially lower impact on biodiversity values than complete or permanent vegetation removal.

8.5.3 Habitat connectivity

Habitat fragmentation through the clearing of vegetation can increase the isolation of remnant vegetation and create barriers to the movements of small and sedentary fauna such as ground dwelling mammals, reptiles and amphibians. Furthermore, habitat fragmentation can create barriers to the movement of pollinator vectors, such as insects, or seed vectors, such as birds, and consequently affect the life cycle of both common and threatened flora.

The proposal site provides limited connectivity for fauna given the predominantly cleared nature of the site. Vegetation in the transmission line proposal site is connected to surrounding vegetation in the western and central sections of the proposal site, however tree removal is generally restricted to the edge of woodland patches, further fragmenting woodland to only a minor degree, however would not isolate any patches of habitat. Connectivity would still be retained with vegetation removal unlikely to impact movement of any fauna species. The maximum width of removal for the proposal would be associated with the 45-metre easement requirement for the transmission line.

Scattered hollow-bearing trees and small patches of woodland present along the transmission alignment provide 'stepping stones' of habitat between larger areas of vegetation for mobile species such as bats and birds. Removal of these patches and trees would reduce the availability of these stepping stones to a minor degree. Species that require larger tracts of connected vegetation would not occur in these small, fragmented patches. Poles and wires associated with the transmission alignment would not impact movement of any fauna species.

Connectivity for small ground-dwelling fauna such as lizards and kangaroos would be retained in the proposal site, as these species can move under and between the solar panels and across the transmission line easement.

Direct impacts to habitat connectivity associated with removal of native vegetation are discussed further in section 8.1.

8.5.4 Water bodies, water quality and hydrological processes

Two farm dams may be removed by the proposal. There is also the potential for some gilgai wetlands to be disturbed during the construction of the transmission line. It is anticipated that pole placement for the transmission line in the area of the gilgai wetlands would be micro-sited and avoid direct impacts on the wetlands themselves. Removal of these dams and gilgai wetlands would reduce the number of watering points in the wider study area to a minor degree, however there is a substantial area of waterbodies in the study area that would remain undisturbed. Threatened species that may use these habitats (such as the Grey-crowned Babbler and microchiropteran bats) would likely use a number of similar watering points throughout their home range. Threatened species dependent on wetlands, such as Brolgas, are likely to utilise similar habitat throughout the study area and locality, while still able to inhabit wetland areas within the transmission line easement where retained.

There would be no direct impacts on the undefined drainage lines within the proposal site, with pole locations for the transmission line located away from drainage lines. There is potential for impacts to the depressions and table drains that retain water after periods of substantial rain, particularly along the road reserve of Forest Road. Given their ephemeral nature, these drainage lines provide poor quality habitat for threatened species.

There would be minor if any impacts on aquatic habitat downstream of the proposal site with impacts likely to be localised in the areas of pole placement for the transmission line and only minor ephemeral drainage lines located in the vicinity of the solar farm proposal site. There is no evidence that aquatic habitat in the vicinity of the proposal site would be occupied by any threatened biota (see Section 8.4).

8.5.5 Vehicle strike

The Newell Highway and Stockinbingal-Parkes Railway run north-south and cross the western section of the transmission line proposal site. The remainder of the proposal site currently has low levels of vehicle activity typically associated with low density agricultural land uses. Occasional movements of cars, utility vehicles, trucks and farming equipment would occur throughout the proposal site. The movements of vehicles and machinery would increase during construction, but would be limited to a small number of operational staff and maintenance activities during operation. The risk of vehicle strike along the transmission line alignment is unlikely to increase to more than a minor degree with the Newell Highway and railway posing the largest existing risk.

The potential risk of vehicle strike is most relevant to common species such as kangaroos, and few threatened species are likely to be at risk. Birds such as the Grey-crowned Babbler typically move away from vehicles and the risk of injury and mortality is low.

8.6 Considerations of MNES

The proposal would result in direct impacts to the following MNES:

- *Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia* (PCT 76, PCT 80) which is listed as an EEC
- *Weeping Myall Woodlands* (PCT 26) which is listed as an EEC
- *Superb Parrot (Polytelis swainsonii)* which is listed as a vulnerable species

Areas of woodland, derived native grassland and derived scrub are all consistent with the criteria for listing as EEC forms of the relevant communities under the EPBC Act, with the exception of the planted part of PCT 76. The Superb Parrot was recorded during the survey period for the proposal and vegetation to be removed by the proposal provides potential habitat for the species.

The proposal would remove about 2.60 hectares of Grey Box Woodland and 0.65 hectares of Weeping Myall Woodland. This represents a small fraction of the mapped habitat within the study area, with about 160 hectares and 24.4 hectares of these communities remaining in the study area, respectively. There are additional areas of these communities outside of the mapped areas and within the locality, and so this quantum of impact would represent an even smaller portion of the communities being removed by the proposal. The Superb Parrot is likely to utilise both of these communities and other woodland vegetation as habitat and therefore potential habitat for this species in the study area is about 184.4 hectares, with the proposed habitat removal representing a minor fraction of this and an even smaller portion within the locality. No patches of habitat would be completely removed and no connecting links would be severed.

The occurrence of PCT 244 within the proposal site does not meet the key diagnostic characteristics in the listing advice for *Poplar Box Grassy Woodland on Alluvial Plains* as listed under the EPBC Act and therefore was not assessed further.

Due to the impacts on these MNES, assessments of significance have been prepared in accordance with the '*Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*' (DotE, 2013). These assessments are provided in Appendix E.

Given the relatively small area of direct impacts on these communities and habitat for the Superb Parrot in the context of the additional potential habitat in the surrounding study area and locality, the proposal is unlikely to constitute a significant impact, and no further assessment or approval of the proposal under the EPBC Act is likely to be required.

9. Mitigation and management of impacts

9.1 Overview

The mitigation of adverse effects arising from the proposal has been presented according to the hierarchy of avoidance, mitigation and offsetting of impacts. The proposal has been located and designed to avoid impacts on biodiversity values as far as possible as discussed in Section 7. The majority of the impacts arising from the proposal are associated with the solar farm, which has been purposefully sited in an area of agricultural land that does not contain remnant native vegetation or threatened species habitat. The proposal would result in minimal direct impacts on native biota and their habitats within the proposal site associated with a small portion of the solar farm where planted native vegetation could not be practically avoided and sections of the transmission line alignment.

There is limited potential for impacts on native vegetation or threatened species habitat in the study area during the longer-term operational phase of the proposal. Specific mitigation measures are recommended in section 9.2 to minimise impacts on the natural environment and biodiversity values.

9.2 Mitigation of impacts

In order to address the potential impacts of the proposal on biodiversity, the mitigation measures outlined in Table 9-1 should be incorporated into the CEMP.

Table 9-1: Mitigation measures

Timing	Mitigation measures	Responsible party
Pre-construction/ clearing	A fauna management plan should be prepared prior to construction. This would detail fauna management protocols including management of tree hollows and fauna handling.	Site ecologist
	Ensure all workers are provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity.	Construction contractor/ Site ecologist
	Use of and regular inspection and maintenance of erosion and sediment control measures.	Construction contractor
	Fence off or mark trees and areas of native vegetation to be retained, to avoid additional impacts on vegetation. Fencing should protect the entire Tree Protection Zone (i.e. 10 times the diameter of the trunk at breast height).	Construction contractor/ Site ecologist
	Appropriate buffers would be established around trees that are to be retained. Work would avoid damage to the structural root zones (SRZ) of the trees	Construction contractor/ Site ecologist
Construction/ clearing	Restrict stockpiles of construction materials, fill or vegetation to existing cleared areas and not within areas of adjoining native vegetation	Construction contractor
	Water should be applied to stockpile areas during windy conditions	Construction contractor

Timing	Mitigation measures	Responsible party
	Construction traffic would remain on existing roads and tracks and avoid areas of native vegetation where practicable.	Construction contractor
	Any hollow-bearing trees to be felled should be marked prior to clearing of vegetation. The removal of hollow bearing trees is to be undertaken in accordance with a tree hollow management protocol set out in the CEMP, and would involve the presence of a qualified ecologist or wildlife specialist experienced in the rescue of fauna.	Site ecologist
	Habitat features such as hollow trunks and limbs within the proposal site should be salvaged and replaced within adjacent areas of woodland as far as is practicable.	Site ecologist
	Pole placement within gilgai wetland habitat will be micro-sited to avoid direct impacts to wetlands.	Site ecologist
	Reinstatement of stabilised surfaces as quickly as practicable after construction	Construction contractor/ Site ecologist
Post construction/ clearing	Planting of locally endemic tree species in areas proposed for vegetated screens. Species should be drawn from the list of species typical of the PCTs present on site wherever practical.	Site ecologist

9.3 Decommissioning of the solar farm

At the end of life, the solar farm would be decommissioned. Pacific Hydro would remove all above ground structures while underground infrastructure would be left in-situ. A decommissioning and rehabilitation plan would be prepared detailing the actions required for Pacific Hydro to return the site to a condition suitable for agricultural use.

10. Offsetting

10.1 BC Act offset requirements

10.1.1 Impacts requiring offset

Impacts associated with the proposal that require offsetting include the removal of 3.9 hectares of native vegetation, and associated habitat for threatened biota. Impacts within the proposal site that require biodiversity offsets are shown on Figure 10.1.

Ecosystem credits

The data from the fieldwork and mapping was entered into version 1.3.0.00 of the BAM calculator as a 'Development Assessment' to determine the number and type of biodiversity credits that would be required to offset impacts of the proposal ('Parent' case 00024310).

Two separate related (child) cases were created in the parent case (00024310) for:

- The solar farm site using a 1,500 metre buffer for the landscape assessment and reflecting full removal of vegetation in the impact area (00024310/BAAS18127/21/00024311); and
- the transmission line using a 500 metre buffer for a linear development and reflecting partial removal of vegetation in the corridor (case 0024310/BAAS18127/21/00024316).

The Biodiversity credit reports are included in Appendix F and summarised below.

There are 3.9 hectares of native vegetation at the proposal site that would be impacted by construction of the solar farm and the associated transmission line / switchyard. The majority of the vegetation to be removed for the solar farm is non-native and comprises impacts not requiring offsets (see Section 10.1.2).

Groundcover would be allowed to regenerate under the panels throughout the solar farm, however, due to the dominance of exotic species within the site it is unlikely that the groundcover within the narrow area of the native plantings would be dominated by native species once it regenerates. This area would be subject to edge effects and competition by exotic species that are likely to out-compete native species. Therefore the 'future vegetation integrity score' for this vegetation zone was entered as 0.

It is assumed that the construction and operation of the transmission line will not necessitate the removal of all vegetation layers or habitat attributes and so the 'future vegetation integrity score' for the various vegetation zones was not entered as 0.

In order to reflect the quantum of impact associated with impacts in the transmission line corridor, the future vegetation integrity score of all vegetation zones entered into the BAM calculator for the transmission line was based on the following (these are also summarised in Appendix D):

- Total removal of the canopy layer to account for the maintenance of a 45-metre wide easement, i.e. zero value for compositional, structural and canopy-related functional attributes, including:
 - Number of large trees
 - Stem size class
 - Regeneration

- Retention of the shrub layer in the areas of woodland where species would not grow to a height within 6.5 metres of the transmission line spans. Compositional and structural values for the shrub layer were retained as existing values for the appropriate vegetation zones
- Removal of all woody debris and leaf litter, i.e. zero value for fallen logs and litter cover to reflect the removal of canopy vegetation that account for these attributes
- Retention of the composition and structure scores included for the 'current vegetation integrity score' for grass and grass like, forb, fern and other attributes. This is to account for the limited direct impacts of construction of the transmission line, which would be limited to pole placement. Groundcover in the majority of the easement would remain relatively undisturbed or subject to temporary impacts and allowed to regenerate to a condition similar to its existing state.

Ecosystem credits that would be required to offset the impacts of the proposal are shown in Table 10-1.

Table 10-1: Ecosystem credits required to offset impacts of the proposal

Vegetation zone / PCT	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in VI score	BC Act status	Ecosystem credits required
Solar farm						
Zone 1 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - planting	0.23	38.4	0	-38.4	EEC	4
Transmission line						
Zone 2 – PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion - good	0.65	66	17	-49.1	EEC	16
Zone 3 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - good	0.59	47.5	12.8	-34.7	EEC	10

Vegetation zone / PCT	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in VI score	BC Act status	Ecosystem credits required
Zone 5 – PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion - good	0.38	64.9	15.5	-49.4	EEC	9
Zone 7 – PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion – derived scrub	1.40	52	15.2	-36.8	EEC	26
Zone 8 – PCT 244 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt) - Planting	0.68	41.2	14.5	-26.7	Not listed	9
Total credits						74

10.1.2 Impacts not requiring offset

Vegetation zone 6 (PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains - Derived native grassland) and vegetation zone 4 (PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions - Derived native grassland) comprises vegetation with VI scores of 13.8 and 0.9, respectively, which are less than the minimum VI score of 15 that would require calculation of an offset according to the BAM.

An additional area of 0.0012 hectares of gilgai wetland habitat would be directly impacted for the proposal, however, due to the very small area the BAM calculator defaulted the impact area of the vegetation zone (zone 9) to 0 hectares. Zones 4 and 6 also defaulted to 0 hectares

due to their very small area. A change in VI score could not be calculated, therefore these zones were removed from the BAM calculator.

Offsets are not required for impacts on non-native vegetation. No credits were calculated for cropped/predominantly exotic grassland and non-native plantings.

Species credits

No species credit species were recorded. No species credit habitat for dual credit species (i.e. breeding habitat) was recorded. No polygons have been prepared and no species credits have been calculated (see below).

The Grey-crowned Babbler and Superb Parrot were recorded within the proposal site during field surveys and are confirmed predicted threatened species for this assessment. The ecosystem credits listed above would offset the removal of foraging habitat for these species and breeding habitat for the Grey-crowned Babbler as it is not a dual credit species. The Superb Parrot is a dual credit species, being a species credit species for its breeding habitat. No evidence of breeding was exhibited during field surveys for this species during the appropriate survey period and therefore no species credits are required.

10.1.3 Option to meet offset obligations / approach to delivering offsets

In accordance with the offset rules established by the *Biodiversity Conservation Regulation 2017* there are various means by which offset obligations described in Section 10.1 can be met. These include:

- Retiring the appropriate credits from an established stewardship site
- Monetary payment directly into the Biodiversity Conservation Trust Fund, or
- Funding an approved biodiversity action. Funding a biodiversity action may be available as a last resort, subject to consultation with approval authorities, if all other options are determined to be unsuitable.

Existing biodiversity credits

Should Pacific Hydro opt to offset the residual impacts of the proposal by securing and retiring appropriate credits from stewardship site/s, these must fit within the trading rules of the BOS in accordance with the 'like for like' report generated by the credit calculator. The like for like trading rules for the ecosystem credits required for the proposal are summarised in Table 10-2. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAM calculator.

Table 10-2: 'Like for like' ecosystem credits required to offset impacts of the proposal

Credit class	Any PCT in the below class	And in any of the below trading groups	Containing hollow-bearing trees	In the below IBRA subregions
Credit classes for PCT 26	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penneplain, Murray-Darling Depression, Riverina and NSW South	-	Yes	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans,

Credit class	Any PCT in the below class	And in any of the below trading groups	Containing hollow-bearing trees	In the below IBRA subregions
	Western Slopes bioregions (including PCTs 26, 27, 37, 43, 49, 55, 145, 159, 1766)			Murrumbidgee and Nymagee Or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.
Credit classes for PCT 76 (planting)	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (including PCTs 76, 80, 81, 82, 101, 110, 237, 248)	-	No	
Credit classes for PCT 76 (good)	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (including PCTs 76, 80, 81, 82, 101, 110, 237, 248)	-	Yes	
Credit classes for PCT 80	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (including PCTs 76, 80, 81, 82, 101, 110, 237, 248)	-	No	
Credit classes for PCT 244	Floodplain Transition Woodlands (includes PCT 56, 74, 76, 80, 81, 82, 237, 244, 248)	Floodplain Transition Woodlands $\geq 70\%$ and $< 90\%$	No	

Payment into the Biodiversity Conservation Fund

A payment to the Biodiversity Conservation Fund (BCF) could be considered if a suitable number and type of biodiversity credits could not be secured from third parties. This is currently the preferred option for Pacific Hydro.

It should be noted that payment for offsets are subject to change and that credit payment prices are reviewed by the BCT quarterly. The payment amounts presented within this report were calculated and valid as of 25 March 2021 and are included in Table 10-3.

Table 10-3: Estimated biodiversity offset credit payment price

Credit class	Price per credit	Number of credits required	Final credit price
Solar farm			

Credit class	Price per credit	Number of credits required	Final credit price
76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	\$4,123.14	4	\$16,492.57
Total solar farm (excl. GST)			\$16,492.57
Transmission line			
26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	\$5,998.05	16	\$95,968.79
76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	\$4,123.14	10	\$41,231.43
80 - Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	\$4,123.14	35	\$144,309.99
244 - Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	\$3,962.83	9	\$35,665.46
Total transmission line (excl. GST)			\$317,175.67
TOTAL (incl GST)		74	\$333,668.24

10.2 Offsets for impacts on MNES

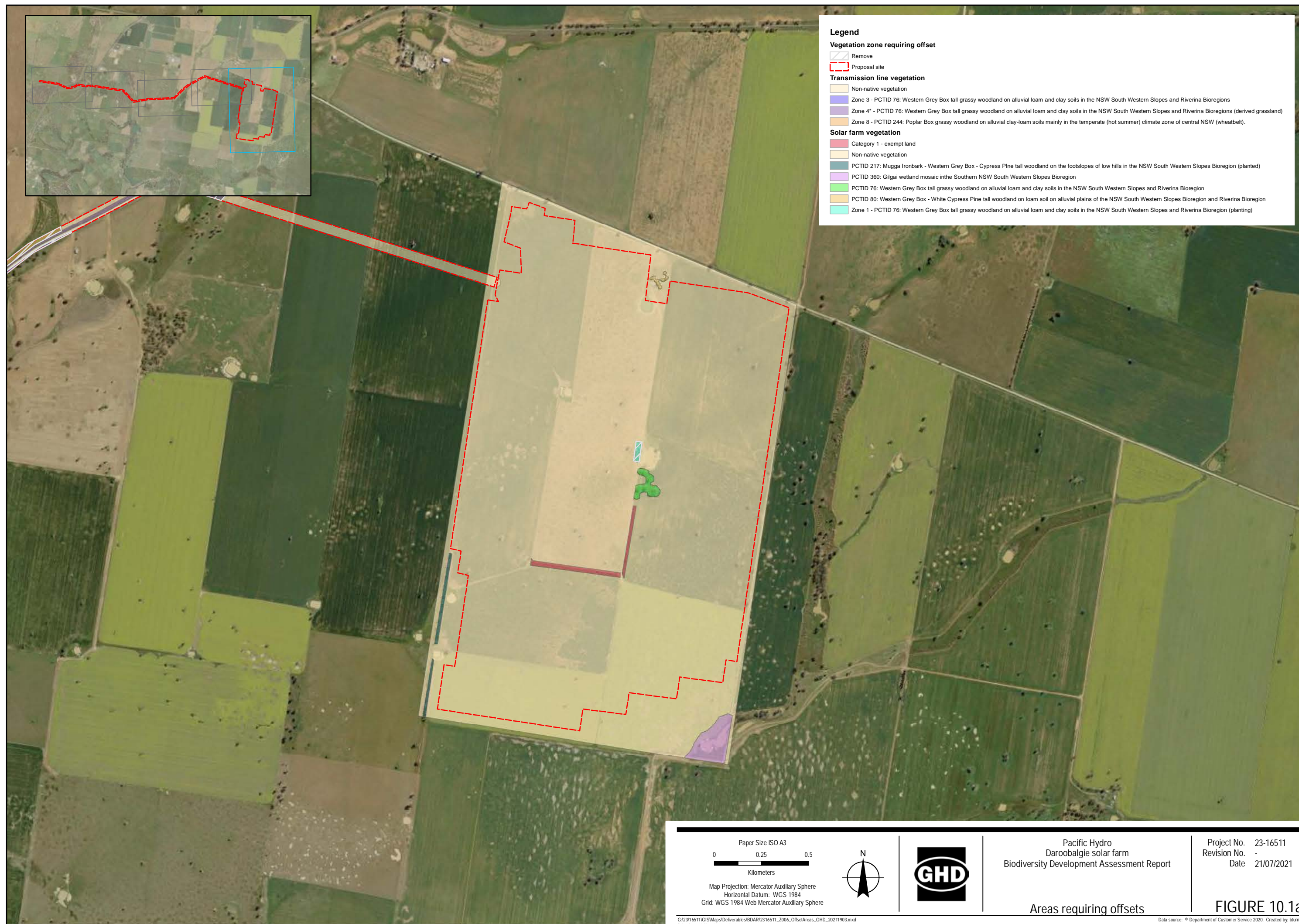
Offsets are required for any significant residual impacts on MNES, according to the requirements of the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy October 2012* (EPBC Act Offsets Policy) (DSEWPac, 2012).

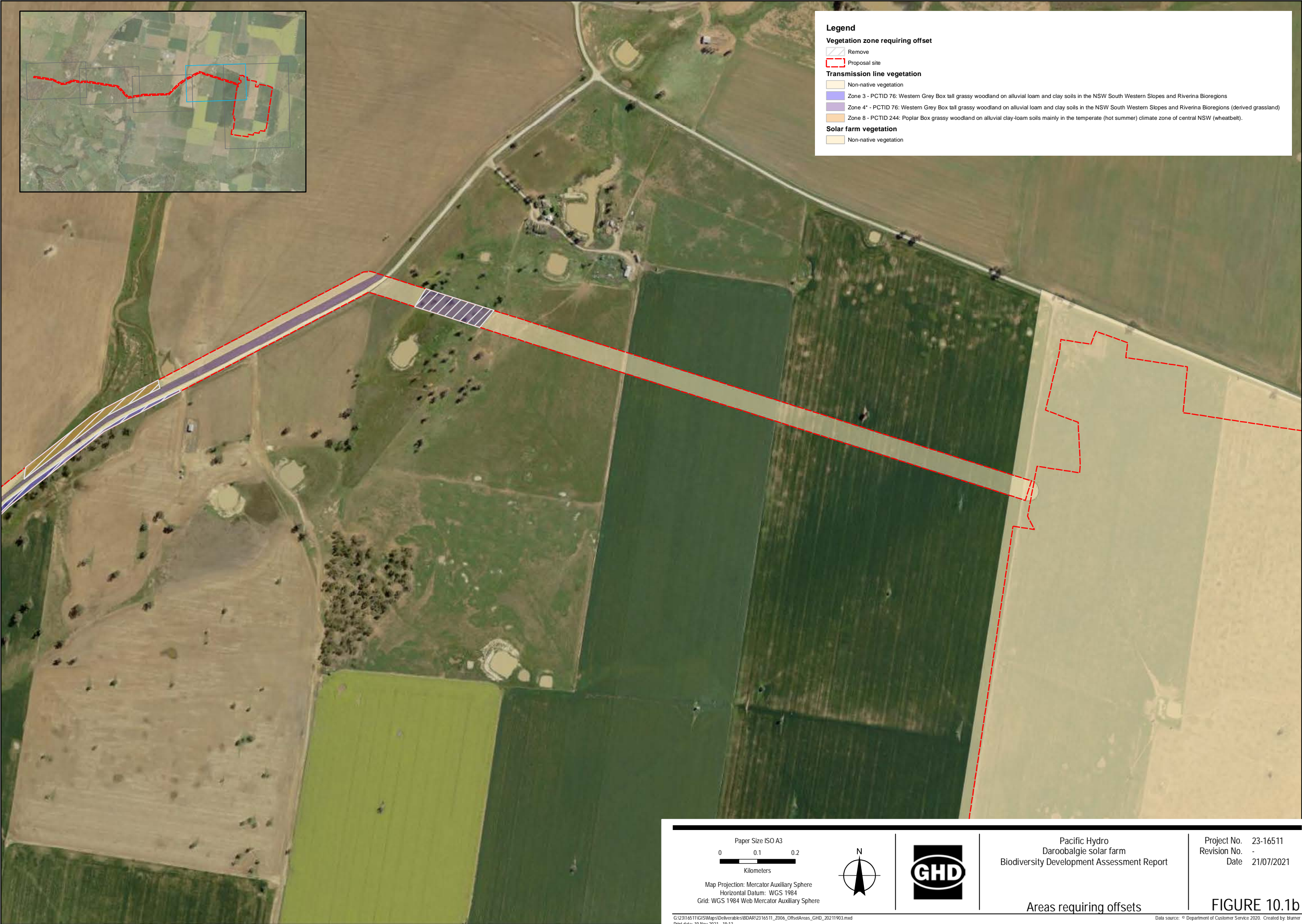
The proposal would remove habitat for the following MNES listed under the EPBC Act:

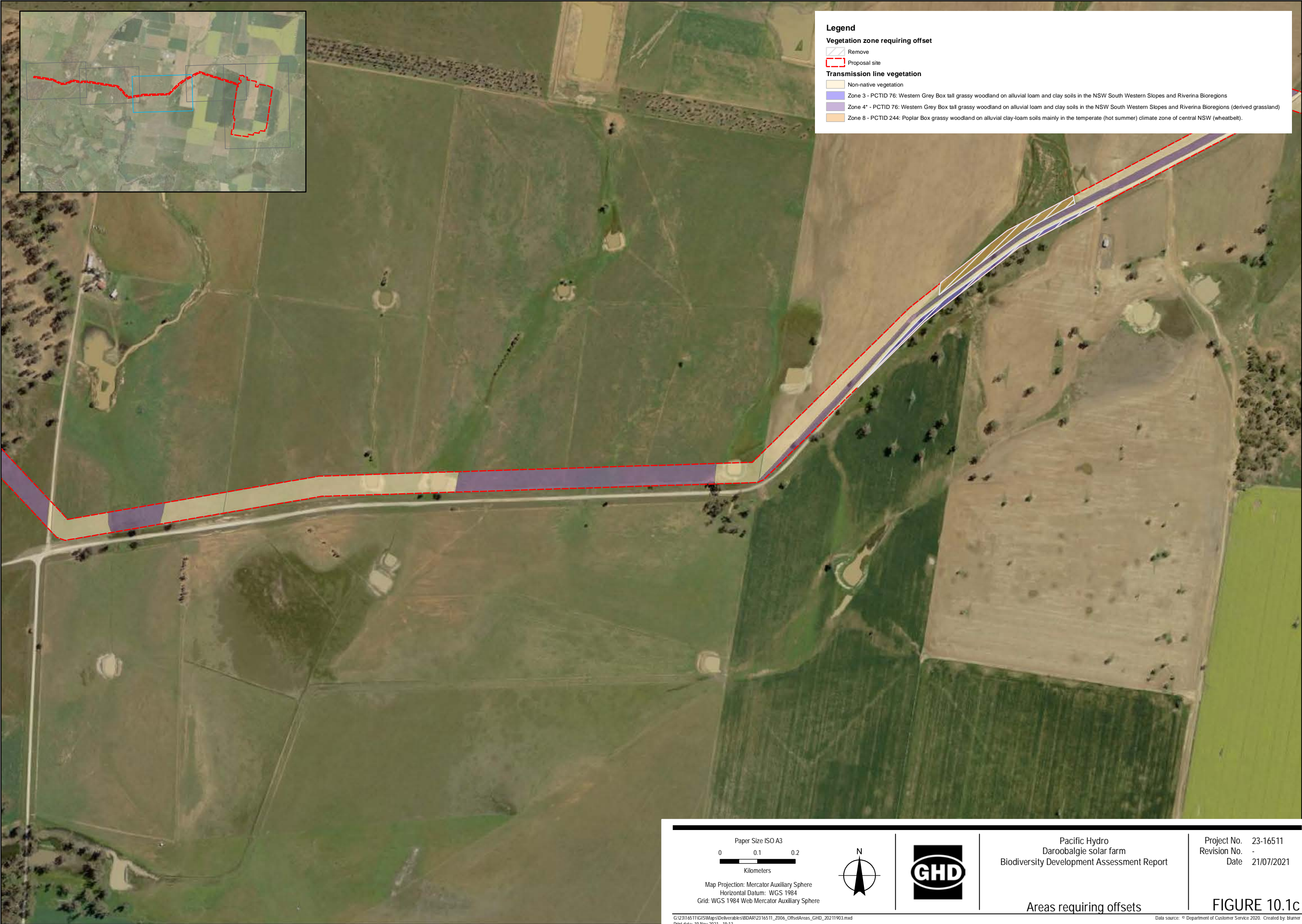
- 0.65 hectares of Weeping Myall Woodlands (represents about seven percent of the mapped habitat in the study area)
- 2.60 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia (represents about 1.6 percent of the mapped habitat in the study area)
- 3.9 hectares of Superb Parrot habitat (represents about three percent of the potential mapped habitat in the study area)

The assessments of significance prepared for the two TECs and the vulnerable Superb Parrot indicated that the proposal is unlikely to have a significant impact on these MNES due to the

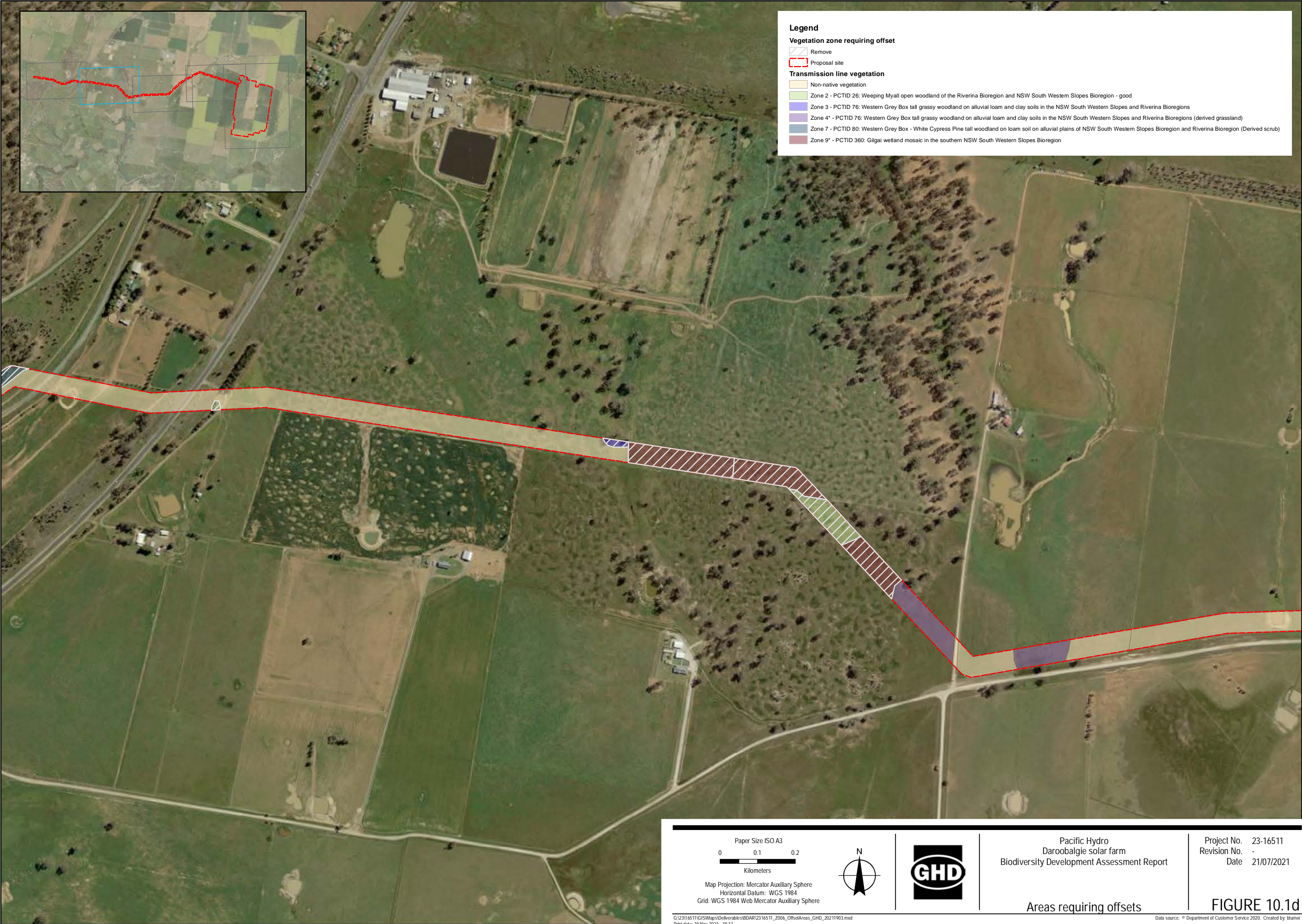
limited removal of habitat in the context of the additional habitat in the surrounding study area and locality. No patches of habitat would be completely removed and no connecting links would be severed. Therefore, the proposal is unlikely to be deemed a controlled action and no offsets would be required under the EPBC Act.



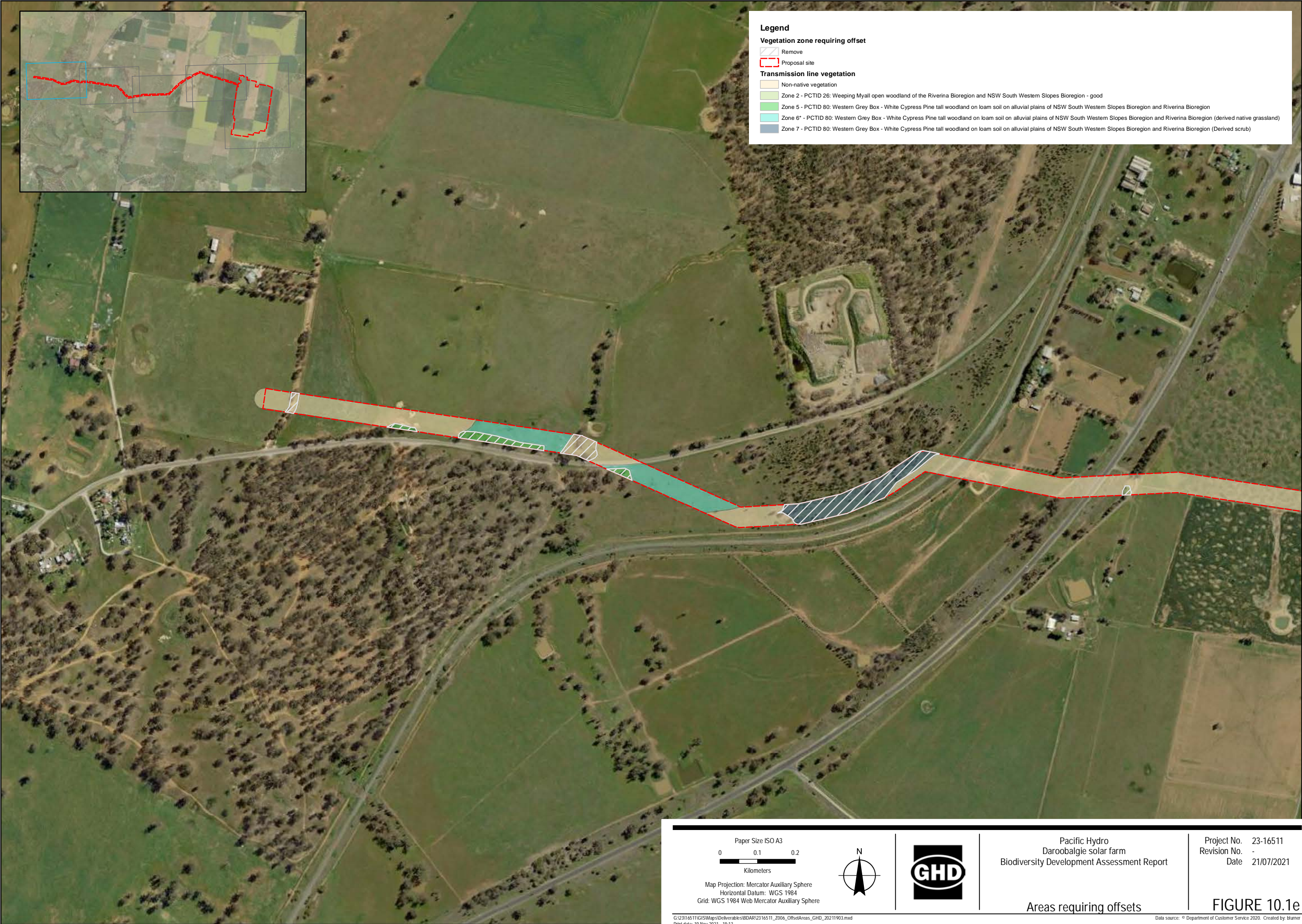




Data Disclaimer: Whilst every care has been taken to prepare this map, GHD (and Sixmaps 2019, NSW Department of Lands, Geoscience Australia) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.



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11. Conclusion

Pacific Hydro proposes to construct and operate a 100 megawatt solar farm (approximate capacity) and associated transmission line and switchyard at Daroobalgie, about 11 kilometres north-east of Forbes.

The majority of the study area has been cleared and used for agriculture (sheep and cattle grazing, and cropping). The solar farm site has been predominantly cleared and cultivated and comprises cropland and improved pasture dominated by exotic species. The transmission line alignment and switchyard has also been predominantly cleared of remnant woodland vegetation, however native grassland species have persisted in the central portion of the alignment forming a derived native grassland community. There are small patches of Gilgai wetland and Weeping Myall woodland in the central portion of the alignment. The western section of the alignment traverses the edge of a Crown Reserve, which contains Western Grey Box woodland.

PCT 26 comprises a local occurrence of the endangered ecological community (EEC) *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*. It is also commensurate with the related EEC listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as *Weeping Myall Woodlands*. Most areas of PCT 76 and PCT 80 comprise local occurrences of the EEC *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*. These patches are also commensurate with the EEC listed under the EPBC Act as *Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia*. The proposal would remove 0.65 hectares and 2.60 hectares of these EECs, respectively.

Two threatened fauna species listed under the *Biodiversity Conservation Act 2016* (BC Act) were recorded during surveys; the Grey-crowned Babbler, which is an ecosystem credit species, and the Superb Parrot, which is a dual credit species, being a species credit species for its breeding habitat. No evidence of breeding was exhibited during field surveys for this species during the appropriate survey period and therefore no species credits were calculated. No threatened flora or other species credit entities were recorded

The location and layout of the proposal was purposefully modified to avoid impacts to biodiversity values and especially threatened biota. Areas of high value vegetation commensurate with Grey Box Woodland EEC were avoided within the solar farm site and areas of remnant woodland vegetation were avoided as far as practicable during transmission alignment selection to minimise impacts on fauna habitats and to retain better condition native vegetation. The gilgai wetland in the south-eastern corner of the solar farm site would also be retained. A range of mitigation measures are also proposed, including planting of vegetated screens, fauna habitat management and rescue protocols, and protection of vegetation to be retained.

The following ecosystem credits that would be required to offset the residual impacts of the proposal:

- 4 credits for Zone 1 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions – planting
- 16 credits for Zone 2 – PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion – good

- 10 credits for Zone 3 – PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions – good
- 35 credits for Zones 5 & 7 – PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion – good & derived scrub
- 9 credits for Zone 8 – PCT 244 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt) - planting

No species credits are required for the proposal.

An area of 0.0042 hectares of derived native grassland and gilgai habitat (zones 4, 6 & 9) would also be directly impacted for pole placement, however, due to the very small area the BAM calculator defaulted the impact area over the three vegetation zones to 0 hectares each. A change in VI score could not be calculated, therefore these zones were removed from the BAM calculator.

No credits were calculated for cropped/predominantly exotic grassland and non-native plantings as offsets are not required for impacts on non-native vegetation that does not provide habitat for threatened species.

There would be impacts on two endangered ecological communities (*Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia* *Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-Eastern Australia and Weeping Myall Woodlands*) and one threatened species (Superb Parrot) listed under the EPBC Act. Given the relatively small area of direct impacts on these communities and habitat for the Superb Parrot in the context of the additional potential habitat in the surrounding study area and locality, the proposal is unlikely to constitute a significant impact. No further assessment or approval or provision of biodiversity offsets is required under the EPBC Act.

Aquatic habitat is limited to undefined, ephemeral drainage lines, farm dams and gilgai wetland areas. These do not constitute key fish habitat and would not provide potential habitat for threatened fish listed under the FM Act. It is anticipated that pole placement for the transmission line in the area of the gilgai wetlands would be micro-sited and avoid direct impacts on the wetlands themselves. There would be no direct impacts on the undefined drainage lines within the proposal site.

A CEMP (or equivalent) would be required for the construction phase of the proposal, and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, and planting of vegetated screens around the boundary of the solar farm.

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Appendix A – Likelihood of occurrence of threatened and migratory biota

Likelihood of occurrence evaluation

An evaluation of the likelihood and extent of impact to threatened and migratory fauna recorded from within the Forbes LGA (BC Act threatened species and EPBC Act threatened and migratory species). Records are from a search of the NSW BioNet Atlas, and the EPBC Protected Matters Search Tool available from the Department of the Agriculture, Water and the Environment (DAWE) website. Ecology information has been obtained from the Threatened Species Profiles on the NSW Environment, Energy and Science website (<http://www.environment.nsw.gov.au/threatenedspecies/>) and from the Species Profiles and Threats Database on the Commonwealth DAWE website (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>).

Status

- National - Environment Protection and Biodiversity Conservation Act 1999.
- NSW - Biodiversity Conservation Act 2016 and Fisheries Management Act 1994.
- E - Endangered
- CE -Critically Endangered
- V - Vulnerable
- Mi - Migratory

Likelihood of occurrence in study area

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

Likelihood of impact

- Unlikely impact - The project would have a low possibility of impact on this species/community or its habitats. No five part test is required for this species/community.
- Likely impact - The project could impact on this species/community and its habitat. A five part test is required for this species/community.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	EEC	-		BCD 2021	Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Occurs on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area.	None Unlikely	This community was not recorded in the study area during site surveys
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	EEC	EEC		BCD 2021	Grey box woodlands includes those woodlands in which the most characteristic tree species, <i>Eucalyptus microcarpa</i> (Inland Grey Box), is often found in association with <i>E. populnea subsp. bimbil</i> (Bimble or Poplar Box), <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Brachychiton populneus</i> (Kurrajong), <i>Allocasuarina luehmannii</i> (Bulloak) or <i>E. melliodora</i> (Yellow Box), and sometimes with <i>E. albens</i> (White Box). The community occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22- 26°C.	Recorded Likely	This community was recorded extensively within the study area and proposal site. 2.57 hectares of woodland (including planted Grey Box Woodland) and 0.0125 hectares of derived grassland associated with this community would be impacted by the proposal
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and	EEC			PMST	Inland Grey Box Woodland occurs predominately within the Riverina and South West Slopes regions of NSW down to the Victorian border. It includes Albury to the east and may extend out west towards Hay. This community also extends across the slopes and plains in Central and Northern NSW up to the Queensland Border. This includes Yetman and Inverell in the North, Molong to the east of the	Recorded Likely	This community was recorded extensively within the study area and proposal site. 0.98 hectares of woodland including 0.003 hectares of derived grassland associated with this community would be impacted by the proposal

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Brigalow Belt South Bioregions					Central Slopes and plains and out towards Nymagee to the west. Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22- 26°C. There is a correlation between the distribution of <i>Eucalyptus microcarpa</i> communities and soils of Tertiary and Quaternary alluvial origin, largely corresponding with the Red Brown Earths.		
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	CEEC	-		BCD 2021	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes has a very highly restricted distribution, with known occurrences falling with a region of less than 4000 km2 bounded by Lake Cowal - Temora - Ardlethan - Ungarie. It is estimated that the total area remaining is around 2300 hectares within the local government areas of Bland and Temora. Most remaining areas are on private property or within roadside easements, though small areas are known from the following Natures Reserves: Buddigower, The Charcoal Tank, portions of South West Woodland (former Blue Mallee Flora Reserve and State Forest and Wyalong State Forest) and possibly Big Bush.	None Unlikely	This community was not recorded in the study area during site surveys
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling	EEC			PMST	This ecological community is characterised by the dominance of Weeping Myall (<i>Acacia pendula</i>). The community is typically scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm	Recorded Likely	This community was recorded within the study area and proposal site. 0.66 hectares of this community would be impacted by the proposal

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEI 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Depression, Riverina and NSW South Western Slopes bioregions					<p>mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history.</p> <p>This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narranderra, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.</p>		
Poplar Box Grassy Woodland on Alluvial Plains Poplar Box Grassy Woodland on Alluvial Plains		E		BCD 2021	<p>This ecological community is comprised of native grassy eucalypt woodland where poplar/ Bimble Box is the main tree canopy species present. Other tree species may occasionally occur depending on the characteristics of the site, these include <i>Callitris glaucophylla</i> (White Cypress Pine), <i>Casuarina cristata</i> (Belah), <i>Eucalyptus coolabah</i> (Coolibah), <i>Eucalyptus largiflorens</i> (Black Box), <i>Eucalyptus melanophloia</i> (Silver-Leaved Ironbark), <i>Eucalyptus microcarpa</i> (Inland Grey Box) and <i>Eucalyptus pilligaensis</i> (Narrow-Leaved Grey Box). This community mostly occurs as scattered patches inland of the Great Dividing Range in New South Wales and Queensland, within the Brigalow Belt North, Brigalow Belt South, Cobar Penneplain, Darling Riverine Plains, NSW South Western Slopes and Riverina IBRA bioregions.</p>	None Unlikely	This community was not recorded in the study area during site surveys

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Sandhill Pine Woodland in the Riverina, Murray- Darling Depression and NSW South Western Slopes bioregions	EEC			BCD 2021	Sandhill Pine Woodland has been recorded in the far south-western portion of the NSW South Western Slopes bioregion near Urana, extending through the Riverina bioregion, from the Urana – Narranderra district in the east, into the southern part of the Murray-Darling Depression bioregion, as far west as the South Australian border. In the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, the community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. Sandhill Pine Woodland typically occupies red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW.	None Unlikely	This community was not recorded in the study area during site surveys
Weeping Myall Woodlands	E	E		PMST	Occurs on inland alluvial plains west of the Great Dividing Range, on black, brown, red-brown or grey clay/ clay-loam soils. Typically on flat areas, shallow depressions or gilgais on raised plains, not associated with drainage lines and rarely flooded. Open woodland to woodland with <i>Acacia pendula</i> the dominant or sole canopy species. Often includes an open layer of shrubs above an open ground layer of grasses and herbs, though can exist naturally either as a shrubby or a grassy woodland.	Recorded Likely	This community was recorded within the study area and proposal site. 0.66 hectares of this community would be impacted by the proposal
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native	EEC	CE		PMST	Occurs on the tablelands and western slopes of NSW, on moderate to highly fertile soils. Found in areas with annual rainfall between 400 - 1200 mm, at altitudes between 170 - 1200 m asl. Open woodland/forest, characterised by White Box, Yellow Box and Blakely's Red Gum. Intact sites are rare, but	None Unlikely	This community was not recorded in the study area during site surveys

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion					contain a high species diversity of trees, shrubs, climbers, grasses and particularly herbs. The NSW listing includes sites with/without canopy layer and areas with predominately exotic groundlayer, whereas to meet the federal listing criteria areas must have either intact tree layer and predominately native groundlayer, or an intact ground layer with high species diversity but no remaining tree layer.		
Flora							
<i>Androcalva procumbens</i>	V	V		PMST	Mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas and recent collections from the Upper Hunter. Grows on sandy soils, often on roadsides. Has been recorded in Tumbledown Red Gum and Mugga Ironbark communities, Broombush scrub, under mallee eucalypts with a Common Fringe-myrtle understorey, and in a recently burnt Ironbark and Callitris area. Also in <i>Eucalyptus fibrosa subsp. nubila</i> , Tumbledown Red Gum, White Box and White Cypress Pine woodlands north of Dubbo.	Low Unlikely	The study area occurs outside of this species typical range. No vegetation communities associated with this species were recorded in the study area.
<i>Austrostipa metatoris</i> A spear-grass	V	V	Credit	PMST Credit Calculator	Most records occur in the Murray Valley with sites including Cunninyeuk Station, Stony Crossing, Kyalite State Forest (now part of Murrumbidgee Valley Regional Park) and Lake Benanee. Scattered records also occur in central NSW including Lake	Low Unlikely	Targeted surveys during the prescribed survey period did not locate this species. The study area occurs outside of this species typical range. No

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					Cargelligo, east of Goolgowi, Condobolin and south west of Nymagee. Otherwise only known from near Bordertown in south east South Australia, where it may be locally extinct. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Associated species include <i>Eucalyptus populnea</i> , <i>E. intertexta</i> , <i>Callitris glaucophylla</i> , <i>Casuarina cristata</i> , <i>Santalum acuminatum</i> and <i>Dodonaea viscosa</i> .		vegetation communities associated with this species were recorded in the study area.
<i>Austrostipa wakoolica</i> A spear-grass	E	E	-	2 records (BCD 2021) PMST	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest (now part of South West Woodland Nature Reserve). Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise.	Moderate Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land.
<i>Brachyscome papillosa</i> Mossgiel Daisy	V	V	Credit	Credit Calculator	The Mossgiel Daisy is endemic to NSW and chiefly occurs within the Riverina Bioregion, from Mossgiel in the north, Murrumbidgee Valley (Yanga) National Park in the south west to Urana in the south east. Sites are scattered across this Bioregion including the Jerilderie area, the Hay Plain (Maude and Oxley) and around Darlington Point. In addition, there are a number of records from the Willandra Lakes World Heritage Area (including Mungo National Park) with a north-western outlier at Byrnedale Station, north of		The study area occurs outside of this species typical range (i.e. south and west of the Coolamon to Ardlethan Road, west of Lockhart and north of Rand)

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					Menindee. The only known site on South Western Slopes is Ganmain Reserve. Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and Leafless Bluebush (<i>Maireana aphylla</i>) plains, but also in grassland and in Inland Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris spp.</i>) woodland.		
<i>Caladenia arenaria</i> Sand-hill Spider Orchid	E	E	Credit	Credit Calculator	<i>Caladenia arenaria</i> is found mostly on the south west plains and western south west slopes. The original description is of a plant from Nangus, west of Gundagai (1865) and there is a report of the species from Adelong near Tumut. A record near Cootamundra needs verifying. The Sand-hill Spider Orchid is currently only known to occur in the Riverina between Urana and Narranderra. Occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (<i>Callitris glaucophylla</i>)		The study area occurs outside of this species typical range. No vegetation communities associated with this species were recorded in the study area.
<i>Diuris sp.</i> (Oaklands, D.L. Jones 5380) Oakland Diuris	E	-	Credit	Candidate Species	Currently known only from the Oaklands-Urana region of southern NSW. Grows in White Cypress Pine (<i>Callitris glaucophylla</i>) Woodland, either among dense grasses in flat areas with associated eucalypts, or amongst sparse grasses and forbs on low sandhills. Grows mostly on sandy loam soils.	Low Unlikely	The study area occurs outside of this species typical range. No vegetation communities associated with this species were recorded in the study area.
<i>Diuris tricolor</i> Pine Donkey Orchid	V	-	Credit	Candidate Species PMST	Sporadically distributed on the western slopes of NSW, extending from south of Narranderra all the way to the north of NSW. Localities in the south include Red Hill north of Narranderra, Coolamon, and several sites west of Wagga Wagga. Condobolin-Nymagee road, Wattamondara towards Cowra, Eugowra, Girilambone, Dubbo and Cooyal, in the Central West. Pilliga SCA, Pilliga National Park and Bibblewindi State Forest in the north and Muswellbrook in the east.	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land. No vegetation communities or

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					Disturbance regimes are not known, although the species is usually recorded from disturbed habitats. Associated species include <i>Callitris glaucophylla</i> , <i>Eucalyptus populnea</i> , <i>Eucalyptus intertexta</i> , Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species.		associated species were recorded in the study area
<i>Eleocharis obicis</i> Spike-Rush	V	V	Credit	Candidate Species	Found near Condobolin and Hay, as well as being known from an old collection from the Barrier Range near Broken Hill. The later collection was made on the Lachlan River floodplain at Micabil, near Condobolin. Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands. Sites include depressions with heavy clay soils on the Lachlan River floodplain, with <i>Eragrostis australasica</i> , <i>Atriplex vesicaria</i> and <i>A. nummularia</i> shrublands, low-lying claypans near an irrigation channel, and a shallow open ditch on a low ridge with <i>Eucalyptus populnea</i> in red sandy soil over clay.	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land.
<i>Lepidium aschersonii</i> Spiny Peppercress	V	V	Credit	Candidate Species	Not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). In the north of the State recent surveys have recorded a number of new sites including Brigalow Nature Reserve, Brigalow State Conservation Area, Leard State Conservation Area and Bobbiwaa State Conservation Area. Also known from the West Wyalong in the south of the State. Records from Barmedman and Temora areas are likely to be no longer present. Approximately 50% of the total <i>Lepidium aschersonii</i> recorded for Australia occurs in NSW.	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					Found on ridges of gilgai clays dominated by Brigalow (<i>Acacia harpophylla</i>), Belah (<i>Casuarina cristata</i>), Buloke (<i>Allocasuarina luehmannii</i>) and Grey Box (<i>Eucalyptus microcarpa</i>). In the south has been recorded growing in Bull Mallee (<i>Eucalyptus behriana</i>). Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.		
<i>Lepidium monoplocoides</i> Winged Peppercress	E	E	Credit	Candidate Species	Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising <i>Eragrostis australasicus</i> , <i>Agrostis avenacea</i> , <i>Austrodanthonia duttoniana</i> , <i>Homopholis proluta</i> , <i>Myriophyllum crispatum</i> , <i>Utricularia dichotoma</i> and <i>Pycnosorus globosus</i> , on	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					waterlogged grey-brown clay. Also recorded from a Maireana pyramidata shrubland.		
<i>Leptorhynchos orientalis</i> Lanky Buttons	E	-	Credit	Credit Calculator	Recorded from several Hay Plain and southern Riverina localities, including Willanthry east of Hillston, Zara-Wanganella via Hay, McKinley Road SW of Hillston, and "Morundah" navy land west of Buckingbong SF. A large population has most recently been recorded from Cowl Cowl Station SSW of Hillston along a TSR. Grows in woodland or grassland, sometimes on the margins of swamps. Communities include a Bimble Box plain in red-brown soil, dense Acacia pendula woodland with herbaceous understorey on red clay to clay-loam, open grassland areas on red soils, and red clay plains at the edge of a Canegrass swamp.		Proposal site is located outside the geographic limitations of the species (i.e. west of Narrandera/Lockhart Road and north of Urana/Lockhart Road)
<i>Pilularia novae-hollandiae</i> Austral Pillwort	E		Credit	Candidate Species	The Austral Pillwort is a small semi-aquatic fern that resembles fine grass. In NSW, the Austral Pillwort has been recorded from suburban Sydney, Khancoban, the Riverina between Albury and Urana (including Henty, Walbundrie, Balldale and Howlong). This species grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most records for the Albury-Urana area were from table drains on the side of roads.	Low Unlikely	The study area occurs outside of this species typical range. Targeted surveys during the prescribed survey period did not locate this species. Wetland habitat (gilgai) in the study area is grazed and trampled regularly by stock, and it is unlikely that this species would persist in the site.
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	E	E		PMST	Occurs at 4 sites in NSW (Captains Flat Cemetery, Ilford Cemetery, Steves TSR at Delegate and Tarengo TSR near Boorowa). Also at Hall in ACT. Grows on relatively fertile soils in grassy woodland or natural grassland. Occurs in relatively moist, poorly drained areas.	Low Unlikely	The study area occurs outside of known habitat areas for the species. No suitable moist, poorly drained native grassland or grassy woodland habitat likely to support the species occurs in the study area

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Prasophyllum</i> sp. Wybong (C.Phelps ORG 5269) -	-	CE		PMST	Distributed within the Border Rivers (Gwydir, Namoi, Hunter), Central Rivers and Central West Natural Resource Management Regions. The species is known to occur in open eucalypt woodland and grassland. The species can be found in the EPBC listed threatened ecological community White-box Yellow-box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (TSSC, 2009).	Low Unlikely	The study area occurs outside of known habitat areas for the species. No associated habitat (Box-Gum Woodland) containing a native understory was recorded in the proposal site.
<i>Swainsona murrayana</i> Slender Darling-pea	V	V	Credit	PMST Candidate Species	Found throughout NSW , it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Occurs in grassland, herbland and open Black-box woodland. Associated with low chenopod shrubs Maireana species, wallaby-grass Austrodanthonia species and spear grass Austrostipa species. Flowers from spring to early summer. Grows on heavy grey or brown clay, loam, or red cracking clays. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. Habitat for this species is limited in the proposal site due to degradation by weeds and exotic species associated with surrounding agricultural land.
<i>Swainsona recta</i> Small Purple-pea	E	E	Credit	Candidate Species PMST	Small Purple-pea was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Over 80% of the southern population grows on a railway easement. It is also known from the ACT and a single population of four plants near Chiltern in	Low Unlikely	Targeted surveys for this species during the prescribed survey period did not locate this species in the proposal site. No associated vegetation communities or species were recorded in the study area.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					<p>Victoria.</p> <p>Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum <i>Eucalyptus blakelyi</i>, Yellow Box <i>E. melliodora</i>, Candlebark Gum <i>E. rubida</i> and Long-leaf Box <i>E. gonicalyx</i>.</p> <p>Grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i>, poa tussocks <i>Poa spp.</i> and spear-grasses <i>Austrostipa spp.</i></p>		Habitat in the study area is unlikely to support the species
<i>Swainsona sericea</i> Silky Swainson-pea	V		Credit	Candidate Species	<p>Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland.</p> <p>Found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes.</p>	Low Unlikely	The study area occurs outside of this species known range. Vegetation communities typically associated within the species do not occur in the study area
<i>Tylophora linearis</i> -	V	E		PMST	<p>Majority of records occur in the central western region. Records from Goonoo, Pillaga West, Pillaga East, Bibblewindi, Cumbil and Eura State Forests, Coolbaggie NR, Goobang NP and Beni SCA. Also has been recorded Hiawatha State Forest near West Wyalong in the south and there are old records as far north as Crow Mountain near Barraba and near Glenmorgan in the western Darling Downs.</p> <p>Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i>, <i>Eucalyptus sideroxylon</i>,</p>	Low Unlikely	The study area occurs outside of this species known range. Communities typically associated within the species do not occur in the study area

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					<i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i> .		
Amphibians							
<i>Crinia sloanei</i> Sloane's Froglet	V	E	Species	Credit Calculator	Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. At a number of sites where records are verified by museum specimens, the species has not been subsequently detected during more recent frog surveys in the vicinity (e.g. Holbrook, Nyngan, Wagga Wagga and Tocumwal). The low number of sites, low number of recorded individuals per site, and the low proportion of records of this species in regional surveys all indicate that a moderately low number of mature individuals exist. The apparent loss from previous recorded sites and decline in recording rates indicates that this is not just a rare or uncommonly encountered species, but that there has been a reduction in population size and range. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.	Low Unlikely	Surveys were conducted in the required survey periods over multiple site surveys, and this species was not detected. Some moderate habitat exists in the study area within ephemeral gilgai wetlands, however, these would only provide intermittent habitat during times of high or prolonged rainfall, and would predominantly remain dry due to the arid climate of the Forbes area. The study area also contains some permanent aquatic habitat (farm dams), however these provide poor refuge habitat for the species, as they lack fringing vegetation, and are disturbed frequently by stock, resulting in significant turbidity and contamination. Given the limited opportunities for recruitment from other wetland habitat the study area is unlikely to support a population of the species.
Birds							
<i>Actitis hypoleucos</i>		C,J,K		PMST	Does not breed in Australia. When in Australia it is found on all coastlines and in inland areas, but is concentrated in the north and west with important	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Common Sandpiper					areas in WA, the NT and Qld. Utilises a wide range of coastal and inland wetlands with varying salinity levels.		area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Anseranas semipalmata</i> Magpie Goose	V	-		2 records (BCD 2021)	The Magpie Goose is still relatively common in the Australian northern tropics, but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Anthochaera phrygia</i> Regent Honeyeater	CE	CE		PMST	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Low Unlikely	Woodland habitat in the study area does not constitute preferred or important foraging habitat for the species. Minimal impacts of the proposal on woodland are unlikely to substantially reduce foraging resources for this mobile species if they were to occur in the study area. The study area is outside of the species known breeding region, no breeding habitat occurs.
<i>Apus pacificus</i> Fork-tailed Swift	-	Mi		PMST	Recorded in all regions of NSW. Non- breeding, and almost exclusively aerial while in Australia. Occurs over urban and rural areas as well as areas of native vegetation.	Low Unlikely	The species may occur, and forage aerially over the proposal site. The species is unlikely to be detrimentally impacted by the minimal removal of woodland vegetation, which may provide roosting or perching habitat, given the species mobility and the availability of alternant habitat in the study area.
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	V	-	Ecosy stem	2 records (BCD 2021) Credit calculator	The Dusky Woodswallow is widespread from the coast to inland, including the western slopes of the Great Dividing Range and farther west. It is often recorded in woodlands and dry open sclerophyll forests, and has also been recorded in shrublands, heathlands regenerating forests and very occasionally in moist forests or rainforests. The	Moderate Unlikely	Habitat within the study area is unlikely to support the species, as it typically occurs in large tracts (greater than 100 hectares) of relatively undisturbed woodland habitat. Woodland habitat within the

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, often with coarse woody debris. It is also recorded in farmland, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber. The nest is an open shallow untidy cup frequently built in an open hollow, crevice or stump. Although Dusky Woodswallows have large home ranges, individuals may spend most of their time in about a 2 ha range and defend an area about 50 m around the nest. Dusky Woodswallows prefer larger remnants over smaller remnants. Competitive exclusion by Noisy Miners (<i>Manorina melanocephala</i>) is a significant threat to this species.		study area occurs in smaller, disturbed patches (no bigger than 80 hectares). It has been modified by adjacent agricultural land, residential housings and various infrastructure corridors through the Crown Reserve.
<i>Botaurus poiciloptilus</i> Australasian Bittern	E	E		PMST	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. The Species favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.), it hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. The species may construct feeding platforms over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.		No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Burhinus grallarius</i>	E	-	Credit	Credit Calculator	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the	Low Unlikely	No suitable woodland or open-forest habitat contain a sparse

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Bush Stone- curlew					far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Nest on the ground in a scrape or small bare patch.		grassy ground-layer and abundant fallen timber, occurs in the study area to support this species.
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	-	C,J,K		PMST	Spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. In Australasia, prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. Breeds in northern Siberia.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Calidris ferruginea</i> Curlew Sandpiper	E	CE, M		PMST	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.		be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Calidris melanotos</i> Pectoral Sandpiper	-	Mi		PMST	In NSW, the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. The species prefers shallow fresh to saline wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo	V	-	Credit	Credit Calculator	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and	Low Unlikely	Some foraging habitat for this species (<i>Alloscasuarina leuhmannii</i>) was available in native plantings within the proposal site, and within remnant Grey Box woodland along the proposed transmission alignment. Food resources were

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations.		limited in the study area, and did not occur extensively. The solar farm site contained some hollow-bearing trees, however they occurred as isolated paddock trees in a highly modified and cleared (agricultural land) environment unlikely to represent preferred breeding habitat the species would utilise. The loss of only 3.9 hectares of native and planted woodland containing a small component of this species foraging habitat (Buloke) from the study area is unlikely to substantially impact foraging habitat for this highly mobile and transient species.
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo	V	-	Credit	Credit Calculator	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> ,	Low Unlikely	Proposal site is located outside the geographic limitations of the endangered population (i.e. Carrathool, Griffith, Leeton and Narrandera LGAs)

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations.		
<i>Certhionyx variegatus</i> Pied Honeyeater	V	-	Ecosy stem	Credit Calculator	Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Occasionally occurs further east, on the slopes and plains and the Hunter Valley, typically during periods of drought. Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	Low Unlikely	Minimal suitable habitat (acacia (mulga), mallee and spinifex scrub) to support this species occurs in the study area. The loss of 0.66 hectares of foraging habitat within Weeping Mall woodland is unlikely to substantially reduce foraging resources for this mobile species if it were to occur.
<i>Chthonicola sagittata</i> Speckled Warbler	V	-	Ecosy stem	2 records (BCD 2021) Credit Calculator	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Low Unlikely	Habitat within the study area is unlikely to support the species, as it typically occurs in large tracts (greater than 100 hectares) of relatively undisturbed woodland habitat. Woodland habitat within the study area occurs in smaller, disturbed patches (no bigger than 80 hectares). It has been modified by adjacent agricultural land, residential housings and various infrastructure corridors through the Crown Reserve.
<i>Circus assimilis</i> Spotted Harrier	V		Ecosy stem	Credit Calculator	Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including <i>Acacia</i> and mallee remnants, inland riparian woodland, grassland and	Moderate Unlikely	The species may utilise open woodland and grassy habitat in the study area to forage for prey. Impacts of the transmission line route would not impact on foraging habitat

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					shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.		for this species, as its prey could still readily access the areas surrounding the transmission line poles. The operation of the proposed solar farm site would reduce foraging opportunities for the species within the property, as the solar panels would act as impenetrable shelter for prey species. Given the wide availability of foraging habitat (open grasslands woodland and agricultural land) in the study area, these impacts are unlikely to be detrimental to this highly mobile predator. No stick nests or potential nest trees were observed during site surveys. The proposed impacts on 4.7 hectares of woodland is unlikely to substantially reduce the availability of breeding resources for this species
<i>Climacteris affinis</i> - endangered population White-browed Treecreeper population in Carrathool local government area south of the	EP	-	Credit	Credit Calculator	In NSW, occupies a broad area of western NSW, west from a line from Balranald to Lake Cargelligo then Lightning Ridge. The species appears absent in the far north west of the state with no records occurring west of a line from Broughams Gate, 100km northwest of Broken Hill to Hungerford. A small population, now recognised as isolated, occurs in Carrathool local government area south of the Lachlan River and Griffith local government areas.	Low Unlikely	The regional distribution for this threatened population does not extend to the study area. This threatened population would not occur

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
Lachlan River and Griffith local government area					Occurs in a range of semi-arid and arid tall shrublands and woodlands across the southern half of Australia. In NSW, the species occupies a variety of habitats including Mulga, Brigalow, Gidgee, Belah, Buloke and White Cypress. The species may also occur in habitats adjacent to those detailed above, including Coolibah, River Red Gum and Black Box.		
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	V	-	Ecosy stem	2 records (BCD 2021) Credit Calculator	Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round. Up to 80% of the diet is comprised of ants; other invertebrates (including spiders, insects larvae, moths, beetles, flies, hemipteran bugs, cockroaches, termites and lacewings) make up the remaining percentage; nectar from Mugga Ironbark (<i>Eucalyptus sideroxylon</i>) and paperbarks, and sap from an unidentified eucalypt are also eaten. Hollows in standing dead or live trees and tree stumps are essential for nesting. Breeds in pairs or co-operatively in territories which range in size from 1.1 to 10.7 ha (mean = 4.4 ha).	Low Unlikely	Woodland within the study area lacks stringy barks and rough-barked eucalypts habitat this species prefers. This species is unlikely to permanently occur in the study area as it lacks its preferred feed resources.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Daphoenositta chrysoptera</i> Varied Sittella	V	-	Ecosy stem	1 record (BCD 2021) Credit Calculator	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Low Unlikely	This species may occur within the western extent of the proposal site where connected woodland habitat occurs, where it may utilise foraging resources. The removal of minimal foraging resources (4.7 hectares of woodland) from the edge of woodland in the proposal site is unlikely to substantially reduce foraging resources for this mobile species.
<i>Falco hypoleucos</i> Grey Falcon	E	V	Ecosy stem	PMST Credit Calculator	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Moderate Unlikely	The species may utilise open grassy habitat in the study area to forage for prey. Impacts of the transmission line route would not impact on foraging habitat for this species, as its prey could still readily access the areas surrounding the transmission line poles. The operation of the proposed solar farm site would reduce foraging opportunities for the species within the property, as the solar panels would act as impenetrable shelter for prey species. Given the wide availability of foraging habitat (open grasslands woodland and agricultural land) in the study

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
							area, these impacts are unlikely to be detrimental to this highly mobile predator. No stick nests or potential nest trees were observed during site surveys. The proposed impacts on 4.7 hectares of woodland is unlikely to substantially reduce the availability of breeding resources for this species
<i>Gallinago hardwickii</i> Latham's Snipe		J,K, Migratory Wetland		PMST	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Grantiella picta</i> Painted Honeyeater	V	V		PMST	Nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Inhabits Boree, Brigalow and Grey Box Woodlands and Box-Ironbark forests. Specialist forager on the fruits of mistletoes, preferably of the Amyema genus.	Low Unlikely	This nomadic species may forage on mistletoe in Grey-box woodland in the study area. The proposed impact on potential foraging resources is minimal (2.64 hectares), and is unlikely

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					Nests in outer tree canopy. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> .		to substantial reduce the availability of foraging resources for this mobile species, given the abundant availability of similar habitat in the study area.
<i>Grus rubicunda</i> Brolga	V	-	Ecosy stem	Credit Calculator	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps. They feed primarily on sedge roots and tuber but will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species if they were to occur
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V	M	Specie s/Ecos ystem	PMST Credit Calculator	Distributed along the Australian coastline and well inland along rivers and wetlands, it's widespread in eastern NSW. Foraging habitat consists of coastal seas, rivers, fresh and saline lakes, lagoons, reservoirs and terrestrial habitats such as grasslands. Diet consists of waterbirds, turtles and fish. Resident pairs are territorial and occupy nesting territories of hundreds of hectares. Breeding habitat consists of large trees within mature open forest, gallery forest or woodland and reported that they avoid nesting near urban areas. Nest trees are typically large emergent eucalypts and often have emergent dead branches or	Low Unlikely	No suitable habitat (large open waterways) required to support this species foraging requirements occur in the study area, or would be impacted by the proposal.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.		
<i>Hieraaetus morphnoides</i> Little Eagle	V	-	Species/Ecosystem	1 record (BCD 2021) Credit Calculator	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Moderate Unlikely	The species may utilise open grassy habitat in the study area to forage for prey. Impacts of the transmission line route would not impact on foraging habitat for this species, as its prey could still readily access the areas surrounding the transmission line poles. The operation of the proposed solar farm site would reduce foraging opportunities for the species within the property, as the solar panels would act as impenetrable shelter for prey species. Given the wide availability of foraging habitat (open grasslands woodland and agricultural land) in the study area, these impacts are unlikely to be detrimental to this highly mobile predator. No stick nests or potential nest trees were observed during site surveys. The proposed impacts on 4.5 hectares of woodland (including planted woodland) is unlikely to substantially reduce the availability of breeding resources for this species

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Hirundapus caudacutus</i> White-throated Needletail	-	Mi		PMST	The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. A large proportion of the White-throated Needletails of the nominate subspecies would occur in Australia as non-breeding visitors. Most White-throated Needletails spend the non-breeding season in Australasia, mainly in Australia, and occasionally in New Guinea and New Zealand, though it has been suggested that some may overwinter in parts of South-East Asia. As the Needletails that occur in Australia migrate from breeding areas in the Northern Hemisphere, they would be affected by global threats.	Low Unlikely	The species may occur, and forage aerially over the proposal site. The species is unlikely to be detrimentally impacted by the minimal removal of woodland vegetation, which may provide roosting or perching habitat, given the species mobility and the availability of alternant habitat in the study area.
<i>Lathamus discolor</i> Swift Parrot	E	CE		PMST	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> .	Low Unlikely	This intermittently occurring species may forage on flowering eucalypts in woodland in the study area. The proposed impact on potential foraging resources is minimal (2.64 hectares), and is unlikely to substantially reduce the availability of foraging resources for this mobile species, given the abundant availability of similar habitat in the study area. Important habitat for the species is mapped to the west of the proposal site within Back Yamma State Forest, but would

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
							not be impacted by the proposal.
<i>Leipoa ocellata</i> Mallee Fowl	E	V		PMST	Occurs in semi-arid to arid mallee country in the south-west of NSW. Its NSW stronghold is centred on Mallee Cliffs NP, extending east to Balranald and with scattered records north to Mungo NP. There are also populations near Dubbo (Goonoo forest). Occasional records exist from the Pilliga, around Cobar and Goulburn River NP. 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. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers.	None None	No suitable mallee habitat required to support this species occurs in the study area.
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo	V	-	Species/Ecosystem	Credit Calculator	In NSW Major Mitchell's Cockatoo is found across the arid and semi-arid inland and is regularly as far east as about Bourke and Griffith, and sporadically further east than that. The species inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. It feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines.	High Unlikely	This species may occur and forage in the study area given abundant foraging resources for the species. Isolated hollow-bearing trees occur within the proposed solar farm site, which may provide nesting habitat for the species.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Lophoictinia isura</i> Square-tailed Kite	V	-	Species/Ecosystem	Credit Calculator	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. The species is found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, it has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	Moderate Unlikely	The species may utilise open grassy habitat in the study area to forage for prey. Impacts of the transmission line route would not impact on foraging habitat for this species, as its prey could still readily access the areas surrounding the transmission line poles. The operation of the proposed solar farm site would reduce foraging opportunities for the species within the property, as the solar panels would act as impenetrable shelter for prey species. Given the wide availability of foraging habitat (open grasslands woodland and agricultural land) in the study area, these impacts are unlikely to be detrimental to this highly mobile predator. No stick nests or potential nest trees were observed during site surveys. The proposed impacts on 4.7 hectares of woodland, including planted woodland, is unlikely to substantially reduce the availability of breeding resources for this species
<i>Melanodryas cucullata</i>	V	-	Ecosystem	1 record (BCD 2021)	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal	Moderate Unlikely	This species may occur within the proposal site and forage on habitat resources present. The

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>cucullata</i> Hooded Robin				Credit Calculator	Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.		removal of minimal woodland foraging resources (2.64 hectares of Grey-Box woodland) from the edge of woodland and 0.003 hectares of native grasslands in the proposal site is unlikely to substantially reduce foraging resources for this mobile species.
<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater	V	-	Ecosy stem	Credit Calculator	Extends south from central Queensland, through NSW, Victoria into south eastern South Australia, though it is very rare in the last state. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>).	Low Unlikely	No suitable tracts of extensive, connected woodland habitat likely to support this species occurs in the study area.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Motacilla flava</i> Yellow Wagtail		C,J,K		PMST	The Yellow Wagtail breeds in temperate Europe and Asia. They occur within Australia in open country habitat with disturbed ground and some water. Recorded in short grass and bare ground, swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns.		This species may occur intermittently in the study area. The loss of minimal foraging habitat is unlikely to impact this mobile species.
<i>Myiagra cyanoleuca</i> Satin Flycatcher	-	Mi		PMST	In NSW widespread on and east of the Great Divide, sparsely scattered on the western slopes, very occasional records on the western plains. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, often near wetlands and watercourses. On migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Generally not in rainforests. Prefer to nest in a fork of outer branches of trees, such as paperbarks, eucalypts, and banksia. Where they breed at elevations of more than 600 m above sea level in south-eastern Australia, they breed from November to early January (Frith 1969). mainly insectivorous, preying on arthropods, mostly insects, although very occasionally they will also eat seeds. They are arboreal foragers, feeding high in the canopy and subcanopy of trees.		This species may occur intermittently in the study area. The loss of minimal foraging habitat is unlikely to impact this mobile species.
<i>Neophema pulchella</i> Turquoise Parrot	V	-	Ecosy stem	2 records (BCD 2021) Credit Calculator	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.		This species may occur within the proposal site and forage on habitat resources present. The removal of minimal woodland foraging resources (2.64 hectares of Grey-Box woodland) from the edge of woodland patches and 0.003 hectares of native grasslands in the proposal site is unlikely to

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
							substantially reduce foraging resources for this mobile species. Hollow-bearing trees to be impacted within the proposed solar farm site are unlikely to provide nesting habitat for the species, as they occur in a highly cleared and modified environment, isolated from woodland habitat. Woodland connected to the Crown Reserve to the west of the proposal site may contain suitable nesting trees, however transmission line impacts are limited to the edge of woodland habitat and are unlikely to impact on this habitat.
<i>Ninox connivens</i> Barking Owl	V	-	Species/Ecosystem	Credit Calculator	The Barking Owl is found throughout continental Australia except for the central arid regions. The owls sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. Extensive wildfires in 2019-20 reduced habitat quality further, burnt many old, hollow-bearing trees needed as refuge by prey species and reduced the viability of some regional owl populations. The species inhabit woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared		The species may occur and forage within the proposal site. Impacts of the proposal site would result in modification of this species foraging habitat. The species would be able to forage within the proposal site post-construction. Given the minimal impact to foraging habitat, it is unlikely that this mobile species would be detrimentally impacted by the proposal

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. The species typically roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.		
<i>Numenius madagascariensis</i> Eastern Curlew		C,J,K		PMST	The Eastern Curlew is widespread in coastal regions in the north-east and south of Australia, including Tasmania, and scattered in other coastal areas. It is rarely seen inland. It breeds in Russia and north-eastern China. On passage, they are commonly seen in Japan, Korea and Borneo. Small numbers visit New Zealand. The Eastern Curlew is found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.		No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Oxyura australis</i> Blue-billed Duck	V	-		3 records (BCD 2021)	The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. The species disperses during the breeding season to deep swamps up to 300 km away, and is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in	Low Low	No suitable permanent aquatic or wetland habitat required to support this species occurs in the study area or would be impacted by the proposal

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached.		
<i>Pachycephala inornata</i> Gilbert's Whistler	V	-	Ecosy stem	Credit Calculator	<p>The Gilbert's Whistler is sparsely distributed over much of the arid and semi-arid zone of inland southern Australia, from the western slopes of NSW to the Western Australian wheatbelt. The eastern population extends from the central NSW mallee (Yathong, Nombinnie and Round Hill NRs), south and east through the Cocoparra Range to Pomingalama Reserve (near Wagga Wagga) then north through the South West Slopes east as far as Cowra and Burrendong Dam, to the Goonoo reserves (with scattered records as far north as Pilliga). Occasional records are also made of this species in the Capertee Valley. The species is also recorded in River Red Gum forests along the Murray River valley between Mathoura and Wentworth, with the eastern populations (between Mathoura and Barham) apparently isolated from other NSW populations. West of Swan Hill, this population may interact with populations found to the north of the Murray River west of Balranald and as far north as the Scotia country (Tarawi NR and Scotia Sanctuary).</p> <p>The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Within the mallee the species is often found in association with an understorey of</p>	Low Unlikely	Habitat within the proposal site is not preferred by the species, as they typically occur in woodland with a dense shrub layer. This species may occur intermittently and utilise foraging resources. The loss of minimal foraging habitat is unlikely to impact this mobile species.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth Callitris pine. Parasitic 'cherries' (Exocarpus species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised.		
<i>Pandion haliaetus</i> Osprey	V	Mi		PMST	The distribution of the species around the northern coast (south-western Western Australia to south-eastern NSW) appears continuous except for a possible gap at Eighty Mile Beach. Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. Eastern Ospreys occur sympatrically and sometimes interact with White-bellied Sea-Eagles	Low Unlikely	No suitable habitat (large open waterways) required to support this species foraging requirements occur in the study area, or would be impacted by the proposal.
<i>Petroica boodang</i> Scarlet Robin	V	-	Ecosy stem	Credit Calculator	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.	Moderate Unlikely	This species may occur intermittently in the study area, and utilise foraging habitat. The loss of minimal foraging habitat is unlikely to impact this mobile species. No breeding habitat occurs in the region.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.		
<i>Petroica phoenicea</i> Flame Robin	V	-	Ecosy stem	Credit Calculator	<p>The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands.</p> <p>Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.</p>	Moderate Unlikely	This species may occur intermittently in the study area. The loss of minimal foraging habitat is unlikely to impact this mobile species. No breeding habitat occurs in the region.
<i>Polytelis swainsonii</i> Superb Parrot	V	V	Specie s/Ecos ystem	PMST 5 records (BCD 2021) Credit Calculator	<p>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. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round.</p> <p>In the Riverina the birds nest in the hollows of large</p>	Recorded Likely	This species was recorded foraging within the proposal site in Grey Box woodland. Isolated hollow-bearing trees occur within the proposed solar farm site, however as this species typically nests within riparian corridors, the study area is unlikely to contain breeding habitat

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.		
<i>Pomatostomus temporalis</i> <i>temporalis</i> Grey-crowned Babbler (eastern subspecies)	V	-	Ecosystem	8 records (BCD 2021) Credit Calculator	The eastern subspecies (<i>temporalis</i>) occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. This subspecies also occurs in the Trans-Fly Region in southern New Guinea. In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	Recorded Low	This species was recorded foraging in the proposal site. No breeding nests or trees were recorded during site surveys within the solar farm site or transmission line route. The species may nest within Grey Box woodland to the west of the proposal site, however, as impacts to woodland in this area are limited to the degraded edge of the woodland, impacts to breeding habitat are unlikely.
<i>Rhipidura rufifrons</i> Rufous Fantail	-	Mi		PMST	Found along NSW coast and ranges. Inhabits rainforest, dense wet forests, swamp woodlands and mangroves. During migration, it may be found in more open habitats or urban areas (BA, 2017). Forages mainly in the low to middle strata of forests, sometimes in or below the canopy or on the ground; insectivorous. Breeds from about September to February. A small cup-shaped nest made from grass, roots, fine strips of bark, plant-fibre, decayed wood, moss and spider web is placed in a tree, shrub or	Low Unlikely	No suitable rainforest or dense wet forest habitat occurs for this species in the study area.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					vine, between 0.34–6.0 m above the ground, the average height being 1.6 m (Higgins et al. 2006). Nests are placed in a wide variety of plant species, including Blackberries (<i>Rubus fruticosus</i>), Musk Daisybush (<i>Olearia argophylla</i>), eucalypts and other genera.		
<i>Rostratula australis</i> Australian Painted Snipe	E	E		PMST	In NSW many records of the Australian Painted Snipe are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. The species prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares) and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Stagonopleura guttata</i> Diamond Firetail	V	-	Ecosy stem	1 record (BCD 2021) Credit Calculator	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Cental and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over	Moderate Unlikely	This species may occur intermittently in the study area, and utilise foraging habitat. The loss of minimal foraging habitat is unlikely to impact this mobile species.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.		
<i>Stictonetta naevosa</i> Freckled Duck	V	-		4 records (BCD 2021)	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	Low Unlikely	No suitable permanent aquatic or wetland habitat required to support this species occurs in the study area or would be impacted by the proposal
<i>Tringa stagnatilis</i> Marsh Sandpiper		C,J,K		PMST	The Marsh Sandpiper is found on coastal and inland wetlands throughout Australia. It is recorded in all regions of NSW but especially the central and south coasts and (inland) on the western slopes of Great Divide and western plains. The Hunter River Estuary and the Macquarie Marshes are internationally important sites for this species. The Marsh Sandpiper	Low Unlikely	No suitable permanent aquatic habitat, to support this species year-round occurs in the study area. Ephemeral gilgai wetlands may provide moderate foraging habitat for the species during times of high rainfall, however

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, salt pans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes.		due to the arid climate of the Forbes region, this is unlikely to be a frequent occurrence. The impact on gilgai wetland habitat is minimal (less than 0.0012 hectares), and would be unlikely to reduce the availability of this intermittent foraging resource for the species, if they were to occur
<i>Tyto novaehollandiae</i> Masked Owl	V	-	Credit	Credit Calculator	The Masked Owl occurs from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. This species lives in dry eucalypt forests and woodlands from sea level to 1100 m and often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.		Proposal site is outside the known range for the species as mapped in the BioNet Atlas. If the species were to occur in the proposal site, the minimal impacts of the proposal are unlikely to impact on foraging habitat for the species
Bats							
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V		PMST	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. The species roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young	Low Unlikely	No cave or cliff structures occur in the study area. This species is unlikely to occur.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. It is found in well-timbered areas containing gullies.		
<i>Chalinolobus picatus</i> Little Pied Bat	V	-	Ecosy stem	Credit Calculator	The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	Moderate Unlikely	This species may roost in hollow-bearing trees in the study area, and forage over the proposal site. Hollow-bearing trees in the proposal site are unlikely to support the species due to their occurrence in a highly cleared and disturbed environment, isolated from connected woodland habitat.
<i>Nyctophilus corbeni</i> South-eastern Long-eared Bat	V	V	Ecosy stem	Credit Calculator	Distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, bullocke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	Moderate Unlikely	This species may roost in hollow-bearing trees in the study area, and forage over the proposal site. Hollow-bearing trees in the proposal site are unlikely to support the species due to their occurrence in a highly cleared and disturbed environment, isolated from connected woodland habitat.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	Ecosy stem	PMST Credit Calculator	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. The species occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within	Low Unlikely	This species typically occurs within 200 kilometres of the east coats of Australia, and is unlikely to occur in the study area. No known roost camps occur in the study area.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.		
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat	V	-	Ecosystem	Credit Calculator	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. It forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Moderate Unlikely	This species may roost in hollow-bearing trees in the study area, and forage over the proposal site. Hollow-bearing trees in the proposal site are unlikely to support the species due to their occurrence in a highly cleared and disturbed environment, isolated from connected woodland habitat.
Fish							
<i>Maccullochella macquariensis</i> Trout Cod	E	-		PMST	The Trout Cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. The species was once widespread and abundant in these areas but has undergone dramatic declines in its distribution and abundance over the past century. The last known reproducing population of Trout Cod is confined to the Murray River below Yarrawonga downstream to Tocumwal.	None Unlikely	No permanent aquatic likely to support this species occurs in the study area or would be impacted by the proposal
<i>Maccullochella peelii</i> Murray Cod	-	V		PMST	Occurs throughout the Murray-Darling Basin. Can live in a wide range of habitats, from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The presence of wood debris has been shown to be the primary factor determining Murray cod presence.	None Unlikely	No permanent aquatic likely to support this species occurs in the study area or would be impacted by the proposal

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
<i>Macquaria australasica</i> Macquarie Perch	V	E		PMST	Occurs in the upper reaches of the Lachlan, Murrumbidgee and Murray Rivers, and in parts of the Hawkesbury and Shoalhaven catchment areas. Inhabits river and lake habitats, especially the upper reaches of rivers and their tributaries. Requires clear water with deep, rocky holes and abundant cover (including aquatic vegetation, woody debris, large boulders and overhanging banks). Spawning occurs in spring and summer in shallow upland streams or flowing sections of river systems.	None Unlikely	No permanent aquatic likely to support this species occurs in the study area or would be impacted by the proposal
Mammals							
<i>Cercartetus nanus</i> Eastern Pygmy Possum	V		Credit	Credit Calculator	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.		Proposal site is outside the known range for the species as mapped in the BioNet Atlas
<i>Dasyurus maculatus maculatus</i> (SE mainland population) Spotted-tailed Quoll	V	E		PMST 1 record (BCD 2021)	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. The species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small	Low Unlikely	No large tracts of connected habitat occur in the study area for this species. Woodland habitat is sparse and fragmented by agricultural properties and infrastructure. Habitat in the study area is unlikely to support the species.

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
					caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. Are known to traverse their home ranges along densely vegetated creeklines.		
<i>Petaurus norfolcensis</i> Squirrel Glider	V	-	Credit	Candidate Species	The Squirrel Glider is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	Low Unlikely	Woodland habitat within the proposal site typically would not support the species as it is too fragmented to allow movement. The Crown Reserve to the west of the proposal site could support the species, however impacts to woodland in this area would occur to the degraded edges of the woodland only, and would not further fragment habitat for the species.
<i>Phascolarctos cinereus</i> Koala	V	V	Credit	Credit Calculator	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. The species inhabit eucalypt woodlands and forests, and feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.		No suitable breeding habitat. No core habitat present according to mapping of Areas of Regional Koala Significance (ARKS). Woodland in the study area is highly fragmented by agricultural development, and not easily traversable by the species
<i>Pseudomys novaehollandiae</i>	-	V		PMST	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Genetic evidence indicates	Low Unlikely	No suitable habitat to support the species (open forest with a heathland understory and

Scientific name Common name	BC Status	EPBC Status	Credit type	Source	Habitat requirements (OEH 2020b)	Likelihood of occurrence Likelihood of impact	Justification
New Holland mouse					that the New Holland Mouse once formed a single continuous population on mainland Australia and the distribution of recent subfossils further suggest that the species has undergone a large range contraction since European settlement. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals.		vegetated sand dunes) occurs in the study area.
Reptiles							
<i>Aprasia parapulchella</i> Pink-tailed Worm Lizard	V	V		PMST	Populations occur in the Queanbeyan/Canberra district, Cooma, Yass, Bathurst, Albury and West Wyalong areas. Inhabits grassland and open woodland with substantial embedded rock cover in sunny situations. Recorded in both native and non-native grasslands. Usually recorded under small rocks (150 - 600 mm basal area) shallowly embedded in the soil (2 - 5 cm, and use ant burrows under these rocks.	Low Unlikely	The study area occurs outside the known geographical extent for the species. No suitable rocky habitat within native grasslands occurs within the study area.

Appendix B – Survey results

Flora species recorded

Family	Exo tic	Scientific Name	Common Name
Aizoaceae	*	<i>Psilocaulon tenue</i>	Wiry Noon-flower
Amaranthaceae	-	<i>Alternanthera denticulata</i>	Lesser Joyweed
Amaranthaceae	*	<i>Amaranthus retroflexus</i>	Redroot Amaranth
Amaranthaceae	-	<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	Tall Mulla Mulla
Apiaceae	-	<i>Daucus glochidiatus</i>	Native Carrot
Asteraceae	*	<i>Arctotheca calendula</i>	Capeweed
Asteraceae	-	<i>Calotis cuneifolia</i>	Purple Burr-Daisy
Asteraceae	-	<i>Calotis hispidula</i>	Bogan Flea
Asteraceae	*	<i>Carthamus lanatus</i>	Saffron Thistle
Asteraceae	*	<i>Centaurea melitensis</i>	Maltese Cockspur
Asteraceae	-	<i>Centipeda cunninghamii</i>	Common Sneezeweed
Asteraceae	*	<i>Cichorium intybus</i>	Chicory
Asteraceae	*	<i>Cirsium vulgare</i>	Spear Thistle
Asteraceae	*	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
Asteraceae	-	<i>Euchiton involucratus</i>	Star Cudweed
Asteraceae	*	<i>Hypochaeris glabra</i>	Smooth Catsear
Asteraceae	*	<i>Hypochaeris radicata</i>	Catsear
Asteraceae	*	<i>Lactuca serriola</i>	Prickly Lettuce
Asteraceae	*	<i>Lactuca</i> spp.	-
Asteraceae	-	<i>Leiocarpa</i> spp.	-
Asteraceae	-	<i>Minuria leptophylla</i>	-
Asteraceae	-	<i>Picris</i> spp.	-
Asteraceae	-	<i>Rhodanthe pygmaea</i>	Pigmy Sunray
Asteraceae	-	<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	-
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sowthistle
Asteraceae	-	<i>Stuartina muelleri</i>	Spoon Cudweed
Asteraceae	*	<i>Taraxacum officinale</i>	Dandelion
Asteraceae	-	<i>Vittadinia cuneata</i>	A Fuzzweed
Asteraceae	*	<i>Xanthium spinosum</i>	Bathurst Burr
Boraginaceae	*	<i>Echium plantagineum</i>	Patterson's Curse
Boraginaceae	*	<i>Heliotropium europaeum</i>	Potato Weed
Brassicaceae	*	<i>Brassica rapa</i> subsp. <i>campestris</i>	Turnip
Brassicaceae	*	<i>Capsella bursa-pastoris</i>	Shepherd's Purse
Brassicaceae	*	<i>Lepidium africanum</i>	Common Peppergrass
Brassicaceae	*	<i>Raphanus raphanistrum</i>	Wild Radish

Family	Exo tic	Scientific Name	Common Name
Brassicaceae	*	<i>Sisymbrium irio</i>	London Rocket
Campanulaceae	-	<i>Wahlenbergia communis</i>	Tufted Bluebell
Campanulaceae	-	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell
Campanulaceae	-	<i>Wahlenbergia spp.</i>	Bluebell
Campanulaceae	-	<i>Wahlenbergia stricta</i>	Tall Bluebell
Caryophyllaceae	*	<i>Cerastium glomeratum</i>	Mouse-ear Chickweed
Casuarinaceae	-	<i>Allocasuarina luehmannii</i>	Bulloak
Casuarinaceae	-	<i>Casuarina cristata</i>	Belah
Chenopodiaceae	-	<i>Atriplex semibaccata</i>	Creeping Saltbush
Chenopodiaceae	-	<i>Einadia nutans</i>	Climbing Saltbush
Chenopodiaceae	-	<i>Enchylaena tomentosa</i>	Ruby Saltbush
Chenopodiaceae	-	<i>Maireana decalvans</i>	Black Cotton Bush
Chenopodiaceae	-	<i>Maireana enchylaenoides</i>	Wingless Fissure-weed
Chenopodiaceae	-	<i>Maireana microphylla</i>	Small-leaf Bluebush
Chenopodiaceae	-	<i>Maireana pentagona</i>	Hairy Bluebush, Slender Fissure-weed
Chenopodiaceae	-	<i>Salsola australis</i>	-
Chenopodiaceae	-	<i>Salsola kali var. kali</i>	Buckbush
Chenopodiaceae	-	<i>Scleroblitum atriplicinum</i>	Purple Goosefoot
Chenopodiaceae	-	<i>Sclerolaena birchii</i>	Galvanized Burr
Chenopodiaceae	-	<i>Sclerolaena diacantha</i>	Grey Copperburr
Chenopodiaceae	-	<i>Sclerolaena divaricata</i>	Tangled Copperburr
Chenopodiaceae	-	<i>Sclerolaena muricata</i>	Black Rolypoly
Chenopodiaceae	-	<i>Sclerolaena spp.</i>	Copperburr, Poverty-bush
Clusiaceae	-	<i>Hypericum gramineum</i>	Small St John's Wort
Clusiaceae	*	<i>Hypericum perforatum</i>	St. Johns Wort
Colchicaceae	-	<i>Wurmbea dioica subsp. Dioica</i>	Early Nancy
Convolvulaceae	-	<i>Convolvulus erubescens</i>	Pink Bindweed
Convolvulaceae	-	<i>Dichondra repens</i>	Kidney Weed
Crassulaceae	-	<i>Crassula decumbens var. decumbens</i>	Spreading Stonecrop
Crassulaceae	-	<i>Crassula sieberiana</i>	Australian Stonecrop
Crassulaceae	*	<i>Crassula spp.</i>	Stonecrop
Cucurbitaceae	*	<i>Citrullus lanatus var. lanatus</i>	Wild Melon, Camel Melon, Bitter
Cupressaceae	-	<i>Callitris glaucophylla</i>	White Cypress Pine
Cyperaceae	-	<i>Carex inversa</i>	Knob Sedge
Cyperaceae	-	<i>Cyperus bifax</i>	Downs Nutgrass
Cyperaceae	*	<i>Cyperus eragrostis</i>	Umbrella Sedge
Cyperaceae	-	<i>Eleocharis acuta</i>	-
Cyperaceae	-	<i>Eleocharis plana</i>	Flat Spike-sedge
Cyperaceae	-	<i>Eleocharis spp.</i>	Spike-rush, Spike-sedge
Euphorbiaceae	-	<i>Chamaesyce drummondii</i>	Caustic Weed
Fabaceae (Caesalpinioideae)	-	<i>Senna artemisioides subsp. X artemisioides</i>	-

Family	Exo tic	Scientific Name	Common Name
Fabaceae (Caesalpinioideae)	-	<i>Senna artemisioides</i> subsp. <i>X coriacea</i>	-
Fabaceae (Caesalpinioideae)	*	<i>Senna occidentalis</i>	Coffee Senna
Fabaceae (Faboideae)	*	<i>Astragalus hamosus</i>	Yellow Milk-vetch
Fabaceae (Faboideae)	*	<i>Medicago arabica</i>	Spotted Burr Medic
Fabaceae (Faboideae)	*	<i>Medicago laciniata</i>	Cut-leaved Medic
Fabaceae (Faboideae)	*	<i>Medicago minima</i>	Woolly Burr Medic
Fabaceae (Faboideae)	*	<i>Medicago polymorpha</i>	Burr Medic
Fabaceae (Faboideae)	*	<i>Medicago sativa</i>	Lucerne
Fabaceae (Faboideae)	*	<i>Medicago truncatula</i>	Barrel Medic
Fabaceae (Faboideae)	*	<i>Trifolium angustifolium</i>	Narrow-leaved Clover
Fabaceae (Faboideae)	*	<i>Trifolium arvense</i>	Haresfoot Clover
Fabaceae (Faboideae)	*	<i>Trifolium campestre</i>	Hop Clover
Fabaceae (Faboideae)	*	<i>Trifolium glomeratum</i>	Clustered Clover
Fabaceae (Faboideae)	*	<i>Trifolium repens</i>	White Clover
Fabaceae (Faboideae)	*	<i>Trifolium subterraneum</i>	Subterranean Clover
Fabaceae (Faboideae)	*	<i>Trifolium vesiculosum</i>	-
Fabaceae (Mimosoideae)	-	<i>Acacia pendula</i>	Weeping Myall, Boree
Fumariaceae	*	<i>Fumaria muralis</i> subsp. <i>muralis</i>	Wall Fumitory
Gentianaceae	*	<i>Centaurium erythraea</i>	Common Centaury
Geraniaceae	*	<i>Erodium botrys</i>	Long Storksbill
Geraniaceae	*	<i>Erodium cicutarium</i>	Common Crowfoot
Geraniaceae	-	<i>Erodium crinitum</i>	Blue Crowfoot
Geraniaceae	-	<i>Geranium solanderi</i>	Native Geranium
Goodeniaceae	-	<i>Goodenia fascicularis</i>	Mallee Goodenia
Goodeniaceae	-	<i>Goodenia pinnatifida</i>	Scrambles Eggs
Goodeniaceae	-	<i>Goodenia pusilliflora</i>	-
Hypoxidaceae	-	<i>Hypoxis glabella</i> var. <i>glabella</i>	Tiny Star
Hypoxidaceae	-	<i>Hypoxis</i> spp.	-
Iridaceae	*	<i>Romulea minutiflora</i>	Small-flowered Onion Grass
Iridaceae	*	<i>Romulea rosea</i> var. <i>australis</i>	Onion Grass
Juncaceae	-	<i>Juncus continuus</i>	-
Juncaceae	-	<i>Juncus</i> spp.	A Rush
Juncaceae	-	<i>Juncus usitatus</i>	-

Family	Exo tic	Scientific Name	Common Name
Juncaginaceae	-	<i>Triglochin procera</i>	Water Ribbons
Lamiaceae	-	<i>Mentha diemenica</i>	Slender Mint
Lamiaceae	*	<i>Salvia verbenaca</i>	Vervain
Lamiaceae	-	<i>Teucrium racemosum</i>	Grey Germander
Linaceae	-	<i>Linum marginale</i>	Native Flax
Lobeliaceae	-	<i>Lobelia concolor</i>	Poison Pratia
Lobeliaceae		<i>Pratia concolor</i>	Poison Pratia
Lomandraceae	-	<i>Lomandra filiformis</i>	Wattle Matt-rush
Lomandraceae	-	<i>Lomandra spp.</i>	Mat-rush
Lythraceae	-	<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife
Lythraceae	-	<i>Lythrum spp.</i>	-
Malvaceae	*	<i>Abutilon spp.</i>	Lantern-bush
Malvaceae	*	<i>Malva parviflora</i>	Small-flowered Mallow
Malvaceae	*	<i>Malva spp.</i>	Mallow
Malvaceae	-	<i>Sida corrugata</i>	Corrugated Sida
Malvaceae	-	<i>Sida fibulifera</i>	Pin Sida
Marsileaceae	-	<i>Marsilea drummondii</i>	Common Nardoo
Marsileaceae	-	<i>Marsilea hirsuta</i>	Short-fruited Nardoo
Meliaceae	-	<i>Melia azedarach</i>	White Cedar
Myoporaceae	-	<i>Eremophila sturtii</i>	Turpentine Bush
Myoporaceae	-	<i>Myoporum montanum</i>	Western Boobialla
Myoporaceae	-	<i>Myoporum spp.</i>	Boobialla
Myrsinaceae	*	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
Myrtaceae	-	<i>Eucalyptus camaldulensis</i>	Eucalyptus camaldulensis population in the Hunter catchment
Myrtaceae	-	<i>Eucalyptus melliodora</i>	Yellow Box
Myrtaceae	-	<i>Eucalyptus microcarpa</i>	Western Grey Box
Myrtaceae	-	<i>Eucalyptus populnea subsp. bimbil</i>	Bimble Box
Nyctaginaceae	-	<i>Boerhavia dominii</i>	Tarvine
Oxalidaceae	*	<i>Oxalis corniculata</i>	Creeping Oxalis
Oxalidaceae	-	<i>Oxalis perennans</i>	-
Oxalidaceae	*	<i>Oxalis pes-caprae</i>	Soursob
Oxalidaceae	-	<i>Oxalis spp.</i>	-
Papaveraceae	*	<i>Papaver spp.</i>	-
Phormiaceae	-	<i>Dianella longifolia</i>	Blueberry Lily
Phormiaceae	-	<i>Dianella revoluta</i>	Blueberry Lily
Plantaginaceae	-	<i>Plantago cunninghamii</i>	Sago-weed
Plantaginaceae	-	<i>Veronica plebeia</i>	Trailing Speedwell
Poaceae	-	<i>Amphibromus nervosus</i>	Swamp Wallaby Grass
Poaceae	-	<i>Aristida behriana</i>	Bunch Wiregrass
Poaceae	-	<i>Aristida ramosa</i>	Purple Wiregrass
Poaceae	-	<i>Austrostipa aristiglumis</i>	Plains Grass

Family	Exo tic	Scientific Name	Common Name
Poaceae	-	<i>Austrostipa bigeniculata</i>	Yanganbil
Poaceae	-	<i>Austrostipa scabra</i>	Speargrass
Poaceae	-	<i>Austrostipa</i> spp.	A Speargrass
Poaceae	*	<i>Avena fatua</i>	Wild Oats
Poaceae	*	<i>Avena sativa</i>	Oats
Poaceae	-	<i>Bothriochloa macra</i>	Red Grass
Poaceae	-	<i>Chloris divaricata</i> var. <i>divaricata</i>	Slender Chloris
Poaceae	*	<i>Chloris</i> spp.	-
Poaceae	-	<i>Chloris truncata</i>	Windmill Grass
Poaceae	-	<i>Chloris ventricosa</i>	Tall Chloris
Poaceae	-	<i>Cynodon dactylon</i>	Common Couch
Poaceae	-	<i>Dichelachne</i> spp.	A Plumegrass
Poaceae	-	<i>Digitaria brownii</i>	Cotton Panic Grass
Poaceae	-	<i>Digitaria divaricatissima</i>	Umbrella Grass
Poaceae	*	<i>Digitaria</i> spp.	A Finger Grass
Poaceae	*	<i>Diplachne</i> spp.	-
Poaceae		<i>Elymus scaber</i>	Common Wheatgrass
Poaceae	-	<i>Enteropogon acicularis</i>	Curly Windmill Grass
Poaceae	*	<i>Eragrostis cilianensis</i>	Stinkgrass
Poaceae	-	<i>Eragrostis parviflora</i>	Weeping Lovegrass
Poaceae	-	<i>Eriochloa australiensis</i>	Australian Cupgrass
Poaceae	*	<i>Hordeum leporinum</i>	Barley Grass
Poaceae	-	<i>Lachnagrostis filiformis</i>	-
Poaceae	*	<i>Lolium rigidum</i>	Wimmera Ryegrass
Poaceae	-	<i>Panicum effusum</i>	Hairy Panic
Poaceae	-	<i>Paspalidium constrictum</i>	Knottybutt Grass
Poaceae	-	<i>Paspalidium distans</i>	-
Poaceae	-	<i>Paspalidium gracile</i>	Slender Panic
Poaceae	-	<i>paspalidium</i> spp.	-
Poaceae	*	<i>Paspalum dilatatum</i>	Paspalum
Poaceae	-	<i>Paspalum distichum</i>	Water Couch
Poaceae	*	<i>Phalaris aquatica</i>	Phalaris
Poaceae	*	<i>Phalaris paradoxa</i>	Paradoxa Grass
Poaceae	*	<i>Poa annua</i>	Winter Grass
Poaceae	-	<i>Rytidosperma bipartitum</i>	Wallaby Grass
Poaceae	-	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
Poaceae	-	<i>Rytidosperma duttonianum</i>	Brown-back Wallaby Grass
Poaceae	-	<i>Rytidosperma fulvum</i>	Wallaby Grass
Poaceae	-	<i>Rytidosperma richardsonii</i>	Straw Wallaby-grass
Poaceae	-	<i>Rytidosperma</i> spp.	-
Poaceae	*	<i>Sorghum</i> spp.	-
Poaceae	-	<i>Sporobolus caroli</i>	Fairy Grass

Family	Exo tic	Scientific Name	Common Name
Poaceae	-	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
Poaceae	-	<i>Tragus australianus</i>	Small Burrgrass
Poaceae	*	<i>Triticum aestivum</i>	Wheat
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel Tail Fesque
Poaceae	*	<i>Vulpia spp.</i>	Rat's-tail Fescue
Polygonaceae	-	<i>Persicaria hydropiper</i>	Water Pepper
Polygonaceae	*	<i>Polygonum aviculare</i>	Wireweed
Polygonaceae	-	<i>Rumex brownii</i>	Swamp Dock
Polygonaceae	*	<i>Rumex crispus</i>	Curled Dock
Polygonaceae	-	<i>Rumex tenax</i>	Shiny Dock
Portulacaceae	-	<i>Portulaca oleracea</i>	Pigweed
Potamogetonaceae	-	<i>Potamogeton drummondii</i>	Pondweed
Pteridaceae	-	<i>Cheilanthes sieberi</i>	Rock Fern
Sapindaceae	-	<i>Dodonaea viscosa</i>	Sticky Hop-bush
Sapindaceae	-	<i>Dodonaea viscosa subsp. cuneata</i>	Wedge-leaf Hop-bush
Scrophulariaceae	*	<i>Kickxia elatine subsp. crinita</i>	Twining Toadflax
Scrophulariaceae	*	<i>Linaria arvensis</i>	-
Solanaceae	*	<i>Datura ferox</i>	Fierce Thornapple
Solanaceae	*	<i>Lycium ferocissimum</i>	African Boxthorn
Solanaceae	-	<i>Solanum esuriale</i>	Quena
Solanaceae	*	<i>Solanum nigrum</i>	Black-berry Nightshade
Verbenaceae	*	<i>Verbena bonariensis</i>	Purpletop
Zygophyllaceae	*	<i>Tribulus terrestris</i>	Cat-head

Fauna species recorded during surveys

Scientific Name	Common Name	NSW Status	EPBC Status
Amphibians			
<i>Crinia parinsignifera</i>	Eastern Sign-bearing froglet	-	-
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	-	-
<i>Pseudophryne bibronii</i>	Bibron's Toadlet	-	-
Birds			
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	-	-
<i>Anas gracilis</i>	Grey Teal	-	-
<i>Anas superciliosa</i>	Pacific Black Duck	-	-
<i>Anhinga novaehollandiae</i>	Australasian Darter	-	-
<i>Anthus novaeseelandiae</i>	Australian Pipit	-	-
<i>Ardea pacifica</i>	White-necked Heron	-	-
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	-	-
<i>Cacatua sanguinea</i>	Little Corella	-	-
<i>Chenonetta jubata</i>	Australian Wood Duck	-	-
<i>Cincloramphus mathewsi</i>	Rufous Songlark	-	-
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-
<i>Corcorax melanorhamphos</i>	White-winged Chough	-	-
<i>Corvus coronoides</i>	Australian Raven	-	-
<i>Corvus mellori</i>	Little Raven	-	-
<i>Cracticus nigrogularis</i>	Pied Butcherbird	-	-
<i>Cracticus tibicen</i>	Australian Magpie	-	-
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-
<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck	-	-
<i>Egretta novaehollandiae</i>	White-faced Heron	-	-
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	-	-
<i>Eolophus roseicapillus</i>	Galah	-	-
<i>Falco berigora</i>	Brown Falcon	-	-
<i>Falco cenchroides</i>	Nankeen Kestrel	-	-
<i>Gerygone fusca</i>	Western Gerygone	-	-
<i>Grallina cyanoleuca</i>	Magpie-lark	-	-
<i>Haliastur sphenurus</i>	Whistling Kite	-	-
<i>Himantopus himantopus</i>	Black-winged Stilt	-	-
<i>Hirundo neoxena</i>	Welcome Swallow	-	-
<i>Manorina melanocephala</i>	Noisy Miner	-	-
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	-	-
<i>Microeca fascinans</i>	Jacky Winter	-	-
<i>Milvus migrans</i>	Black Kite	-	-
<i>Ninox novaeseelandiae</i>	Southern Boobook	-	-
<i>Northiella haematogaster</i>	Blue Bonnet	-	-

Scientific Name	Common Name	NSW Status	EPBC Status
<i>Nymphicus hollandicus</i>	Cockatiel	-	-
<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-
<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-
<i>Pardalotus striatus</i>	Striated Pardalote	-	-
<i>Pelecanus conspicillatus</i>	Australian Pelican	-	-
<i>Petrochelidon ariel</i>	Fairy Martin	-	-
<i>Phalacrocorax varius</i>	Pied Cormorant	-	-
<i>Platycercus eximius</i>	Eastern Rosella	-	-
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	-	-
<i>Polytelis swainsonii</i>	Superb Parrot	V	V
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	-
<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-
<i>Rhipidura albiscapa</i>	Grey Fantail	-	-
<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-
<i>Struthidea cinerea</i>	Apostlebird	-	-
<i>*Sturnus vulgaris</i>	Common Starling	-	-
<i>Threskiornis molucca</i>	Australian White Ibis	-	-
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	-	-
<i>Vanellus miles</i>	Masked Lapwing	-	-
<i>Vanellus tricolor</i>	Banded Lapwing	-	-
Mammals			
<i>Austronomus australis</i>	White-striped Freetail-bat	-	-
<i>*Lepus capensis</i>	Brown Hare	*	*

Key: * - exotic,, **bold**- threatened species, V – vulnerable, D – definite record (Anabat analysis), K – dead, O – observed,

Pr - probable record (Anabat analysis), W – heard.

Appendix C – Field data sheets

BAM Site – Field Survey Form						Site Sheet no: 10	
Date: 8 12 20		Survey Name: Darroobalgie		Zone ID:		Recorders: SR	
Zone:	Datum:	Plot ID: 4	Plot dimensions:	Photo #:			
Easting: 601780	Northing: 6311021	IBRA region:	Midline bearing from 0 m:	354			
Vegetation Class:						Confidence: H M L	
Plant Community Type: 244		'? looking'				EEC:	Confidence: H M L

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

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

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	X	X
20 – 29 cm	X	X
10 – 19 cm	✓	✓
5 – 9 cm	✓	X
< 5 cm	X	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0m

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 5 25 15 25			
Average of the 5 subplots				

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

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

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

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

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

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

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	8/12/20	Darrobaldie	4	SR

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	<i>Eucalyptus populnea</i>	N	20	6		
T	<i>Eucalyptus melliodora</i>	N	0.5	1		
G	<i>Rytidosperma fulvum</i>	N	5	500		
-	<i>Lolium rigidum</i>	E	10	1000		
-	<i>Echinochloa polystachya</i>	E	0.5	50		
G	<i>Chloris truncata</i>	N	10	500		
G	<i>Cynodon dactylon</i>	N	10	500		
-	<i>Poa annua</i>	E	20	1000		
-	<i>Paspalum dilatatum</i>	E	0.5	25		
G	<i>Bothriochloa narda</i>	N	0.5	100		
-	<i>Centaurea erythraea</i>	E	0.2	60		
G	<i>Juncus tenuis</i>	N	0.2	25		
-	<i>Avena fatua</i>	E	0.5	200		
-	<i>Medicago lacinata</i>	E	0.1	10		
-	<i>Trifolium glomeratum</i>	E	1	200		
F	<i>Crassula decumbens</i>	N	0.1	5		
G	<i>Eragrostis pectinacea</i>	N	5	400		
F	<i>Lythrum hyssopifolia</i>	N	0.2	20		
-	<i>Lepidium africanum</i>	E	0.2	3		
-	<i>Malva sp.</i>	E	0.1	1		
F	<i>Atriplex semibaccata</i>	N	0.1	1		
-	<i>Trifolium vesiculosum</i>	E	0.1	1		
F	<i>Boerhaavia dominii</i>	N	0.2	25		
F	<i>Sida corrugata</i>	N	0.5	150		
F	<i>Vitellaria cuneata</i>	N	0.2	10		
G	<i>Austrochloa scabra</i>	N	1	200		
G	<i>Anthosachne scabra</i>	N	1	200		
F	<i>Euphorbia drummondii</i>	N	0.1	20		
-	<i>Oxalis articulata</i>	E	0.1	10		
G	<i>Aristida behriana</i>	N	0.1	5		
-	<i>Avena sativa</i>	E	0.1	1		
S	<i>Salsola australis</i>	N	0.1	3		
-	<i>Erigeron bonariensis</i>	E	0.1	3		
G	<i>Austrochloa aristatum</i>	N	0.5	50		
F	<i>Walthergia gracilis</i>	N	0.1	2		
G	<i>Cenchrus ciliaris</i>	N	0.1	20		
F	<i>Echium insubricum</i>	N	0.1	1		
F	<i>Crassula sieberiana</i>	N	0.1	2		
-	<i>Volpea sp.</i>	E	0.1	5		
F	<i>Alternanthera denticulata</i>	N	0.1	5		

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

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

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

- *Tribulus terrestris*
- *Lactuca sp.*

E 0.1 25
E 0.1 5

BAM Site – Field Survey Form						Site Sheet no: 10	
Date		Survey Name		Zone ID		Recorders	
7/12/20		Darroobalgie				SR	
Zone		Datum		Plot ID		Plot dimensions	
				3			
Easting		Northing		IBRA region		Midline bearing from 0 m	
597301		6310922				263	
Vegetation Class				Confidence:			
				H M L			
Plant Community Type				EEC:		Confidence:	
80 – dense scrub						H M L	

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

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

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	✓	0
50 – 79 cm	✓	0
30 – 49 cm	✓	✓
20 – 29 cm	✓	✓
10 – 19 cm	✓	✓
5 – 9 cm	✓	✓
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		
0		

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

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

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

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

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

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

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

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

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

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	2/12/20	Daroodalgie	3	SR

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
S	<i>Callitris glaucophylla</i>	N	15	16		
G	<i>Austroshippa bigemmitata</i>	N	25	1000		
-	<i>Echium plantaginum</i>	E	0.1	1		
-	<i>Hypocnemis perfoliatum</i>	HTE	20	1000		
-	<i>Trifolium angustifolium</i>	E	5	250		
-	<i>Trifolium glomeratum</i>	E	5	250		
-	<i>Avena fatua</i>	E	0.2	20		
G	<i>Böhmiochloa macra</i>	N	5	250		
F	<i>Convolvulus amurensis</i>	N	1	50		
G	<i>Chloa tricala</i>	N	5	250		
-	<i>Paspalum distichum</i>	E	0.1	1		
F	<i>Rumex bromii</i>	N	0.1	5		
F	<i>Calotis curculio</i>	N	1	100		
G	<i>Anthosachne scabra</i>	N	5	250		
-	<i>Lactuca sp.</i>	E	0.1	3		
-	<i>Senna occidentalis</i>	E	0.2	3		
F	<i>Sida conugata</i>	N	0.1	15		
G	<i>Chloris verticosa</i>	N	1	50		
F	<i>Dionella revoluta</i>	N	0.2	3		
G	<i>Austroshippa scabra</i>	N	1	50		
G	<i>Austroshippa anthelmium</i>	N	5	250		
-	<i>Romulea rosea var australis</i>	E	0.1	30		
e	<i>Chetochloa scabra</i>	N	0.1	15		
-	<i>Salvia verbenacea</i>	E	0.5	30		
G	<i>Rhytidosema sp.</i>	N	0.2	25		
-	<i>Centaurea melitensis</i>	E	0.2	10		
-	<i>Kickxia elatine subsp. crinita</i>	E	0.5	60		
-	<i>Centaureum erythraea</i>	E	0.1	20		
S	<i>Dodonaea viscosa</i>	N	0.1	1		
S	<i>Cassia nemophila</i>	N	0.1	1		
F	<i>Wahlenbergia stricta</i>	N	0.1	10		
G	<i>Cynodon dactylon</i>	N	0.2	60		
-	<i>Trifolium arvensis</i>	E	0.1	5		
F	<i>Oralis perennans</i>	N	0.2	25		
F	<i>Vittadina appressa</i>	N	0.5	50		
-	<i>Lactuca semiola</i>	E	0.1	1		
F	<i>Gonolobus fasciculatus</i>	N	0.1	5		
G	<i>Digitaria divaricatissima</i>	N	25	500		
F	<i>Euchloa inaequalis</i>	N	0.1	1		
-	<i>Linaria arvensis</i>	E				

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

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

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

F *Calotis hispidula*
G *Paspalum distichum*

N 0.1 5
N 0.1 25

BAM Site – Field Survey Form						Site Sheet no: 1 of 1	
		Survey Name		Zone ID		Recorders	
Date 26/08/20		Darroobalgin SE		MC, BT			
Zone 55		Datum GDA94		Plot ID PA		Plot dimensions 20 x 50	
Easting 599879		Northing 6310737		IBRA region Riverina		Midline bearing from 0 m 286	
Vegetation Class						Confidence: H M L	
Plant Community Type 360 Culgai						EEC: H M L	

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

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

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

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

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

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

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

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

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

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

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

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

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	26 08 20	Daridobalgie	PA	MC, BT.

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
-	<i>Archibotheca calendula</i>	E	10	200		
-	<i>Malva parviflora</i>	E	1	30		
-	<i>Lolium rigidum</i>	E	40	1000		
F	<i>Vittadinia cuneata</i>	N	2	150		
-	<i>Medicago minima</i>	E	1	1000		X
-	<i>Erodium cicutarium</i>	E	0.1	50		
-	<i>Centaurea melitensis</i>	E	0.1	30		X
F	<i>Plantago cunninghamii</i>	N	0.1	3		X
G	<i>Enteropogon acicularis</i>	N	10	200		
	<i>Sclerolaena Enchylaena tomentosa</i>	N	0.1	4		X
G	<i>Maximilian Sporobolus caroli</i>	N	1	30		X
G	<i>Chloris truncata</i>	N	0.1	10		
	<i>Sclerolaena muricata</i>	N	0.1	20		X
F	<i>Hypochaeris glabra</i> <i>Leiocarpa</i> sp.		0.1	1		X
-	<i>Sonchus oleraceus</i>	E	0.1	2		
F	<i>Rhodanthe pygmaea</i>	N	0.1	50		X
	<i>Sibola australis</i>	N	0.1	1		
-	<i>Xanthium spinosum</i>	HTE	0.5	30		
G	<i>Cynodon dactylon</i>	N	5	100		
F	<i>Marsilea drummondii</i>	N	0.1	40		
	<i>Sclerolaena divaricata</i>	N	0.1	5		X
F	<i>Solanum esuriale</i>	N	0.1	3		
F	<i>Swainsona</i> <i>Astragalus hamosus</i>		0.1	10		X
-	<i>Echium plataginaceum</i>	E	0.1	1		
	<i>Eleocharis</i> sp. <i>Eleocharis</i>	N	20	2000		X
	<i>Triglochin procera</i>	N	0.1	10		X
F	<i>Pratia concolor</i>	N	1	50		
	<i>Potamogeton drummondii</i>		0.1	5		X
	<i>Juncus</i> - tall.		0.2	15		
-	<i>Avena fastuosa</i>	E	0.1	1		X
-	<i>Symbrium irio</i>	E	0.1	2		
-	<i>Medicago truncatula</i>	E	0.1	1		

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no: 111	
Date		Survey Name		Zone ID		Recorders	
26 8 20		Dandabalgie				MC BJ	
Zone	Datum	Plot ID		Plot dimensions		Photo #	
SS	GDA94	PO		20x50			
Easting	Northing	IBRA region		Midline bearing from 0 m			
597391	6311004	Riverina		205			
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						Confidence:	
80 Western Grey Box						EEC: 4	
						H M L	

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

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

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	X
50 – 79 cm	0	X
30 – 49 cm	1	✓
20 – 29 cm	✓	X
10 – 19 cm	✓	X
5 – 9 cm	✓	X
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		2

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	1	2	10	60	2															
Average of the 5 subplots																				

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

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

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

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

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

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

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	26 08 20	Darodalgie	PD	MC BT

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	Eucalyptus microcarpa	N	30	74		
T	Calamagrostis glaucochylla	N	5	2		
S	Dodonaea viscosa subsp. cuneata	N	2	6		X
F	Crassula sieberiana	N	0.1	20		X
G	Chloris ventricosa	N	20	500		
-	Lolium rigidum	E	20	500		
-	Trifolium repens	E	1	1000		
-	Echinum plantaginum	E	1	100		
-	Bomarea rosea	HTE	0.5	1000		
G	Aristida ramosa	N	0.1	5		X
G	Bothriochloa macrochaeta	N	10	100		
G	Enteropogon acicularis	N	10	100		
-	Sonchus oleraceus	E	0.1	5		
-	Lysimachia arvensis	E	1	200		
-	Trifolium arvense	E	1	1000		
F	Maireana enchyladenoides	N	0.1	2		
-	Hypochaeris glauca	E	0.1	10		
-				1		X
F	Sida corrugata	N	0.1	2		
F	Hypoxis	N	0.1	5		
F	Calotis cuneifolia	N	0.1	3		
F	Goodenia pinnatifida	N	0.1	20		X
-	Arctotheca calendula	E	1	100		
I	Salsola australis	N	0.1	2		
F	Enchylaena tomentosa	N	0.1	3		
I	Atriplex semibaccata	N	0.1	1		
-	Medicago arabica	E	0.1	1		
G	Austrostipa sp.	N	0.1	4		
S	Senna artemisioides	N	0.5	3		X
F	Hypericum gramineum	N	0.1	1		X
E	Cheilanthes sieberi	N	0.1	4		
-	Hypericum perforatum	HTE	0.1	2		X
S	Myoporum sp.	N	0.5	1		X
T	Callitriche cristata - Scell	N	0.1	1		
-	big thistle Lathraea ferox	E	0.1	3		X
-	Eragrostis cilicrensis	E	0.1	1		X
G	Sporobolus caroli	N	0.2	30		X
G	Rytidosperma bipartitum	N	0.1	4		X
F	Elodinum cuneatum	N	0.1	1		
	Maireana microphylla	N	0.1	1		

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF = circle code if 'top 3'.

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

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

- Oculis corniculata

E

0.1 1

X

BAM Site – Field Survey Form						Site Sheet no: 101	
Date		Survey Name	Zone ID	Recorders			
26 08 20		Darabolgic		MC BT			
Zone	Datum	Plot ID		Plot dimensions		Photo #	
55	GDA 94	PF		20 x 50			
Easting	Northing	IBRA region		Midline bearing from 0 m			
597033	6311029	Riverina		244			
Vegetation Class						Confidence: H M L	
Plant Community Type		80 Derived				EEC:	Confidence: H M L

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

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

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

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

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

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

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

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

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

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

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

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

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders			
Date	26 08 20	Darood Salgie	PE	MC BT			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
G	Chloris verticosa	N	50	1000			
-	Echium plantaginaceum	E	1	50			
-	Avena fatua	E	0.1	20			
-	Salvia verbenaca	E	0.1	30			
G	Enteropogon acicularis	N	25	500			
-	Romulea rosea	HTE	0.5	1000			
G	Eragrostis parviflora	N	10	500			
-	Azidotheca calandula	E	0.1	20			
E	Cheilanthes sieberi	N	0.1	3			
-	Trifolium arvense	E	0.2	200			
G	Aristida Lehmanniana	N	0.1	5			
G	Bothriochloa macra	N	0.5	50			
F	Vittadinia cuneata	N	0.1	4			
F	Crassula	N	0.1	3			
-	Trifolium campestre	E	0.1	10			
G	Sporobolus caroli	N	0.1	10			
-	Medicago laciniosa	E	0.1	1			
-	Hypochaeris radicata	E	0.1	2			
-	Lolium rigidum	E	0.1	30			
-	Trifolium angustifolia	E	0.1	5			
G	Cynodon dactylon	N	0.1	20			
F	Calotis cantholia	N	0.1	3			
F	Oxalis perennans	N	0.1	10			
G	Rytidosperma caespitosum	N	1	40			
F	Echium crinitum	N	1	40			
-	Sonchus oleraceus	E	0.1	1			
-	Eragrostis cilienensis	E	0.1	10			
F	Goodenia pinnatifida	N	0.1	5			
G	Austrostipa sp	N	1	40			
-	pod thing		0.1	6			
-	Taraxicum officinale	E	0.1	1			
F	Endyalaena tomentosa	N	0.1	2			
	Sclerolaena muricata	N	0.1	1			
G	Rytidosperma richardsonii	N	0.1	30			
-	Sisymbrium irio	E	0.1	1			
G	Aristida ramosa	N	5	50			
	Salpola australis	N	0.1	15			
G	Paspalum distichum	N	0.1	20			

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'

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

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

BAM Site – Field Survey Form						Site Sheet no: 10/2	
Date		Survey Name	Zone ID	Recorders			
18/12/18		Drobbadgre	SS	L. Maloney, B. Turner			
Zone	Datum	Plot ID	Plot dimensions	Photo #			
SS	GDA94	P2	50x20				
Easting	Northing	IBRA region	Midline bearing from 0 m				
604490	6309878	Riverina	297				
Vegetation Class		develop-site				Confidence: (H) M L	
Plant Community Type		76 - Western Grey Box				EEC: Y Confidence: (H) M L	

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

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	1
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	10
	Shrubs	0
	Grasses etc.	0.1
	Forbs	5.2
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	2	2
50 – 79 cm	1	0
30 – 49 cm	0	1
20 – 29 cm	✓	1
10 – 19 cm	0	1
5 – 9 cm	0	1
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		50m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 50, ..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	1 0 0 0 0			
Average of the 5 subplots	0.02			

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

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

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	glauc	clay/brown	Soil Depth
Slope	—	Aspect	Site Drainage
		glauc	Distance to nearest water and type
			dam 100m

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

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

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

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Zone ID		Recorders	
18/12/18		Paroolbadgery				L. Maloney - B. Turner	
Zone	Datum	Plot ID		Plot dimensions		Photo #	
55	GDA94	P3		50x20			
Easting	Northing	IBRA region		Midline bearing from 0 m			
604319	6309514	Riverina		283			
Vegetation Class						Confidence: H M L	
Plant Community Type 9						Confidence: H (M) L	
Planted <i>filososa</i> PCT (fit)						EEC: N	

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

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	6
	Forbs	7
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	2
	Shrubs	0
	Grasses etc.	31.7
	Forbs	0.9
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	0	0
20 – 29 cm	0	0
10 – 19 cm	✓	0
5 – 9 cm	✓	0
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		3

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	0.5	3	10	5	8															
Average of the 5 subplots	5.3																			

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

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

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

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

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

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

400 m ² plot: Sheet <u>2</u> of <u>2</u>		Survey Name	Plot Identifier	Recorders
Date	18/12/18	Darobobolare	P3	L. Moloney, B. Turner

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

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

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

BAM Site – Field Survey Form						Site Sheet no: 10/2	
Date		Survey Name		Zone ID		Recorders	
19/12/18		Dacombalgie				L. Maloney, B. Turner	
Zone	Datum	Plot ID	Plot dimensions		Photo #		
SS	GDA 94	P4	50x20				
Easting	Northing	IBRA region	Midline bearing from 0 m				
601655	6310887	Riverina	217				
Vegetation Class			transmission line			Confidence: H M L	
Plant Community Type			76 Nislem Grey Box 0 76			EEC: Y6 (H) M L	

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

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

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	4	4
50 – 79 cm	1	1
30 – 49 cm	✓	0
20 – 29 cm	–	0
10 – 19 cm	–	0
5 – 9 cm	–	0
< 5 cm	–	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		8m

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	15 5 10 0 10			
Average of the 5 subplots	8			

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

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

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

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

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

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

BAM Site – Field Survey Form						Site Sheet no: 1042	
Date		Survey Name		Zone ID		Recorders	
19/12/18						L. Maloney, B. Turner	
Zone	Datum	Plot ID		Plot dimensions	Photo #		
SS	GDA94	P9		50x20			
Easting	Northing	IBRA region		Midline bearing from 0 m			
600881	6310445	Riverina					
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						EEC:	
76 Western Grey Box						H M L	

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

derived grassland

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

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	1	1
20 – 29 cm	1	1
10 – 19 cm	1	1
5 – 9 cm	1	1
< 5 cm	1	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0m

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	1 0 1 1 1			
Average of the 5 subplots	0.44			

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

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

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

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

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

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

Appendix D – BAM Calculator data

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to1	funTreeStem20to2	funTreeStem30to4	funTreeStem50to7	funTreeRegen	funHighThreatExot	
Transmission line																																
2	26	0.65	101	26_Good	55	599293	6310736.0	160	1	5	10	12	1	1	25.0	1.7	18.1	3.6	1.0	0.1	1	1	4.4	4.0	1	1	0	0	1	1	0.2	
3	80	1.40	101	80_Derived_scrub	55	597301	6310922.0	263	1	2	11	10	1	1	15.0	0.2	72.5	2.5	0.1	1.0	0	0	10.0	0.0	1	1	0	0	0	0	1	20.2
4	244	0.68	101	244_Good	55	601780	6311021.0	354	2	2	11	10	0	0	20.5	0.2	33.4	1.7	0.0	0.0	0	0	15.0	0.0	1	1	0	0	0	0	0.5	
P4	76	0.59	101	76_Good	55	601655	6310887.0	217	1	0	12	4	1	0	10.0	0.0	71.0	6.2	1.0	0.0	5	5	8.0	8.0	0	0	0	1	1	0	2.1	
P9	76	0.00	101	76_Derived_Grassland	55	600881	6310445.0	260	0	0	10	11	0	1	0.0	0.0	41.7	1.3	0.0	0.1	0	0	0.4	0.0	0	0	0	0	0	0	0.0	
PA	360	0.00	101	360_Good	55	599379	6310737.0	286	0	4	6	8	1	0	0.0	0.4	36.3	3.6	0.1	0.0	0	0	0.0	0.0	0	0	0	0	0	0	0.5	
PD	80	0.38	101	80_Good	55	597391	6311004.0	205	3	7	7	8	1	0	35.1	3.4	40.5	0.8	0.1	0.0	0	0	15.0	2.0	1	1	1	1	0	1	0.6	
PF	80	0.00	101	80_Derived_Grassland	55	597033	6311029.0	244	0	3	12	5	1	0	0.0	0.3	97.5	1.4	0.1	0.0	0	0	0.0	0.0	0	0	0	0	0	0	0.5	
Solar farm																																
P3	76	0.23	2	76_Planting	55	604319	6309514.0	283	3	0	9	5	0	0	3.0	0.0	32.1	0.7	0.0	0.0	0	0	5.3	3.0	1	1	0	0	0	1	0.1	

Appendix E – EPBC Act assessments of significance

Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and derived native grasslands of South-eastern Australia- Endangered

Community description

This community is a grassy woodland dominated or co-dominated by Grey Box (*Eucalyptus microcarpa*). The community also includes grassland understorey derived from the historic clearing of the woody components of the woodland. Both the grassy woodland and the derived native grassland provide vital support to a diverse range of native flora and fauna and are key to retaining regional, state and national biodiversity.

In grassy woodland occurrences, the shrub layer is variable, ranging from absent in areas of intense grazing, to moderately dense cover. In many situations, regrowth of the canopy trees may also be present in the mid layer. This community is heavily influenced by landscape factors and past land management practices. The ground layer varies in compositions, with a combination of grasses, herbs and smaller chenopods.

Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia (the Grey Box ecological community) supports fauna species from a variety of conditions, ranging from wetter forest and woodland ecosystems further east and south to the semi-arid environment to the west and north. The Grey Box Grassy Woodlands have a strong influence on bird assemblage composition and provides foraging, roosting and breeding habitat. Larger mammals such as kangaroos and wallabies often utilise this community for grazing and arboreal species such as possums utilise tree-hollows for shelter and breeding (DSEWPac 2012a).

Key threats

The Grey Box Woodland ecological community is listed as an endangered ecological community due to the significant loss of integrity throughout much of its extent. This includes both vegetative and faunal components, combined with weed invasion, fragmentation and degradation of habitat. Clearing of this community continues to pose serious threats to the Grey Box Grassy Woodlands ecological community. Unfavourable management practices and a lack of protection in reserves are also highlighted as key threats for this ecological community (TSSC 2010).

Geographical distribution and extent

The Grey Box Woodland ecological community occurs from central NSW, through northern and central Victoria into eastern South Australia (DotE 2021)

This community was once widespread throughout south-eastern Australia but now, across its range, only 10 to 15 percent remains of its original extent. The community is found in an area known as the wheat-sheep belt of eastern Australia and as a result has been extensively cleared since European settlement. It is estimated that the extent of the ecological community has declined from between 1.8 to 2.0 million hectares to a present extent between 300 000 and 330 000 hectares in NSW (TSSC 2010). Most of the remaining areas of this ecological community occur on private land. At present, less than one percent of what remains of the community in NSW is in formal conservation reserves (OEH 2021b)

Community description in the study area

In the study area to the east of the Newell Highway this community occurs as remnant roadside vegetation and small, isolated patches within agricultural land. In this area the community has undergone modification and degradation by weed incursion and grazing pressure. Some remnant roadside vegetation is of higher quality, and contains a higher native understory species richness and cover. This includes areas of derived native grassland community, in areas where canopy vegetation has been removed and a predominantly native understory remains. A larger patch of higher quality remnant woodland exists within private property north of Forest Road.

A larger, fragmented patch of The Grey Box Woodland ecological community occurs to the west of the Newell Highway within the Crown Reserve. The community in this area is generally in good condition, containing a connected canopy and an understory dominated by predominantly native forbs and grasses.

Nature of impact

The proposal would remove 2.60 hectares of the community from the degraded edge of remnant roadside vegetation, woodland patches within agricultural land, and the edge of the Crown Reserve. Vegetation removal is restricted to the canopy and tall shrub layer only, to facilitate the 45-metre transmission line easement, and to the immediate pole impact area, to facilitate the erection of transmission line poles throughout the proposal site.

An additional 0.2 hectares of the mapped community would be removed from the proposed solar farm site. This patch within the solar farm is comprised of a juvenile, mixed planting of native vegetation. Grey Box was the dominant species within the planting, and as such the community was mapped as this community for the purpose of the credit calculator. However, these plantings do not function as an intact Grey Box Woodland community, and the removal of these patches have not been considered relevant for the rest of the assessment.

Criteria	Discussion
According to the DotE (2013) 'significant impact criteria', an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:	
Reduce the extent of an ecological community	The proposal will result in the removal of 2.60 hectares of the canopy and shrub layer of Grey Box Woodland ecological community from roadside vegetation, small remnant patches of woodland within agricultural land and a larger patch of remnant woodland present within the Crown Reserve in the west of the proposal site. The majority of the impact area would require the removal of the canopy and tall shrub layer of the community only. This removal includes a small (0.003 hectare) area of derived native grassland which would be removed to allow for the construction of the transmission poles along the transmission line route. In total, about 1.6 per cent of the community would be removed from the study area. This represents a clearing of less than 0.002% of the current estimated remaining Grey Box ecological community in NSW.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The proposed clearing would result in only a minor increase in the degree of fragmentation the community experiences in the study area. Canopy and tall shrub vegetation would be removed from the degraded edges of existing fragmented smaller and larger patches of woodland and derived native grassland. Groundcover vegetation would be retained except for 0.003

Criteria	Discussion
	<p>hectares of soil disturbance where transmission poles would be constructed.</p> <p>These patches occur in a highly fragmented landscape surrounded by high intensity agriculture. Remaining patches of native vegetation are mostly restricted to roadside linear corridors and patches of crown land.</p> <p>The proposal will remove or modify 2.60 hectares of vegetation from the degraded edges of small patches, resulting in a minor increase in the loss of connectivity and a minor increase in the impact of edge effects. Disturbance as a result of construction is unlikely to significantly increase fragmentation of the community more than that which already occurs in the study area, due to the minor impacts of the proposal.</p>
<p>Adversely affect habitat critical to the survival of an ecological community</p>	<p>No critical habitat has been listed for the Grey Box Woodland ecological community under the EPBC Act.</p> <p>Habitat critical to the survival of a species or ecological community also refers to areas that are necessary:</p> <ul style="list-style-type: none"> • For activities such as foraging, breeding, roosting or dispersal • For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • To maintain genetic diversity and long term evolutionary development, or • For the reintroduction of populations or recovery of the species or ecological community (DoE, 2013). <p>Due to the limited area of Grey Box Woodlands remaining across the landscape, this patch of vegetation is important and its removal will contribute to the reduction of geographical extent of this community in NSW. However, given the minimal removal of the community by the proposal, it is unlikely that the proposal will damage habitat necessary for dispersal, maintenance, genetic diversity or recovery of Grey Box Woodlands, as the areas to be impacted occur as part of a larger patch and connected linear roadside corridors and therefore is not critical to the survival of the community.</p>
<p>Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</p>	<p>The proposal will involve some minor earthworks as part of the construction of the proposal which may alter local surface drainage flows within the proposal site. However, it is unlikely to cause substantial alterations of surface water drainage patterns where the community occurs that are necessary for the long-term survival of the ecological community.</p> <p>The earthworks have the potential to cause soil erosion in the proposal site which may run off into the study area, with the potential to impact on surface water quality to the remnant patches of Grey Box woodland, particularly where it occurs in the Crown Reserve to the west of the proposal site.</p> <p>Additionally, vehicle and machinery traffic could cause compaction of soil, which can lead to increased surface run-off and hence greater erosion potential. Although soil disturbance may have adverse impacts on the community, for example, by</p>

Criteria	Discussion
<p>Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting</p>	<p>exacerbating weed impacts on functionally important species such as vulnerable forbs and grasses. The proposal is unlikely to significantly modify abiotic factors critical to the long-term survival of the community</p> <p>The proposal will remove 2.60 hectares of the community from 177.4 hectares of remnant woodland patches connected to the proposal site. No patches would be completely removed or isolated. The proposal would increase the degree of fragmentation between existing patches in the study area, and increase edge impacts.</p> <p>Groundcover vegetation would be retained within all but 0.003 hectares of the impact area, ensuring that local populations of many of the component species in the community would be maintained and connectivity of habitat would be partially maintained.</p> <p>Vegetation that occurs on the edges of the proposal site may be subject to increased weed invasion and it is possible that any weeds that are introduced may change the composition of the ecological community by outcompeting native understorey, resulting in a loss of functionally important species. Given the minor nature of the proposed impacts, this is unlikely to have long-term impacts on the condition of the understorey and species composition of retained areas of this community.</p>
<p>Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: -assisting invasive species, that are harmful to the listed ecological community, to become established, or</p>	<p>The Grey Box Woodland ecological community is listed as an endangered ecological community due to the significant loss of integrity throughout much of its extent. This includes the loss of both vegetative and habitat components, combined with weed invasion, fragmentation and degradation of habitat.</p> <p>The proposed works will result in the removal or modification of 2.60 hectares of this community from the degraded edges of existing fragmented patches of this community. This would result in an increase in the impacts of edge effects. No entire patches of the community would be lost, and the impacts of the proposal are limited to the removal of trees and tall shrubs, to facilitate the transmission line easement.</p> <p>A small planted patch that conforms to this community would be lost from the solar farm site, however this was comprised of a juvenile planting of mixed native species, and would not function as a complete ecological community due to its composition and age structure.</p> <p>The introduction of invasive weed species is a key factor contributing to the degradation of this ecological community. The works have the potential to contribute to this threat through the disturbance of the area to be cleared.</p>
<p>-causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants in to the ecological community which kill or inhibit the growth of species in the ecological community</p>	<p>Construction of the proposal has the potential to result in the mobilisation of contaminated sediments or chemical spill from vehicles or plants. The introduction of pollutants into the surrounding environment, if uncontrolled, could impact on surrounding areas of Grey Box Woodlands.</p>
<p>Interfere with the recovery of an ecological community</p>	<p>There is no national recovery plan for this ecological community.</p>

Criteria	Discussion
	<p>Given the occurrence of this community in the proposal site as isolated roadside vegetation, small remnant patches in agricultural land and a larger remnant patch within the Crown Reserve to the west of the proposal site, the proposal is unlikely to interfere with the recovery of the community due to the patches being impacted by fragmentation from other linear and residential infrastructure and agricultural development.</p> <p>Priority recovery and threat abatement actions listed in the approved conservation advice relevant to the proposal include:</p> <ul style="list-style-type: none"> • Enabling recovery of additional sites. This would occur through future biodiversity offsets required for the proposal and impacts to this community. • Protecting remnants of the listed ecological community through the development of conservation agreements and covenants. <p>Spread of invasive species as a result of clearing is a threat that may be exacerbated by the proposal. The remaining patches are likely to still function as viable patches and contribute to the recovery of the ecological community.</p>
Conclusion	<p>The proposal is not likely to have a significant impact on the endangered Grey Box Woodlands ecological community given:</p> <ul style="list-style-type: none"> • The small area to be removed or modified (about 2.60 ha) from up to 177.4 ha of remnant Grey Box Woodland within the extent of connected patches in the landscape. • That groundcover vegetation would be retained within all but 0.003 hectares of the impact area, ensuring that local populations of many of the component species in the community would be maintained and connectivity of habitat would be partially maintained. • The area to be removed represents less than 0.002 % of the occurrence of the community in NSW. <p>The remaining patches that within the proposal site will experience a minor increase in fragmentation after the proposal, but will still remain as viable patches due to the connectivity to other roadside linear vegetation.</p> <p>However, it is acknowledged that the proposal:</p> <ul style="list-style-type: none"> • Is likely to increase the fragmentation of the community within the proposal site which is already fragmented from linear infrastructure and agricultural clearing in the study area. • Has potential to result in a reduction in the quality of the community, by increasing the risk of establishment of potentially invasive species harmful to the community. <p>These risks would be managed through the implementation of construction and operational mitigation measures as part of the proposal.</p>

Weeping Myall Woodlands- Endangered

Community description

Weeping Myall Woodlands occur as mid-high and low woodland to open woodland. Weeping Myall (*Acacia pendula*) is the sole or dominant overstorey species sometimes occurring with other canopy species such as Belah (*Casuarina cristata*) and Poplar Box (*Eucalyptus populnea* subsp. l). The understorey includes an open layer of chenopod shrubs and forbs with an open ground layer of grasses and herbs (DEWHA 2008b).

This community can vary in structure throughout its range. In higher rainfall areas it typically forms an open woodland. As rainfall decreases the ecological community becomes increasingly restricted, tending to sparse or scattered stands of woodland occurring in discrete bands fringing better-watered country.

Key threats

The Weeping Myall Woodlands endangered ecological community is listed as endangered under the EPBC Act due its decline in geographic distribution (DEWHA 2008b). Other contributing factors have put stress on the Weeping Myall Woodlands, Clearing and lopping for drought fodder has removed Weeping Myall trees, and grazing combined with drought and changed fire regimes has eliminated much of the understorey. Most areas remaining in good condition are on lightly-grazed, uncropped sites, including areas conserved by farmers, road reserves and Travelling Stock Routes and Reserves. Weeping Myall is also highly susceptible to attack by the Bag-Shelter Moth (*Ochrogaster lunifer*) which can defoliate large trees to such an extent that they do not recover. Introduction of invasive species has impacted areas due to the poor ability of important species like chenopods to recover due to limited seed longevity and low competitive abilities (DEWHA 2008b).

Geographical distribution and extent

This community generally occurs on the inland alluvial plains west of the Great Dividing Range in NSW and QLD. It occurs on flat areas shallow depressions on raised alluvial plains. Throughout this range it occurs in small pockets of isolated remnant vegetation. Due to the occurrence of this community on highly fertile soils large areas have been cleared for agricultural use (TSSC 2009).

The national extent is estimated to be within the range of 220,000 to 361,000 hectares in 2006, a decline within the range of 82.1 to 93.5 percent from its pre-European extent. Within NSW the Weeping Myall Woodlands have declined from an estimated original extent between 1,900,000 and 3,300,000 hectares to a current extent of between 190,000 and 330,000 hectares (TSSC 2009). These estimates do not consider the condition of these remnant. Poor land management practices, minimal regeneration and destruction of the understorey make it likely that much of the remaining Weeping Myall Woodlands is in poor condition.

Community description in the study area

This community exists as a single 24.4 hectares patch north of Forest Road in the study area. It occurs as a scattered patch within agricultural land, within areas dominated by gilgais. In the study area, the community contains a predominantly native understory, although the presence of some exotic vegetation and agricultural weeds is evident.

Nature of impact

Impacts to this community are limited to the north-eastern edge of the patch. The proposal would remove 0.66 hectares of canopy and tall shrub vegetation from this area. Native groundcover vegetation would be retained.

Criteria	Discussion
According to the DoE (2013) 'significant impact criteria', an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:	
Reduce the extent of an ecological community	The proposal will remove a total of 0.66 ha of Weeping Myall Woodlands from one patch within private property. This patch extends across a paddock to the south of the alignment, before terminating at the Forest Road roadside reserve to the south. The patch is not connected to any other patches. The clearing will remove a linear 45 metre strip of the community from the north eastern edge of the patch. This represents a minor reduction in extent of the 24.4 hectare patch of the community at the study area.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	<p>Weeping Myall Woodlands occur on highly fertile and arable soils where there is considerable pressure to clear for cropping. This has resulted in this ecological community occurring predominantly as small, varied and fragmented patches (DEWHA 2008b).</p> <p>A small strip of Weeping Myall Woodland would be removed from the edge of the patch in the study area. As the removal would occur to the edge of the community, it is not likely to substantially contribute to the fragmentation of Weeping Myall Woodlands in the local area.</p> <p>Disturbance as a result of construction will likely exacerbate the effects of fragmentation, with introduction of weeds being of particular concern due to the poor ability of important species like chenopods to recover due to limited seed longevity and low competitive abilities.</p> <p>Construction impacts would not further increase fragmentation of the Weeping Myall Woodland patch in the broader region noting that this patch is already isolated from other patches of the community.</p>
Adversely affect habitat critical to the survival of an ecological community	<p>No critical habitat has been listed for the Weeping Myall Woodland ecological community under the EPBC Act 1999. Habitat critical to the survival of a species or ecological community also refers to areas that are necessary:</p> <ul style="list-style-type: none"> • For activities such as foraging, breeding, roosting or dispersal • For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • To maintain genetic diversity and long term evolutionary development, or • For the reintroduction of populations or recovery of the species or ecological community (DoE, 2013)

Criteria	Discussion
	<p>Due to the limited area of Weeping Myall Woodlands remaining across the landscape this patch of vegetation is important and its removal will contribute to the reduction of geographical extent of this community in NSW. However, as impacts to the community are minimal, and limited to the edge of an isolated patch in the study area, it is unlikely that the proposed works will have a significant adverse effect on the dispersal, maintenance, genetic diversity or recovery of Weeping Myall Woodlands.</p>
<p>Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</p>	<p>The Weeping Myall Woodlands is associated with flat areas, depressions, or gilgais on heavy clays and alluvials on raised alluvial plains. These areas are not associated with active channels and are rarely flooded, although the depressions and microreliefs may hold water during significant rain events.</p> <p>The proposal will not involve substantial earthworks in the area surrounding the Weeping Myall Woodland and will not subsequently alter local surface drainage flows within the proposal site. As such, it is unlikely to cause substantial alterations of surface water drainage patterns that are necessary for the long-term survival of the ecological community.</p> <p>The construction works are unlikely to cause soil erosion in the proposal site which could run off into the study area and impact on surface water quality, as surface soil impacts in the area surrounding the Weeping Myall Patch are limited to 0.02 hectares during construction.</p> <p>Vehicle and machinery traffic could cause compaction of soil, which can lead to increased surface run-off and hence greater erosion potential. Although soil disturbance may have adverse impacts on the community, for example, by exacerbating weed impacts on functionally important species such as chenopods and Weeping Myall trees (see below), The proposal is unlikely to significantly modify abiotic factors critical to the long-term survival of the community.</p>
<p>Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting</p>	<p>The proposal would remove Weeping Myall trees that are functionally important to this ecological community. Construction will not result in the removal of groundcover vegetation. Notably, the ecologically important chenopod shrub component of the community would be retained.</p> <p>Disturbance as a result of construction has potential to indirectly affect remaining occurrences of chenopod shrubs, with introduction of weeds being of particular concern due to the poor ability of chenopods to recover as a result of limited seed longevity and low competitive abilities (DEWHA 2008b).</p> <p>Along the vegetation that borders construction, it is possible that any weeds that are introduced may change and transform the composition of the ecological community by outcompeting chenopod shrubs, however, given the minor Impacts of the proposal on the site, this is unlikely.</p>
<p>Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:</p>	<p>Within the proposal site, Weeping Myall Woodlands occur as a stand of canopy species over a predominantly native understorey. The proposal would result in the removal of canopy and tall shrub vegetation only from within the proposal site. Vegetation outside of the proposal site that would not be directly impacted by the proposal is at some risk of indirect impacts resulting from the proposal, if appropriate mitigation</p>

Criteria	Discussion
-assisting invasive species, that are harmful to the listed ecological community, to become established, or	measures are not adopted and implemented. The introduction of weeds poses a heightened threat due to the poor ability of important species like chenopods to recover as a result of limited seed longevity and low competitive abilities.
-causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants in to the ecological community which kill or inhibit the growth of species in the ecological community	Construction of the proposal has the potential to result in the mobilisation of contaminated sediments or chemical spill from vehicles or plants. The introduction of pollutants into the surrounding environment, if uncontrolled, could impact on surrounding areas of Weeping Myall Woodlands, however, would be managed via environmental safeguards. The potential for impacts associated with these pollutants is low, given the disturbed nature of much of the study area, lack of permanent flowing water on site, limited extent and duration of construction works and the environmental safeguards that would be implemented during the construction process.
Interfere with the recovery of an ecological community	<p>There is no adopted or made national recovery plan for this ecological community listed. Priority recovery and threat abatement actions listed in the approved conservation advice include (DEWHA, 2008b):</p> <ul style="list-style-type: none"> • Protecting remnants of the listed ecological community through the development of conservation agreements and covenants • The use of strategic grazing that allows regeneration • Replanting of understorey species where they have been depleted • Use of lopping methods that do not result in the death of the dominant tree species • Avoiding the application of fertilisers and herbicides in or near remnants • Protecting remnants from weeds including the speedy eradication of any new invasions • Raising awareness of the ecological community within the community <p>The proposal will result in the clearing of 0.66 hectares of the canopy and tall shrub layer of Weeping Myall Woodlands, from the edge of a patch of the community. Clearing and modification and proliferation of invasive species are two key threats that may exacerbated by the proposal. The proposal will interfere with the following management actions and outcomes:</p> <ul style="list-style-type: none"> • Protecting remnants of the listed ecological community through the development of conservation agreements and covenants

Criteria	Discussion
	<ul style="list-style-type: none"> Protecting remnants from weeds including the speedy eradication of any new invasions <p>The proposal is not entirely consistent with all of the relevant recommended actions listed above. The main conflict relates to the clearance of vegetation from within the vegetation community, which is unavoidable.</p> <p>The amount of this community to be impacted is small in the context of the extant NSW occurrence (0.66 hectare; or <0.0005% of the estimated NSW extent (TSSC 2010)), and is restricted to one patch. A total of about 2.6 percent of the patch (canopy only) will be removed, with the remainder unlikely to be significantly impacted by the proposal.</p> <p>Taking into account the small amount of vegetation to be impacted within this community, and given that the remainder of relevant recommended actions are consistent with the outcomes and mitigation measures for the proposal, it is considered unlikely that the proposal will interfere with the recovery of the ecological community.</p>
Conclusion	<p>The small area of vegetation that forms part of the ecological community that will be removed is unlikely to significantly impact the occurrence of the community within the study area. The community has a relatively widespread although patchy and fragmented distribution. The proposal will impact on a small patch within the known range of the community through the removal of 0.66 hectares of the canopy and tall shrub layer only. Groundcover vegetation would be retained ensuring that local populations of many of the component species in the community would be maintained and connectivity of habitat would be partially maintained.</p> <p>Notwithstanding this, it is acknowledged that the proposal:</p> <ul style="list-style-type: none"> Is likely to increase the fragmentation and the operation of edge effects on a single patch of the community Has potential to result in a reduction in the quality of the community, by increasing the risk of establishment of potentially harmful invasive species, or by increasing the risk of regular mobilisation of chemicals or pollutants that may be harmful to the community. <p>These risks would be managed through the implementation of construction controls and other mitigation measures as part of the proposal</p>

Superb Parrot (*Polytelis swainsonii*)- Vulnerable

Description and habitat requirements

The breeding range of the Superb Parrot is divided into three main areas throughout eastern inland NSW: along the Murray and Edward Rivers, along the Murrumbidgee River; and in a triangle bounded by Molong, Yass and Young (DSE 2011). Superb Parrots breed in either River Red Gum forests and woodlands or box woodlands (Webster 1998).

At least part of the population of the Superb Parrot undertakes regular seasonal movements, vacating the breeding area after the conclusion of the breeding season, and then returning in spring, while others remain in the breeding areas throughout the year. In central New South Wales, movements are said to occur when eucalypts flower, and when food becomes scarce due to drought and birds seek alternative sources of food (Higgins 1999).

The species seasonally occurs in box-pine (*Callitris*) and Boree (*Acacia pendula*) woodlands (DSE 2011). The Superb Parrot feeds mainly on the ground, on the seeds of grasses as well as cereal crops and spilt grain. They also eat the seed-pods of many understorey species of wattles, and flowers and fruits of eucalypts, berries of mistletoe and lerps (OEH 2021b).

Key threats

Geographical distribution

The Superb Parrot is found in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems; vagrants have also been recorded in southern Queensland (DSE 2011).

Habitat in the study area

The study area contains large tracts of Grey Box Woodland habitat to support the species, especially to the west of the study area within the Crown Reserve. Other treed habitat within the study area (including Weeping Myall Woodland, and planted native woodlands) would provide foraging and perching habitat for the species. The three individuals were recorded foraging within Grey Box Woodland along the transmission line route, east of the Newell Highway. Multiple individuals were also observed and heard flying over the study area towards the Lachlan River on multiple occasions.

No known breeding habitat for the species occurs in the study area however, River Red Gum woodland along the Lachlan River to the south of the study area may provide breeding habitat for the species. The recovery plan for the species maps the study area as where the species is likely to occur. No areas mapped as 'breeding likely to occur' are located in the study area, however there are scattered records of birds breeding outside these mapped areas (Baker-Gabb 2011). Based on the lack of known breeding habitat in the study area, an important population is not considered to be present.

Nature of impact

The proposal would remove 11 hollow-bearing trees occurring as isolated paddock trees in exotic grassland and cropland at the proposed solar farm, however no breeding habitat occurs in the proposal site, and these are unlikely to be utilised by the species. Hollow-bearing trees within the proposed solar farm site are unlikely to provide nesting habitat for the species due to their isolated occurrence in a highly modified landscape cleared of almost all native vegetation cover.

Around, 3.9 hectares of foraging habitat in woodland would be removed to facilitate the construction of the proposed solar farm and to allow for the 45 meter transmission line

easement required for the construction of the proposed transmission line. (This includes 2.37 hectares of naturally occurring Grey Box Woodland from the transmission line and 0.23 hectares of planted Grey Box Woodland from the solar farm, (2.60 hectares total) which represents preferred foraging habitat for the species.

Up to 0.003 hectares of native groundcover vegetation associated with the derived grassland form of Grey Box Woodland would also be impacted by the proposal. This may provide some value as foraging habitat for the species.

Criteria	Discussion
According to the DotE (2013) 'significant impact criteria', an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	No areas mapped as 'breeding likely to occur' are located in the study area (Baker-Gabb 2011). Individuals that occur are likely to be non-breeding visitors to the areas. Based on the lack of known breeding habitat in the study area, an important population is not considered to be present.
Lead to a long-term decrease in the size of an important population of a species	<p>The proposal would not impact any known breeding habitat for the species. Species that occur in the area would be non-breeding visitors.</p> <p>Construction would require the permanent removal of a maximum area of 3.9 hectares of native and planted woodland and 0.003 hectares of native groundcover foraging habitat from along the alignment. Clearing of this woodland vegetation would permanently remove foraging resources for the species. Vegetation removal would occur to the edges of scattered patches of woodland throughout the study area.</p> <p>The Superb Parrot is nomadic, moving large distance between breeding and non-breeding areas. The narrow gaps in overstorey vegetation created by the proposal are unlikely to affect movement of this species. Patches of vegetation would be retained throughout this foraging range.</p> <p>The proposed solar farm is unlikely to increase the risk of mortality or injury for the species, as no infrastructure proposed poses a threat. There could be a minor increase in injury or mortality due to bird strikes on the proposed transmission line. However due to the relatively small size of the Superb Parrot, bridging of the 132 kV transmission lines is unlikely.</p> <p>Given the lack of impact on breeding habitat, and limited extent of clearing through scattered foraging habitat, the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.</p>
Reduce the area of occupancy of an important population	The Superb Parrot occurs through the inland slopes and plains of New South Wales (including the Australian Capital Territory) to northern Victoria (Baker-Gibb 2011). Most birds undertake regular seasonal movements between breeding and non-breeding areas. The proposal would not reduce the area of occupancy of an important population given the lack of impact on breeding habitat.
Fragment an existing important population into two or more populations	Most Superb Parrots undertake regular seasonal movements between breeding and non-breeding areas. Riparian corridors are also known to provide movement corridors for this species, however no riparian corridors would be impacted by the proposal. Impacts to woodland are limited to the already fragmented edges of scattered woodland patches, and would not result in a substantial increase in the distance between

Criteria	Discussion
	<p>patches of trees and would not pose a barrier to movement for the species.</p> <p>Given the high mobility of the species, and large area of NSW in which it occurs, the proposal is unlikely to fragment an important population into two or more populations.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>Habitat critical to the survival of the species comprises breeding and foraging habitat (Baker-Gibb 2011). No breeding habitat occurs in the proposal site.</p> <p>After breeding, different populations move to different foraging grounds. Most of the breeding population from the inland slopes appears to move to the eucalypt-pine woodlands on the plains of west-central and north-central New South Wales (Webster 1988).</p> <p>The proposal would remove canopy and shrub species from the fragmented edges of scattered patches of woodland habitat along the proposal site. This would result in a minor loss in foraging resources for the species in the study area.</p> <p>Given the lack of impact on breeding habitat, and minor nature of clearing through scattered foraging habitat, the proposal is unlikely to adversely affect habitat critical to the survival of a species.</p>
<p>Disrupt the breeding cycle of an important population</p>	<p>No breeding habitat occurs in or near the proposal site. Hollow-bearing trees within the proposed solar farm site are unlikely to provide nesting habitat for the species due to their isolated occurrence in a highly modified landscape cleared of almost all native vegetation cover. The clearing of woodland and shrubs from the edges of scattered patches of foraging habitat would not affect the ability of the species to move between breeding and non-breeding areas. As such, the proposal would not disrupt the breeding cycle of an important population.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>No breeding habitat occurs in or near the proposal site.</p> <p>The proposal would require the permanent removal of 3.9 hectares of native and planted woodland and 0.003 hectares of native groundcover foraging habitat from the proposal site.</p> <p>Clearing of overstorey and mid storey species from the fragmented edges of scattered patches of foraging habitat would not affect the ability of the species to move between breeding and non-breeding areas.</p> <p>Given the lack of impact on breeding habitat, and the minor nature of clearing through scattered foraging habitat, the proposal is unlikely to lead to a decline in the species.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>Operation of the proposal has the potential to spread weeds and pests. The surrounding agricultural land already contains a high diversity of non-native species, and construction impacts could exacerbate the spread of these weeds into areas containing a predominantly more native understory. As this species forages on a variety of canopy and groundcover vegetation, including both native and non-native species, this is unlikely to detrimentally alter the availability of foraging resources for the species.</p> <p>Predator species have been shown to prefer moving down linear clearings, which could increase predation risk for other species (Dawson et al 2017). Feral species, such as cats and foxes, are a threat to this species. The study area has already undergone significant clearing for linear infrastructure (roadways, railways and transmission lines) and for agriculture, and the minor</p>

Criteria	Discussion
	increase in clearing for the proposal is unlikely to increase the risk of predation for the Superb Parrot.
Introduce disease that may cause the species to decline	<p>Psittacine beak and feather disease is a common and potentially deadly disease of parrots. Susceptibility to the infection may be influenced by environmental factors, such as climate, nutrition, habitat quality and social factors (DEH 2005).</p> <p>The proposal is unlikely to introduce Psittacine beak and feather disease, however cumulative impacts of further land clearing and impacts on habitat has the potential to increase susceptibility of individuals.</p>
Interfere substantially with the recovery of the species	<p>The long-term objective of recovery is to minimise the probability of extinction of the Superb Parrot in the wild, and to increase the probability of important populations becoming self-sustaining in the long term (Baker-Gibb 2011). Priority management areas are focused on breeding habitat for the species. Other priority actions include the identification and protection of key movement corridors.</p> <p>The proposal would not impact any breeding habitat for this species. Construction of the proposal would remove some minor foraging habitat for the species.</p> <p>Impacts of the proposal are limited to the already fragmented edges of scattered woodland patches, and the species is more likely to occur in areas of the proposal site containing substantial woodland (i.e to the west within the Crown Reserve, or south along the riparian corridor of the Lachlan River).</p> <p>Individuals that occur in the study area are most likely to be non-breeding vagrants, and the proposal is unlikely to interfere substantially with the recovery of the species, given that no breeding habitat is likely to be removed and the minimal clearing of foraging habitat from the edges of scattered woodlands.</p>
Conclusion	<p>The proposal is unlikely to have a significant impact on the Superb Parrot as:</p> <ul style="list-style-type: none"> • No breeding habitat would be impacted • Clearing of patches of foraging habitat would not affect the ability of the species to move between breeding and non-breeding areas. • Loss of foraging habitat involves removal of canopy and shrubs from the fragmented edges of scattered woodlands, with larger areas of foraging habitat available to the west within the Crown Reserve, and south along the riparian corridor of the Lachlan River • The loss of vegetation from the fragmented edges of scattered woodland patches would not create any substantial gaps in vegetation likely to substantially disrupt the movement of the species between breeding and foraging areas, due to their high mobility.

Appendix F – Biodiversity credit report



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00024310/BAAS18127/21/00024311	Daroobalgie solar farm - solar farm site	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Melissa Joan Cotterill	BAAS18127	50
Proponent Names	Report Created	BAM Case Status
	16/03/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
2	Major Projects	16/03/2022

* 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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

BAM Biodiversity Credit Report (Like for like)

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Melanodryas cucullata cucullata / Hooded Robin (south-eastern form)
Phascolarctos cinereus / Koala
Chthonicola sagittata / Speckled Warbler
Petroica boodang / Scarlet Robin

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.2	0	4	4

BAM Biodiversity Credit Report (Like for like)

76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248	-	76_76_Planting	No	4	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00024310/BAAS18127/21/00024316	Daroobalgie solar farm - transmission line	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Melissa Joan Cotterill	BAAS18127	50
Proponent Names	Report Created	BAM Case Status
	16/03/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
2	Major Projects	16/03/2022

* 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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

BAM Biodiversity Credit Report (Like for like)

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami / Glossy Black-Cockatoo
Grantiella picta / Painted Honeyeater
Phascolarctos cinereus / Koala
Sminthopsis macroura / Stripe-faced Dunnart
Tyto novaehollandiae / Masked Owl

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	0.7	16	0	16
80-Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	1.8	0	35	35
244-Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Not a TEC	0.7	0	9	9
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.6	10	0	10

26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
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BAM Biodiversity Credit Report (Like for like)

	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions This includes PCT's: 26, 27, 37, 43, 49, 55, 145, 159, 1766	-	26_26_Good	Yes	16	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
76-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248	-	76_76_Good	Yes	10	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
80-Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248	-	80_80_Derived_ scrub	No	26	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248	-	80_80_Good	No	9	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

244-Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Floodplain Transition Woodlands This includes PCT's: 56, 74, 76, 80, 81, 82, 237, 244, 248, 251, 628	Floodplain Transition Woodlands >=70% and <90%	244_244_Good	No	9	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options