Appendix D Biodiversity Development Assessment Report (BDAR)

Biodiversity Development Assessment Report

Forest Glen Solar Farm

August 2021

Project Number: 20-492

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Acronyms and Abbreviations

AWS	Automatic weather station
BAM	Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	Biodiversity Conservation Act 2016
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offset Scheme
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment, formally DoEE
DPIE	(NSW) Department of Planning, Industry and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
ha	hectares
km	kilometres
m	metres
MNES	Matters of National environmental significance under the *EPBC Act* (c.f.)
NSW	New South Wales
OEH	Formerly Office of Environment and Heritage, now BCD
SEPP	*State Environmental Planning Policy* (NSW)
sp/spp	Species/multiple species
TEC	Threatened Ecological Community

Executive Summary

The proposed Forest Glen Solar Farm is classified as a State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP). This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Forest Glen Solar Farm (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. NGH has prepared this report on behalf of the proponent, X-ELIO Australia Pty Ltd.

X-Elio are proposing to develop the Forest Glen Solar Farm across an approximately 444 ha area, located approximately 16 km west of Dubbo, NSW along Minore Road within Lot 6/DP755102. The project is likely to have an installed capacity of approximately 110MWdc and include the installation of approximately 150,000 to 200,000 solar panels.

The Development Footprint (where infrastructure will be restricted to) is predominantly within Category 1 land (82%); however, some clearing of native vegetation is likely to be required. All areas of native vegetation within and in close proximity to the Development Footprint have been assessed by NGH through stratification and vegetation integrity plot (BAM plot) surveys in Spring 2020 and Autumn 2021. These data have been used to determine the type and condition of Plant Community Types (PCTs) on-site. Two PCTs were identified within the Development Footprint:

1. PCT 255 '*Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion'*.
2. PCT 201 '*Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion'.*

An additional PCT (PCT 81 'Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion') was identified within the Development Site. The Development Footprint avoids this PCT, so only indirect impacts will be considered in this report.

All candidate species credit species were excluded based on absence of suitable habitat, or through targeted surveys. Assessments of Significance were undertaken for 5 EPBC listed species, Regent Honeyeater, Swift Parrot, Spot-tailed Quoll, Corben's Long-eared Bat, and Grey-headed Flying Fox. The initial AoS concluded a potential for significant impact on Regent Honeyeater foraging habitat. Based on this, areas of suitable Regent Honeyeater foraging habitat were excluded from the Development Footprint, resulting in the determination that a significant impact on Regent Honeyeater was unlikely. The remaining Assessments of Significance concluded no significant impact on EPBC species was likely.

The proposal offsets clearing of native vegetation is detailed in Table 1-1 and Table 1-2.

Table 1-1 Ecosystem credit requirement

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	201_Moderate	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	0.37	51	9
2	255_Poor	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	48.08	5.7	0
3	255_Low	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on	3.22	37.6	53

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
		sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion			
4	255_Moderate	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	1.53	48.7	33

Table 1-2 Scattered tree credit requirement

Class of Scattered Tree	Number of Scattered Trees cleared	Hollows present	Ecosystem credits required	Number of credits required
PCT 255				
3	1	No	0.75	1

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

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

b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or

c) Funding a biodiversity action that benefits the threaten entities impacted by the development.

1. Introduction

The proposed Forest Glen Solar Farm is classified as a State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP). This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Forest Glen Solar Farm (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. NGH Environmental has prepared this report on behalf of the proponent, X-ELIO Australia Pty Ltd.

1.1 The Proposal

X-Elio are proposing to develop the Forest Glen Solar Farm across an approximately 444 ha area, located within Lot 6/DP755102 and including Delroy Road (Lot 1 DP 1198911, Lot 51 and Lot 52 DP755094). The project is likely to include the installation of:

- Approximately 150,000 to 200,000 solar panels mounted on single axis tracking system.
- Steel mounting frames with driven or screwed pile foundations.
- Approximately 20 to 25 power conversion units (PCUs) which include four inverters, one transformer and associated control equipment to convert DC energy generated by the solar panels to 33kV AC energy.
- An onsite 132kV substation containing transformers and associated switchgear to facilitate connection to the national electricity grid via the existing 132kV transmission lines onsite. The connection to the existing 132kV transmission lines onsite would either be above or below ground.
- A Battery and Energy Storage System (BESS) with a capacity of approximately 25MWh (i.e., 25MW power output for one hour) consisting of between 12 to 15 containers (40 foot each).
- Underground power cabling to connect solar panels, and power stations.
- Underground auxiliary cabling for power supplies, data services and communications.
- Buildings to accommodate a site office, protection and control facilities, maintenance facilities and staff amenities.
- Site access track via Delroy Road.
- Internal access roads, operational width typically 6.5m wide.
- One watercourse crossing for internal access roads.

The operational solar farm would involve a lease agreement between X-ELIO and the landowner for the operational life of the project. Site access is off Minore Road via Delroy Road, approximately 1.9km east of the site. The existing access track is unsealed and outside of the project's operational lease boundaries.

The following terms are used in this document:

- **Development Footprint** – all areas of land which may be directly impacted by the proposal, either during construction, operation or decommissioning. The Development Footprint has been defined by buffering the Indicative Infrastructure Layout by 5m, to capture the largest layout considered likely (currently estimated by the client to be about 10% larger than will likely be developed) as well as accounting for all disturbance required to allow for construction activities (ie the installation of all environmental controls). This is intended to provide a 'clearing budget' that will ensure the project's consented offset liability is flexible enough to allow for minor changes in the final detailed design. The Development Footprint described within this BDAR is distinct from the Development Footprint described within the EIS.

- **Indicative Infrastructure Layout –** the indicative infrastructure layout showing where key infrastructure components would be located. It most closely represents the area of actual impact required to construct and operate the solar farm. The final infrastructure layout will be subject to detailed design with appointed contractors.
- **Development Site** – the development site is land within which the development footprint will be sited together with areas of land that could be indirectly impacted by the proposal. That is, the Development Site contains the Development Footprint plus a 100m buffer to consider indirect impacts. The development site has the same meaning as 'subject land' defined in the BAM 2020 for the purpose of this BDAR.
- **Assessment Area** – land extending 1500m out from the Development Site used to assess native vegetation extent and other landscape features.
- **Category 1 land** – exempt land – native vegetation clearing is allowed without approval from Local Land Services, under Part 5A of the LLS Act. Biodiversity values within these areas are not assessed under the BAM (2020).
- **Category 2 land** – regulated land – authorisation may be required from Local Land Services for native vegetation clearing, under Part 5A of the LLS Act. Biodiversity values within these areas are assessed under the BAM (2020).

1.2 The Development Site

1.2.1 Site location

The proposal site is located approximately 16 km west of Dubbo, NSW along Minore Road. The proposal site is identified as Lot 6/DP755102. The property is approximately 789 ha, X-Elio propose to lease around 442 ha (Delroy Road is not included in this lease area), subject to detailed design.

1.2.2 Site description

The Development Site comprises mostly paddocks classified as CATEGORY 1 unregulated land, within flatter land and foot slopes, which have been cleared for agricultural purposes.

Key features of the Development Site include (see Figure 1-1):

- Areas of woodland with moderate diversity of ground cover species, which is potentially of biodiversity value for threatened fauna.
- Hollow bearing trees of high conservation value.
- Scatter (paddock) trees of high conservation value.
- Highly disturbed native vegetation that lacks native understory and forb diversity due to grazing practices.
- Areas of historically cleared Category 1 land, which do not require assessment (Appendix A).
- Six dams.
- Two second order watercourses and seven smaller tributaries.

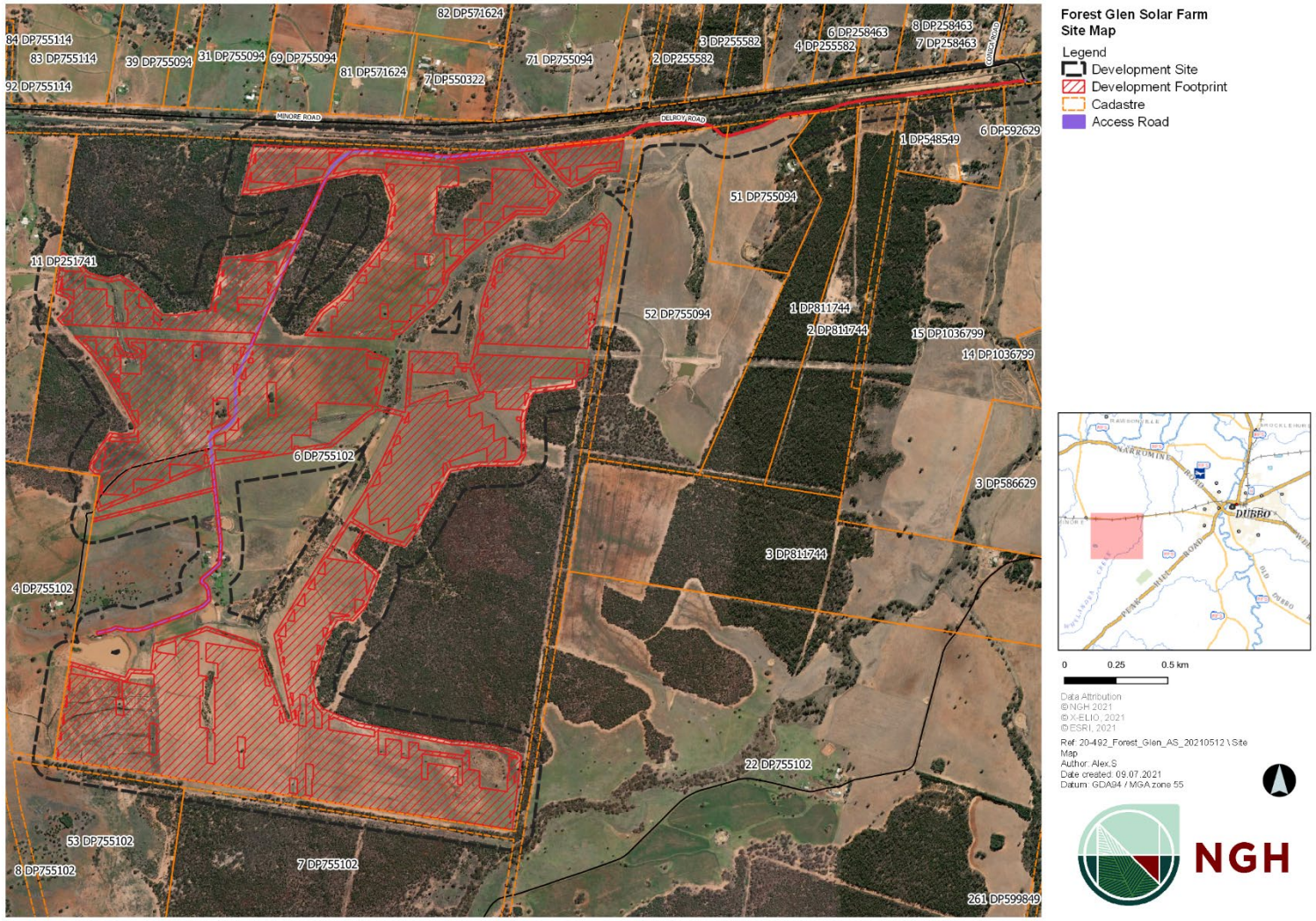


Figure 1-1 Site map

1.3 Study Aims

The aim of this BDAR is to assess the native vegetation and habitats in the Development Site and Development Footprint to determine the impacts and offset requirements under the BC Act.

This BDAR includes an assessment of impacts to protected matters listed under the federal *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This assessment includes use of the Protected Matters Search Tool to determine potential species and communities occurring within the locality, and targeted surveys across the site to detect the presence of these entities or their habitats. Entities known or considered likely to occur have been included in the impact assessment, and Assessments of Significance have been prepared where there is the potential for impacts to determine the significance of impacts to these entities.

1.4 Source of Information Used in the Assessment

The following information sources were used in the development of this BDAR:

- Australian Government's Species Profiles and Threats (SPRAT) database http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

  NSW Threatened Species Profiles http://www.environment.nsw.gov.au/threatenedspeciesapp/ and www.environment.nsw.gov.au/AtlasApp/UI_Modules/
- Department of Primary Industries (DPI) profiles of threatened species, population, and ecological communities
- Commonwealth Department of Agriculture, Water and the Environment Protected Matters Search Tool

  Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool
- Australia's IBRA Bioregions and sub-bioregions. Accessed October 2019 http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 3
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx)
- NSW OEH's BioNet threatened biodiversity database

  Accessed online via login at http://www.bionet.nsw.gov.au/
- OEH BioNet Vegetation Classification Database (OEH 2017)

  Accessed online via login at http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx
- OEH VIS Mapping

  Accessed online at http://www.environment.nsw.gov.au/research/VISmap.htm
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method
- NSW Government SEED Mapping

  https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Biodiversity Values Map

  https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap
- Aerial imagery of historical land use (Sourced from Google Earth and Spatial Services Delivery)

- 2017 Land Use Dataset (Australian Land Use and Management (ALUM) Classification Version 7 (Office of Environment and Heritage (OEH), 2017)
- NSW Woody vegetation extent and Foliage Projective Cover (FPC) 2011 (OEH, 2015)
- Sensitive regulated and vulnerable regulated lands on the Native Vegetation Regulatory Map portal
- Department of Planning Industry and Environment (2015) State Vegetation Type Map: Central West / Lachlan Region Version 1.4. VIS_ID 4468.

2. Landscape Features

2.1 IBRA Bioregions and Subregion

Interim Biogeographical Regionalisation for Australia (IBRA) bioregions are geographically distinct bioregions based on common climates, geology, landforms and native vegetation (Thackaway and Creswell, 1995). There are 89 Bioregions within Australia. The Development Site falls across two IBRA Bioregions (Figure 2-2). These are:

- Brigalow Belt South
- NSW South Western Slopes.

The Brigalow Belt South Bioregion is an extensive area of undulating ranges extending from south of Dubbo in central-western NSW to the mid-Qld coast. The South Western Slopes is an extensive area of foothills and isolated ranges, comprising the lower inland slopes of the Great Dividing Range extending from north of Cowra through southern NSW into western Victoria.

The majority of the Development Site falls within the Pilliga subregion and this was entered into the BAM Calculator.

The Pilliga subregion is characterised by stepped sandstone ridges with low cliff faces and a high proportion of rock outcrops. The geology of the Pilliga subregion comprises Jurassic quartz sandstones, limited shales, Tertiary basalt caps and plugs plus the sediments derived from these rocks. Vegetation communities occupying suitable landscapes include:

- White box with white cypress pine and kurrajong on the basalt hills.
- Blue-leaved ironbark, white gum, black cypress pine, whitewood, and rough-barked apple on stony sandstone plateau and streams.
- Narrow-leaved ironbark, white cypress pine, red stringy bark, patches of mallee and broom heath on gentler sandstone slopes.
- Pilliga box with grey box, poplar box, fuzzy box, bull oak, rosewood, wilga and budda on heavier soils in the west and north.
- River red gum lines all streams.

2.2 NSW Landscape Regions and Area

The Development Site falls across two Mitchell Landscapes. These are:

- Goonoo Slopes
- Geurie Granites.

The dominant Mitchell Landscape within the Development Site is the Goonoo Slopes. This was entered into the BAM Calculator.

2.3 Native Vegetation

The Forest Glen Solar Farm Development Footprint is predominantly within Category 1 land; however, some clearing of native vegetation will be required. Native vegetation cover was calculated in accordance with the site development BAM by applying a 1500m buffer around the edge of the Development Site and digitising all native vegetation within. It also includes all native vegetation inside the Development Site. Native vegetation cover within the Development Site and Development Footprint were determined through vegetation stratification and survey, however the broader 1500m buffer relied on State Vegetation Mapping (SEED, 2015). The native vegetation cover within the 1500m buffer was estimated at approximately 1650ha out of a total area of 3248ha. This equates to 51% native vegetation coverage within the 1500m buffer,

which was entered into the BAM Calculator. See Figure 2-2 showing native vegetation within the 1500m buffer. Vegetation is generally described above in Section 2.3 and further classified below in Section 3.2.

2.4 Cleared Areas

Cleared areas in the Development Footprint are primarily used for cropping and grazing and provide very little in terms of native fauna habitat. These areas provide suitable foraging habitat for raptors, parrots, cockatoos and macropods, and introduced species such as cats, foxes and rabbits. Approximately 1591ha (49%) within the 1500m buffer area is cleared land. Approximately 400ha (50%) of the Development Site and 255 ha (83%) of the Development Footprint has been classified as Category 1 land (Figure 2-1 and Appendix A).

2.5 Rivers and Streams

One unnamed 2nd order stream runs through the Development Site from the north-east. Four 1st order streams branch off this watercourse, as well as one 1st order stream from an additional watercourse in the north-west (Figure 2-2).

2.6 Wetlands

An EPBC protected matters search completed on 19 November 2020 identified four wetlands of international importance. The closest of these to the Development Site are the Macquarie Marshes, located 150-200km from the Development Site, upstream within the Murray Catchment.

2.7 Connectivity Features

No state or regionally significant biodiversity links occur within the Development Site nor within 1500m assessment area. Roadside vegetation in the northern section of the Development Site provides some connectivity through continuous canopy cover (Figure 2-2).

2.8 Areas of Geological Significance

No areas of areas of geological significance were identified within the Development Site.

2.9 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value occur within the Development Site.

2.10 Site Context Components

Method applied

The development proposal conforms to the definition of a *site-based development* under the Biodiversity Assessment Methodology. The site-based development assessment methodology has been used in this BAM assessment.

Percent Native Vegetation Cover

The percentage of Native Vegetation cover within 1500 metres of the Development Site was calculated by estimating the presence of any native vegetation observed using aerial imagery and on-site field surveys conducted in November 2020 (refer to Figure 2-2). Based on on-site vegetation stratification which

consistently identified treeless areas as exotic vegetation, open treeless areas shown in aerial imagery outside of the surveyed areas which showed signs of farming operations were considered exotic vegetation.

The total area within the 1500m buffer from the Development Site was 3248ha. The native vegetation woody cover within the 1500m buffer area surrounding the Development Site was 1650ha or 51%. The non-native vegetation cover 1591 hectares, or 49%. These results were entered into the BAM calculator.

Figure 2-1 Example of Category 1 Land bordering Category 2 Land within the Development Footprint

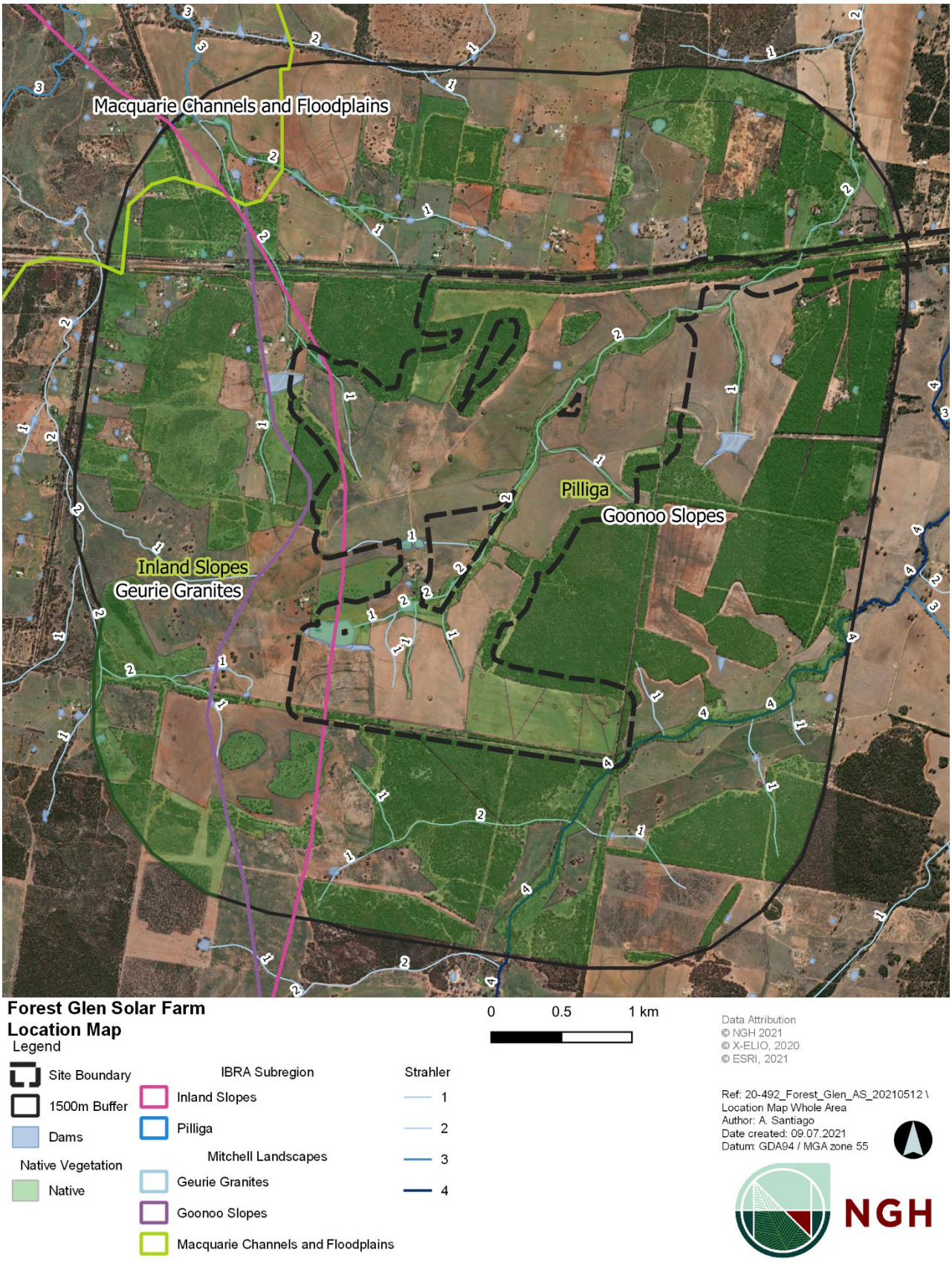


Figure 2-2 Location map

3. Native Vegetation

3.1 Land Category Assessment

As stated within BC Act section 6.8(3), the biodiversity assessment is to exclude the assessment of any clearing of native vegetation and loss of habitat on Category 1 - exempt land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act). This excludes any impacts prescribed by the regulations under section 6.3 of the BC Act. Additionally, in accordance with section 2.3.1.1 of the BAM, biodiversity values that do not need to be assessed include: *(d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 - exempt land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation*.

Boundaries delineating Category 1 - exempt and Category 2 - regulated land on the Native Vegetation Regulatory (NVR) map are not yet publicly available. Therefore, during the transitional period (until the entire NVR map is released), accredited assessors may establish those boundaries and associated categorisation for the consent authority to consider by approximating the method used to make the NVR map under the provisions of the BC Act and the LLS Act. This is done by using the same methodology inclusive of, but not limited to:

- 2013 and 2017 Landuse mapping. *A land use layer contributes to identifying land for inclusion in Category 1 in the NVR map. Chapter 4 of the NVR map method statement describes the process for identifying and mapping existing and historical agricultural land use since 1 January 1990. Mapping existing and historical land use focuses on identifying patterns or evidence of agricultural land uses according to high-resolution aerial or satellite imagery and classifying land under a national land use classification system.*
- Woody vegetation extent layer 2017. *Contributes to identifying areas for inclusion in Category 2 in the NVR map (including individual trees).*
- Aerial imagery pre and post 1990.
- Sensitive regulated land and vulnerable regulated land layer.

To meet the Category 1 land requirement, land must be:

- Land cleared of native vegetation as at 1 January 1990; or
- Lawfully cleared after 1 January 1990.

A total of 399.95 ha of Category 1 land within the Development Site has been excluded from the BAM assessment, except where prescribed impacts are relevant and discussed in Section 7.3. Where in doubt, or where data sources were conflicting, a precautionary approach has been implemented for areas deemed inconclusive in terms of determining historical land use. The land category assessment can be found in Appendix A.

3.2 Plant Community Types (PCTS)

3.2.1 Methods to assess PCTs

Review of existing information

A search was undertaken of the OEH BioNet Vegetation Classification Tool (BioNet) database and the NSW SEED Mapping Portal to assess existing vegetation mapping information within the Development Site. Relevant mapping of the Development Site included State Vegetation Type Map: Central West / Lachlan Region (DPIE, 2015). This mapping helped inform vegetation mapping, however PCTs were based on on-site data collection, which *did not* align well with state mapping.

Field surveys and personnel

On-site field surveys were conducted by BAM accredited ecologists in November 2020 and May 2021 to determine the PCTs on-site and determine the presence of any threatened ecological communities. Surveys included BAM plot data collection and stratification of vegetation across the site. Targeted flora and fauna surveys were conducted to determine the presence of suitable habitat for threatened fauna, both for 'ecosystem credit' species and 'species credit' species (see section 4.2.3).

Floristic surveys

A site inspection and 16 vegetation integrity plots (BAM plots) were conducted across the Development Site from the 9th-13th November 2020. The aim of this field work was to assess the vegetation visually and conduct an acceptable number of VI plots in the representative PCTs observed onsite.

PCT Identification was based on:

- most dominant native species present inside 20 x 20m plots;
- tree species observed in similar and adjoining landforms to the Development Site (where absent in plots); and
- location in the IBRA subregion and distribution using the BioNet Vegetation Classification Database.

Once PCTs were identified, they were then stratified into different condition states, homogenous vegetation zones were identified, and areas were calculated for the purpose of undertaking further survey.

Vegetation integrity quadrats consisting of 20 x 20m floristic survey (composition, structure) and 20 x 50m (function) were replicated across the Development Footprint as detailed in the BAM within each vegetation zone. Data was collected utilising the methodology presented in the BAM (DPIE 2020) by an accredited BAM assessor. All plot surveys, impact assessment and credit calculations were directed by and certified by an accredited BAM assessor.

3.2.2 Limitations

Low and poor condition areas within the Development Site have been highly modified and subjected to past clearing and grazing, resulting in the presence of the groundcover stratum only, often with an absence of trees and tall shrubs. As key indicator species in the upper stratum are required for classifying the PCT, notes were taken in the field of adjoining tree species, especially those with similar landscape attributes, to assist in PCT assignment.

Minimum plot numbers and targeted flora and fauna survey methods, effort and timing have been met. Additionally, local conditions were considered optimal for flora and fauna surveys, given above average rainfall in the region (see Section 4.2.4). Despite this, there is potential for inconspicuous or geophytic species to be missed during surveys, given their low detectability.

Although sufficient survey methods and effort were undertaken to identify all hollow-bearing trees within the Development Site, it is possible that some hollows in the canopy of large trees may not have been detected.

3.2.3 PCTs identified on the Development Site

Two PCTs were identified within the Development Footprint:

1. PCT 255 '*Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion'*.
2. PCT 201 '*Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion'.*

An additional PCT (PCT 81 'Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion') was identified within the Development Site. As this PCT is not within the Development Footprint, it is not considered below.

Descriptions of the PCTs identified are provided in Table 3-1 and Table 3-2.

Table 3-1 Description of PCT 255 within the Development Site.

PCT name		
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)	
Vegetation class	Western Slopes Dry Sclerophyll Forests	
Vegetation type	PCT ID	255
	Common Community Name	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Approximate extent within the Development Footprint	48.08ha – poor condition (VI score <15) 3.22ha – low condition (VI score 15-30) 1.53ha - moderate condition (VI score 30-60)	
Species relied upon for PCT identification	Species name	Relative abundance
	Eucalyptus sideroxylon	7.3% cover
	Eucalyptus pilligaensis	8.0% cover
	Callitris glaucophylla	9.7% cover
	Eucalyptus microcarpa	5.0% cover
	Cassinia laevis	6.0% cover
	Melichrus urceolatus	0.4% cover
	Lomandra filiformis subsp. coriacea	0.1% cover
	Calotis cuneifolia	2.8% cover
Justification of evidence used to identify the PCT	The dominance of the canopy species *E. pilligaensis, E. sideroxylon,* and *C. glaucophylla* narrowed the possible PCTs down to two, PCT 255 and PCT 256. PCT 255 was chosen over 256 as PCT 256 is a Mallee woodland dominated by *E. viridis*, which was absent from within the site. PCT 255 matched well in canopy, mid and ground stratum, though the mid-storey was largely absent for much of the site.	
TEC Status	No associated TECs	
Estimate of percent cleared within NSW	50%	

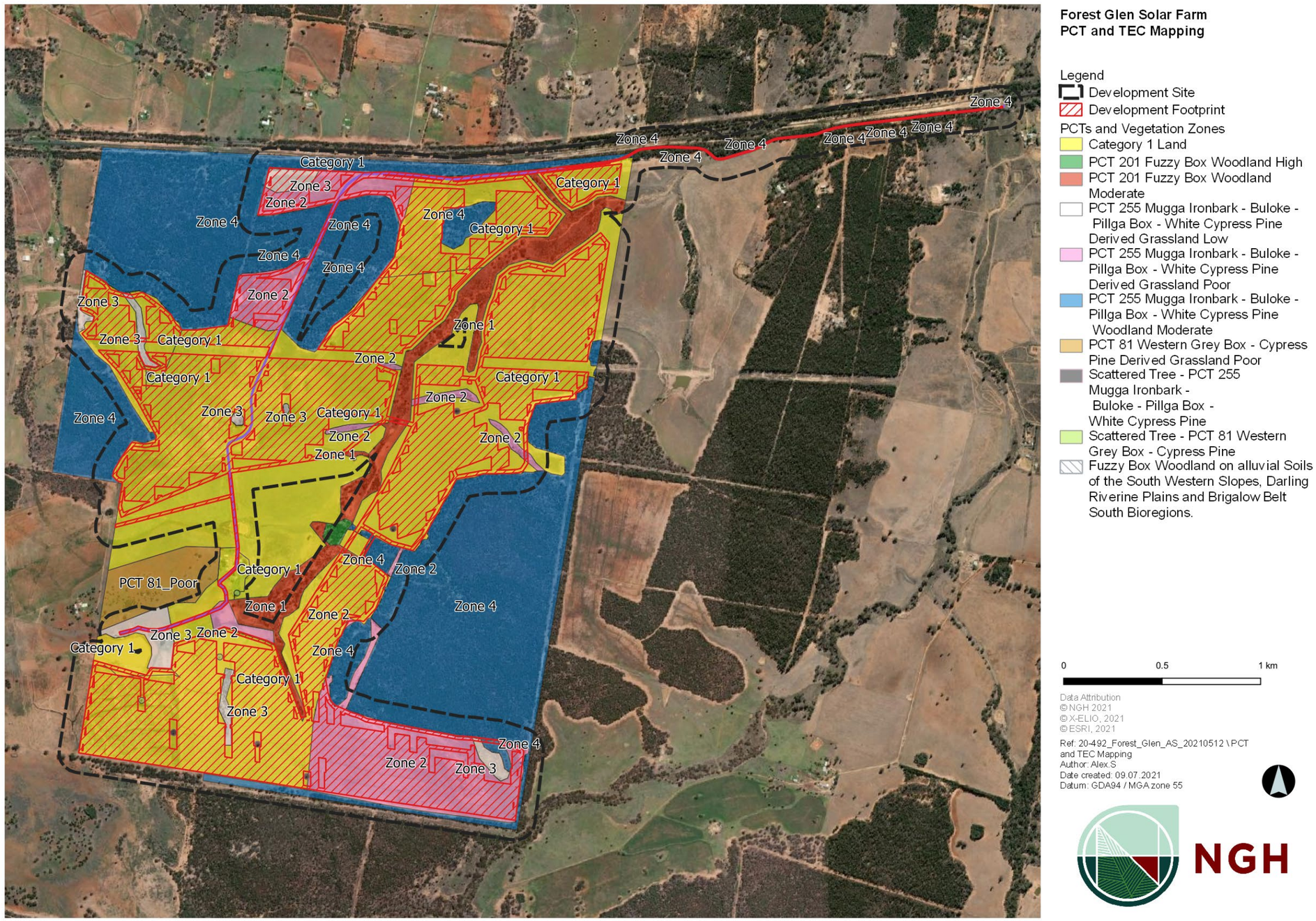
PCT name	
Examples	 Figure 3-1 Example of PCT 255 Woodland Moderate

Table 3-2 Description of PCT 201 within the Development Site

PCT name		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodlands	
Vegetation type	PCT ID	201
	Common Community Name	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
Approximate extent within the Development Footprint	0.37 ha – moderate condition (VI score 30-60)	
Species relied upon for PCT identification	Species name	Relative abundance
	Callitris glaucophylla	16% cover
	Dodonaea viscosa subsp. cuneata	0.1% cover
	Sida corrugata	0.1% cover
	Aristida ramosa	0.9% cover
	Calotis cuneifolia	0.7% cover

PCT name		
	Vittadinia cuneata	0.2% cover
	Glycine clandestina	0.4% cover
	Carex inversa	1.1% cover
	Hypericum gramineum	0.8% cover
	Elymus scaber var. scaber	0.2% cover
	Cheilanthes sieberi	0.1% cover
	Hydrocotyl laxiflora	0.1% cover
	Xerochrysum viscosum	0.1% cover
Justification of evidence used to identify the PCT	There were a total of 76 PCTs with a dominant canopy of *C. glaucophylla* within the Pilliga IBRA sub-region. Although not captured within the BAM plot data, *Eucalyptus blakelyi, E. microcarpa, Brachychiton populneus subsp. populneus, and Allocasuarina luehmanni* were all recorded within PCT. *Eucalyptus pilligaensis* was present in BAM plots, but was considered likely to be encroachment from nearby PCT 255. PCTs which had at least 3 canopy species which were identified within the vegetation zone (including outside of plots) resulted in 3 possible PCTs: 1. PCT 88 - Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion 2. PCT 101 - Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion 3. PCT 201 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion. All 3 PCTs contained several matching upper, mid and ground strata species, however PCT 201 was selected over 88 and 101 given the higher number of matches (12 for PCT 201 compared with 10 for both PCT 88 and 101). Additionally, as this zone occurred as riparian vegetation, the landscape features of PCT 201 were considered a better match.	
TEC Status	PCT 201 is associated with the BC Act listed Endangered Threatened Ecological Community: Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions. The expected dominant species of Fuzzy Box Woodland, *Eucalyptus conica,* was not identified within PCT 201. However, as the landscape features and floristics aligned closely with that of PCT 201 and Fuzzy Box Woodlands, PCT 201 was determined to meet the criteria for listing of TEC Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	
Estimate of percent cleared within NSW	94%	

PCT name	
Examples	



Forest Glen Solar Farm
PCT and TEC Mapping

Legend
- Development Site
- Development Footprint

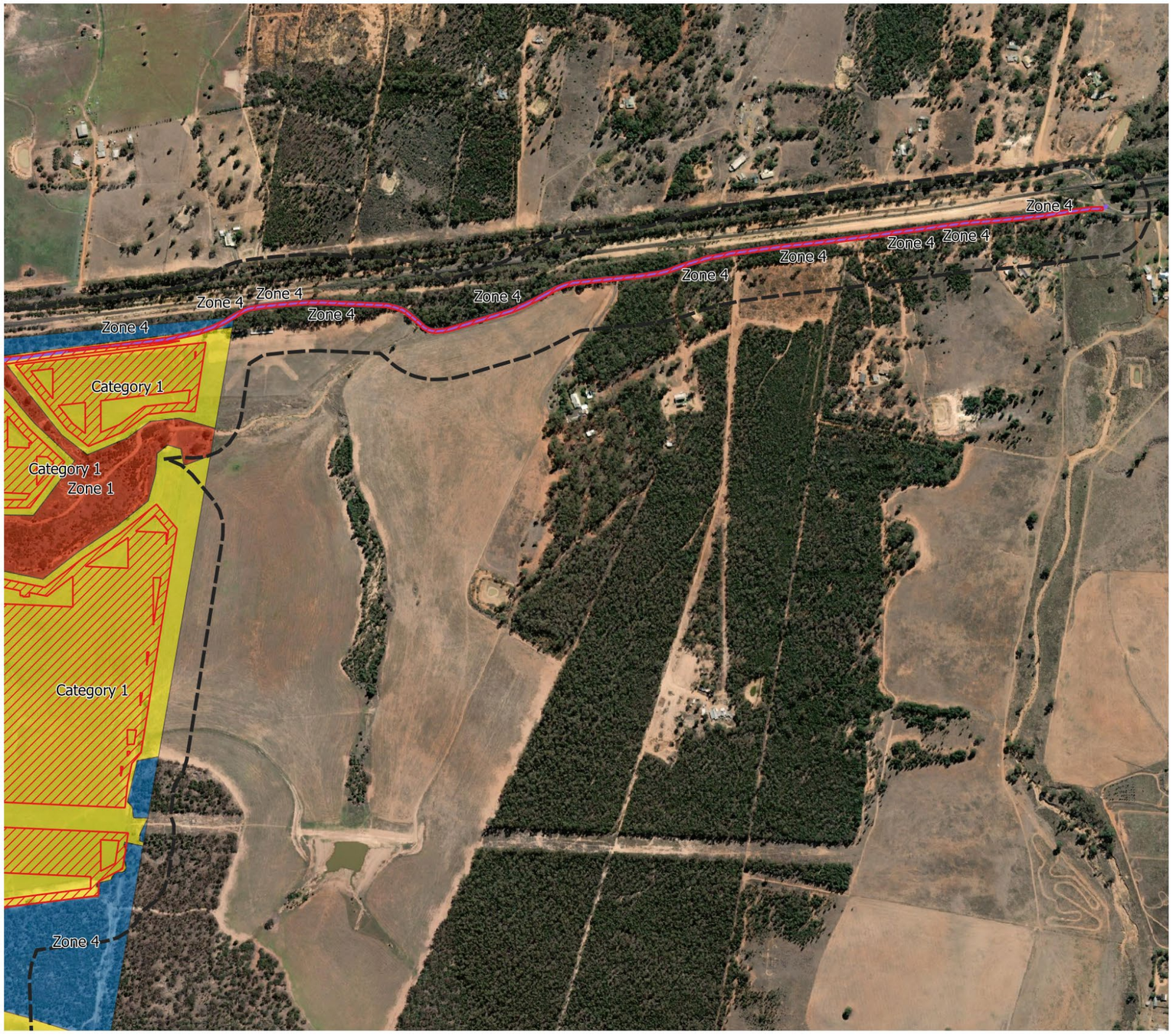
PCTs and Vegetation Zones
- Category 1 Land
- PCT 201 Fuzzy Box Woodland High
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Low
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Poor
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate
- PCT 81 Western Grey Box - Cypress Pine Derived Grassland Poor
- Scattered Tree - PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine
- Scattered Tree - PCT 81 Western Grey Box - Cypress Pine
- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.

0 0.5 1 km

Ref: 20-492_Forest_Glen_AS_20210512 \ PCT and TEC Mapping
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

NGH

Figure 3-2 PCTs and TECs at the Development Site map



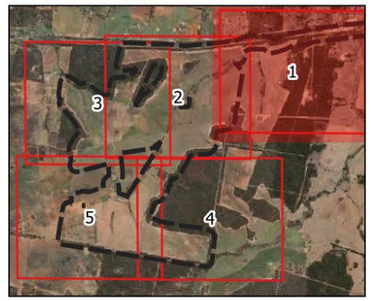
Forest Glen Solar Farm
PCT and TEC Mapping Atlas

Legend

- Development Site
- Development Footprint

PCTs and Vegetation Zones

- Category 1 Land
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate

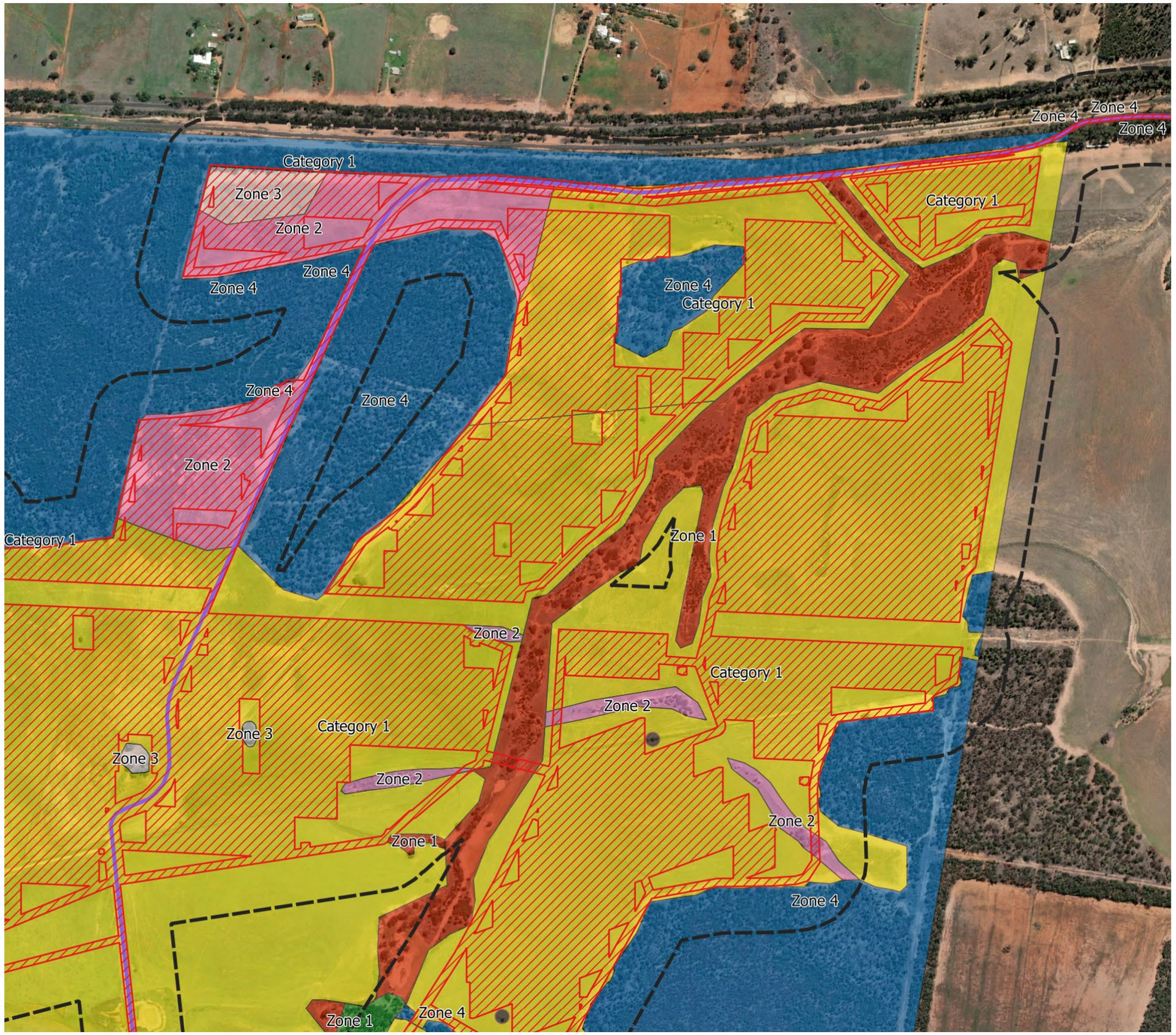


0 0.2 0.4 km

Ref: 20-492_Forest_Glen_AS_20210512 \ PCT and TEC Mapping Atlas
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

NGH

Figure 3-3 PCTs and TECs at the Development Site map 1 of 5



Forest Glen Solar Farm
PCT and TEC Mapping Atlas

Legend

- Development Site
- Development Footprint

PCTs and Vegetation Zones

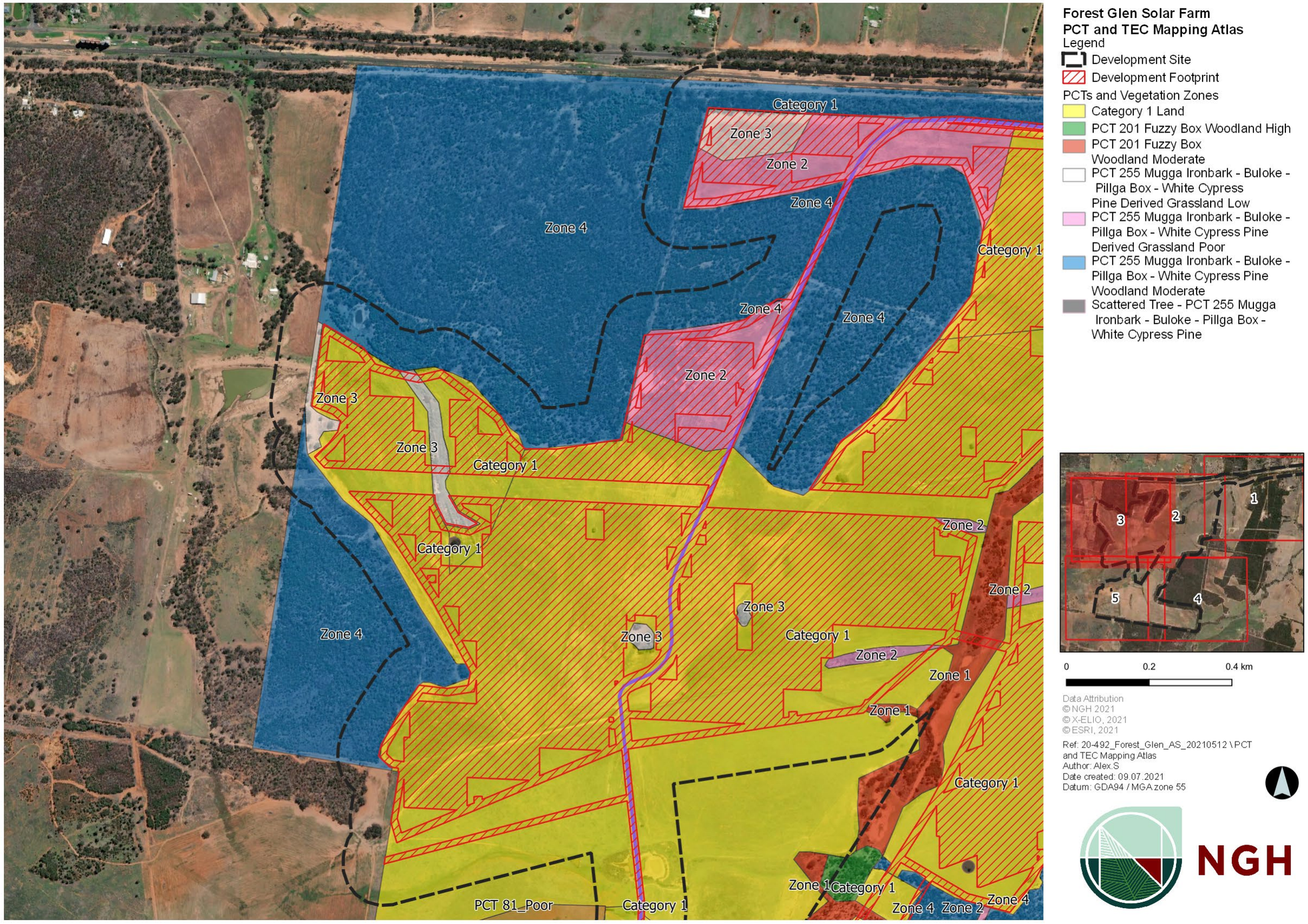
- Category 1 Land
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Low
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Poor
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate
- Scattered Tree - PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine

0 0.2 0.4 km

Ref: 20-492_Forest_Glen_AS_20210512 \ PCT and TEC Mapping Atlas
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

NGH

Figure 3-4 PCTs and TECs at the Development Site map 2 of 5.



Forest Glen Solar Farm
PCT and TEC Mapping Atlas

Legend

- Development Site
- Development Footprint

PCTs and Vegetation Zones

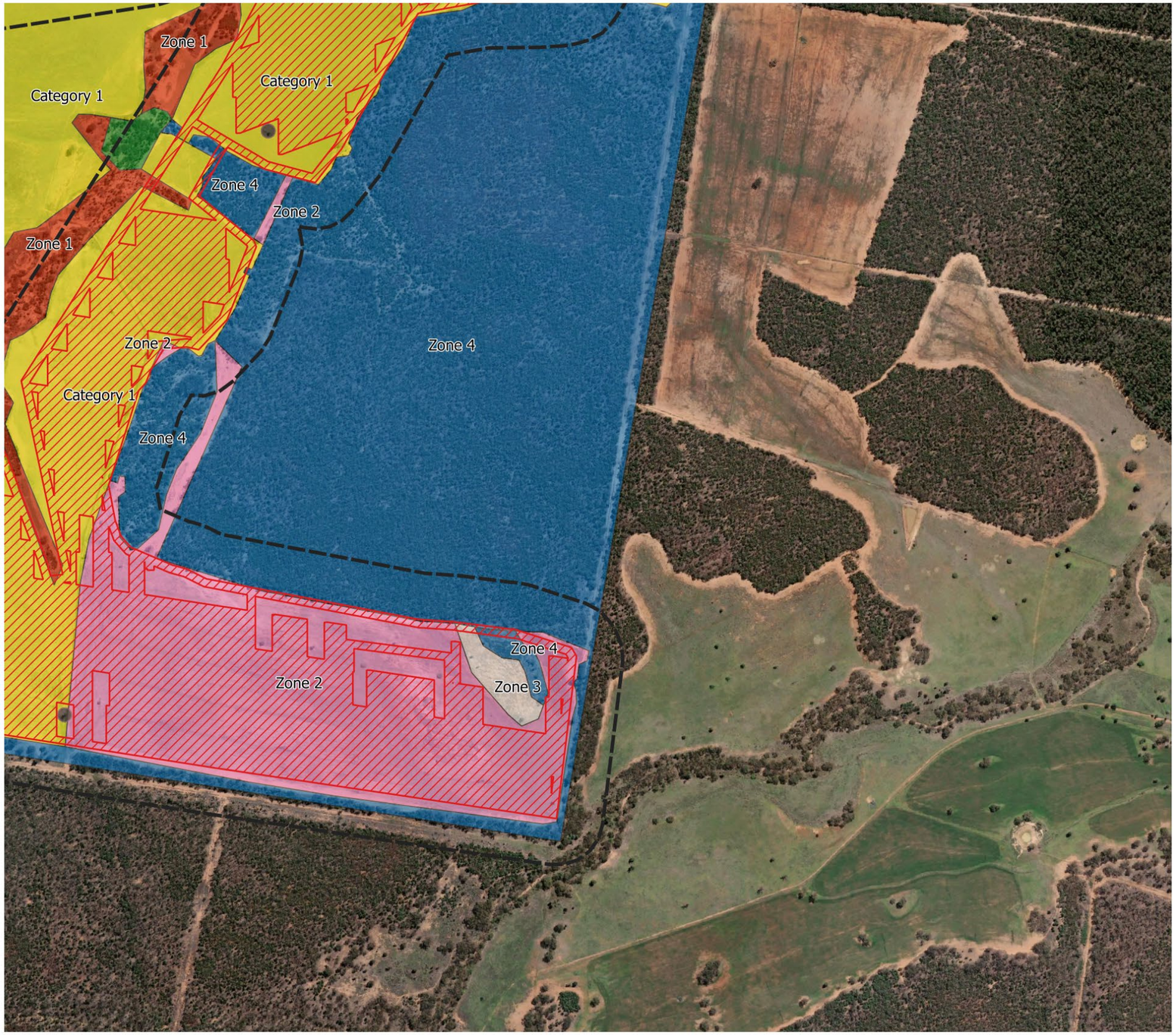
- Category 1 Land
- PCT 201 Fuzzy Box Woodland High
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Low
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Poor
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate
- Scattered Tree - PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine

0 0.2 0.4 km

Ref: 20-492_Forest_Glen_AS_20210512 \PCT and TEC Mapping Atlas
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

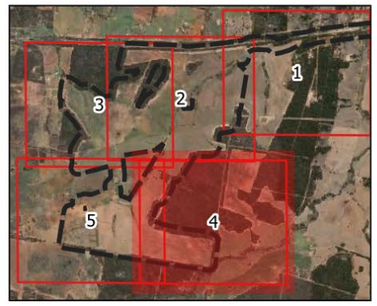
NGH

Figure 3-5 PCTs and TECs at the Development Site map 3 of 5



Forest Glen Solar Farm
PCT and TEC Mapping Atlas
Legend
- Development Site
- Development Footprint

PCTs and Vegetation Zones
- Category 1 Land
- PCT 201 Fuzzy Box Woodland High
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Low
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Poor
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate
- Scattered Tree - PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine



0 0.2 0.4 km

Ref: 20-492_Forest_Glen_AS_20210512 \ PCT and TEC Mapping Atlas
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

NGH

Figure 3-6 PCTs and TECs at the Development Site map 4 of 5

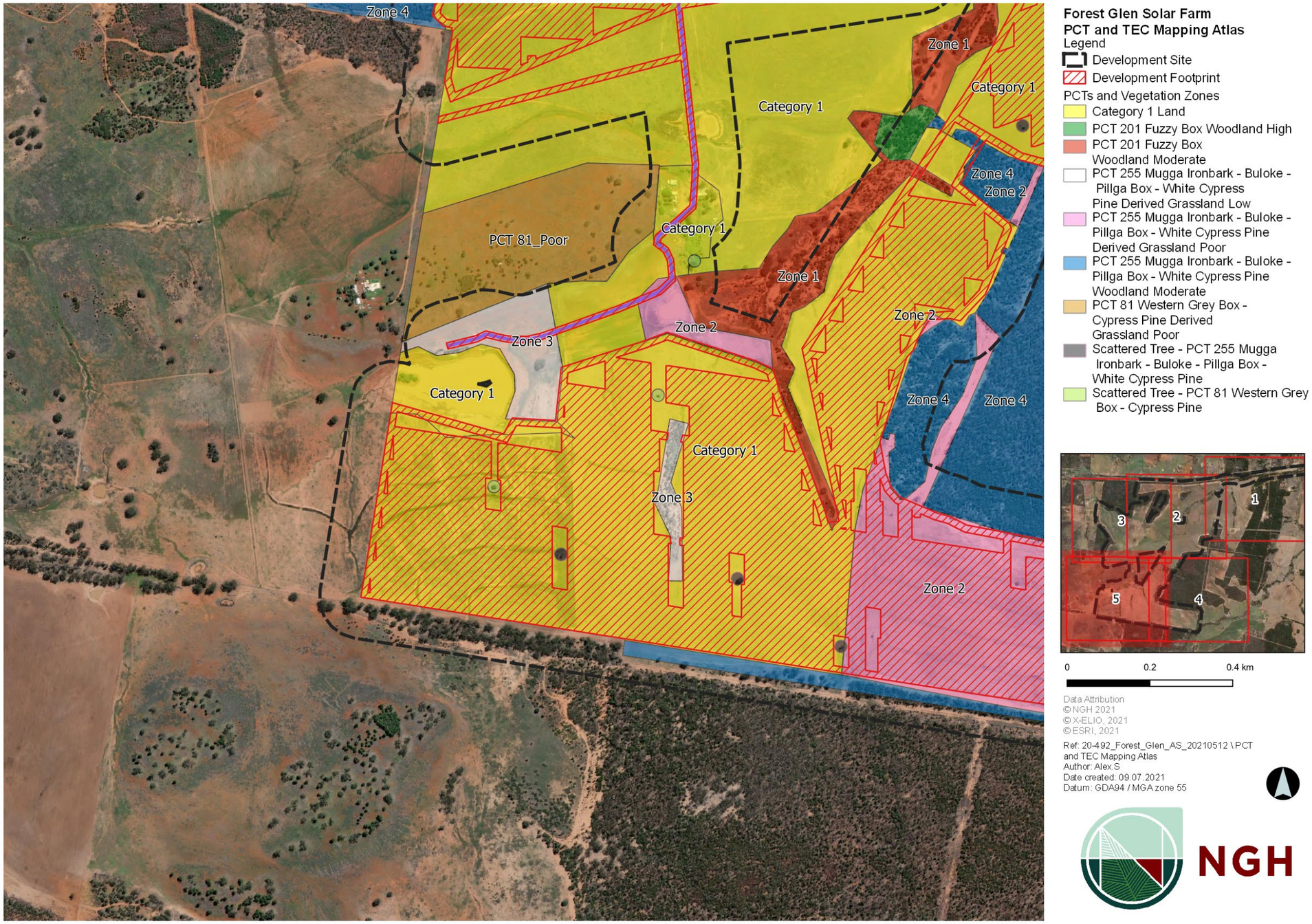


Figure 3-7 PCTs and TECs at the Development Site map 5 of 5

3.3 Vegetation Integrity Assessment

3.3.1 Vegetation zones and survey effort

Vegetation integrity plots were used to further delineate PCTs into vegetation zones based on condition, which was determined using the vegetation integrity score (VI score) calculated in the BAM-C and extrapolated out in combination with on-site vegetation stratification and aerial imagery. Vegetation was classified as poor condition for VI scores lower than 15, low condition between 15-30, moderate condition between 30-60, and high condition above 60.

The number of vegetation integrity plots (BAM plots) undertaken per zone was based on Table 3, Section 4.3.4 of the BAM (2020). As BAM plots were used to inform planning to avoid and minimise impacts, BAM plots undertaken by NGH exceed the minimum required by the BAM in most zones. Refer to Table 3-3.

Table 3-3 Vegetation zones within the Development Footprint.

Zone ID	PCT ID	Condition	Zone area (ha)	Plots undertaken (and required under the BAM)	Patch size (ha)
1	201 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	Moderate	0.37	3 (1)	101
2	255 - Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Poor	48.08	6 (4)	101
3	255 - Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Low	3.22	4 (2)	101
4	255 - Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Moderate	1.53	8 (1)	101
	Category 1 Land	N/A	255.52	N/A	N/A
		Total Area (ha)	**308.77**		

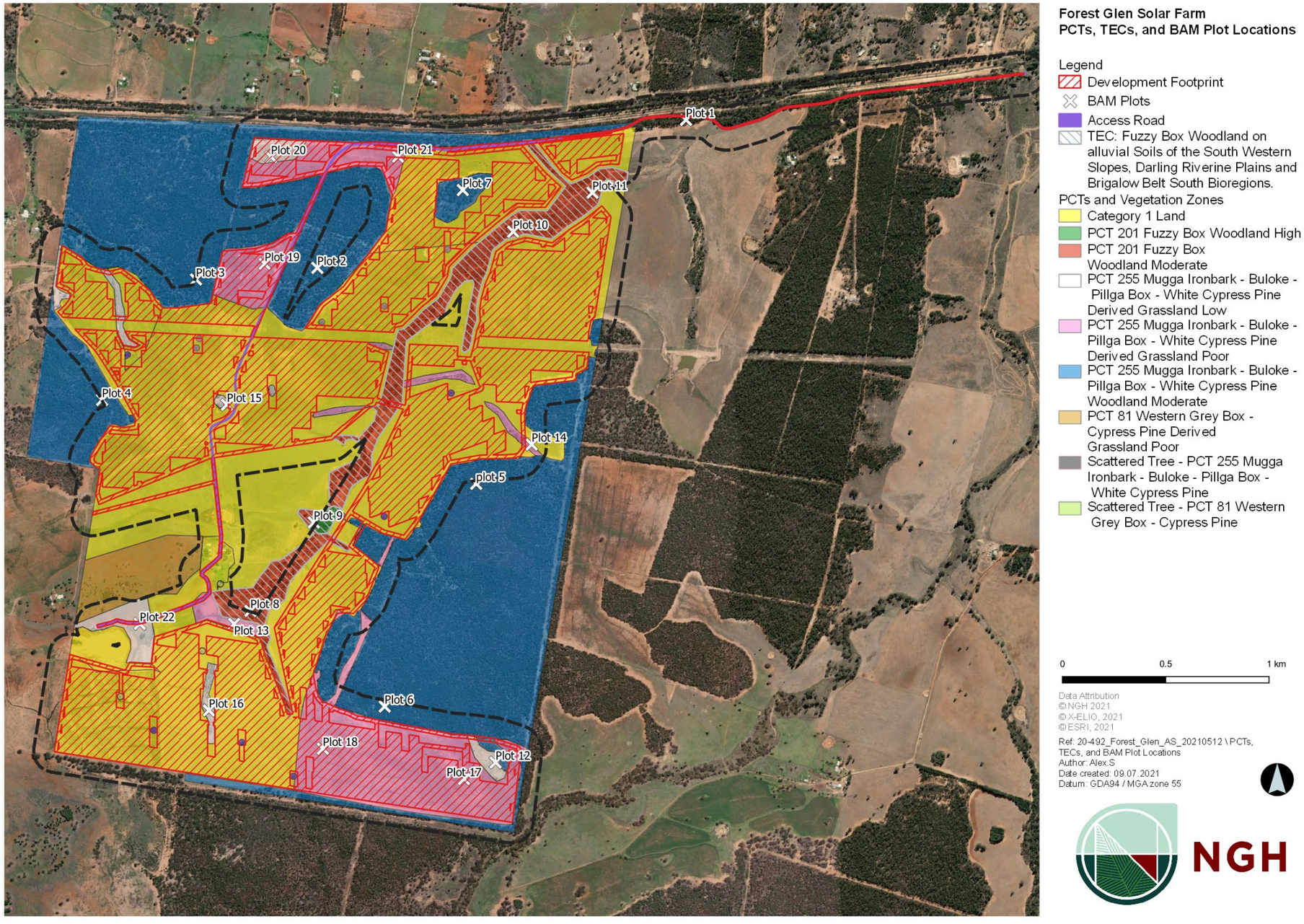
3.3.2 Scattered trees

Scattered trees have been identified as trees that have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type and are on category 2-regulated land and surrounded by category 1-exempt land on the Native Vegetation Regulatory Map under the LLS Act, in accordance with the BAM (2020). All areas that showed a tree canopy connectivity of <50m were classified as a PCT, with individual trees within a broader exotic context being classified as scattered trees. A total of 24 scattered trees were identified within the Development Site (refer to Appendix F). Scattered trees were a mixture of Kurrajong (*Brachychiton populneus subsp. populneus*), White Cypress Pine (*Callitris glaucophylla*), White Cedar (*Melia azedarach*), Blakely's Red Gum (*Eucalyptus blakelyi*), Pilliga box (*Eucalyptus pilligaensis*), Mugga Ironbark (*Eucalyptus sideroxylon*), River Red Gum (*Eucalyptus camaldulensis*), and Buloke (*Allocasuarina luehmannii*). With the exception of White Cedar, which was likely

planted, scattered trees are most likely remnants of the surrounding PCTs identified in the Development Site. One scattered tree is located within the Development Footprint and is expected to be impacted (Table 3-4).

Table 3-4 Summary of scattered tree loss within the Development Footprint

PCT	Species	DBH Category	Number of Trees
255	*Eucalyptus sideroxylon*	>50 cm	1



Forest Glen Solar Farm
PCTs, TECs, and BAM Plot Locations

Legend
- Development Footprint
- BAM Plots
- Access Road
- TEC: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.

PCTs and Vegetation Zones
- Category 1 Land
- PCT 201 Fuzzy Box Woodland High
- PCT 201 Fuzzy Box Woodland Moderate
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Low
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Derived Grassland Poor
- PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine Woodland Moderate
- PCT 81 Western Grey Box - Cypress Pine Derived Grassland Poor
- Scattered Tree - PCT 255 Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine
- Scattered Tree - PCT 81 Western Grey Box - Cypress Pine

0 0.5 1 km

Ref: 20-492_Forest_Glen_AS_20210512 \ PCTs, TECs, and BAM Plot Locations
Author: Alex.S
Date created: 09.07.2021
Datum: GDA94 / MGA zone 55

NGH

Figure 3-8 Vegetation zones and plot locations at the Development Site

3.3.3 Vegetation integrity assessment results

The results of the plot field data can be found in Appendix A.1 and photos of each plot are shown in Appendix A.2. The plot data from the vegetation integrity survey plots were entered into the BAM calculator. The results of the vegetation integrity assessment are provided in Table 3-5.

Table 3-5 Current vegetation integrity scores for each vegetation zone within the Development Site

Zone ID	PCT/Zone	Composition score	Structure score	Function score	Vegetation Integrity Score
1	201_Moderate	84.9	33	47.2	51
2	255_Poor	47.7	23.3	0.2	5.7
3	255_Low	47.7	22.3	50.6	37.6
4	255_Moderate	62.4	28.7	64.4	48.7

4. Threatened Species

4.1 Ecosystem Credit Species

The following ecosystem credit species were returned by the BAM calculator as being associated with the PCTs present within the Development Footprint. These are assumed to occur and contribute to ecosystem credits. Ecosystem credit species which have been excluded from a vegetation zone has been indicated in red, under Associated PCT in Table 4-1. These species have been excluded based on the absence of listed habitat constraints within a vegetation zone, or due to the Development Site being outside of geographic limitations.

Table 4-1 Ecosystem credit species predicted by the BAM-C

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Fauna			
Anthochaera phrygia **Regent Honeyeater (Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus **Dusky Woodswallow**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Calyptorhynchus lathami **Glossy Black-Cockatoo (Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Chalinolobus picatus **Little Pied Bat**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Chthonicola sagittata **Speckled Warbler**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Climacteris picumnus victoriae **Brown Treecreeper (eastern subspecies)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Daphoenositta chrysoptera **Varied Sittella**	255_poor (grassland) 255_low (grassland)	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
	255_moderate (woodland) 201_moderate (woodland)		
Dasyurus maculatus **Spotted-tailed Quoll**	201_moderate (woodland)	Vulnerable	Endangered
Glossopsitta pusilla **Little Lorikeet**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Grantiella picta **Painted Honeyeater**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Vulnerable
Haliaeetus leucogaster **White-bellied Sea-Eagle** **(Foraging)**	201_moderate (woodland)	Vulnerable	Not Listed
Hieraaetus morphnoides **Little Eagle** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Lathamus discolor **Swift Parrot** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Endangered	Critically Endangered
Leipoa ocellata **Malleefowl**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland)	Endangered	Vulnerable
Lophochroa leadbeateri ***Major Mitchell's Cockatoo*** ***(Foraging)***	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Lophoictinia isura **Square-tailed Kite** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Macropus dorsalis **Black-striped Wallaby**	255_poor (grassland) 255_low (grassland) 255_moderate	Endangered	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Melanodryas cucullata cucullata **Hooded Robin (south-eastern form)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Melithreptus gularis gularis ***Black-chinned Honeyeater (eastern subspecies)***	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Miniopterus orianae oceanensis **Large Bent-winged Bat** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Neophema pulchella **Turquoise Parrot**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Ninox connivens **Barking Owl** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Nyctophilus corbeni **Corben's Long-eared Bat**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Pachycephala inornata **Gilbert's Whistler**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland)	Vulnerable	Not Listed
Petroica boodang **Scarlet Robin**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Phascolarctos cinereus **Koala** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Vulnerable
Polytelis swainsonii **Superb Parrot** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland)	Vulnerable	Vulnerable

Common Name	Associated PCT	NSW Listing Status	National Listing Status
	201_moderate (woodland)		
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Pseudomys pilligaensis **Pilliga Mouse**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland)	Vulnerable	Vulnerable
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Stagonopleura guttata **Diamond Firetail**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed
Tyto novaehollandiae **Masked Owl** **(Foraging)**	255_poor (grassland) 255_low (grassland) 255_moderate (woodland) 201_moderate (woodland)	Vulnerable	Not Listed

4.2 Species Credit Species

4.2.1 Species credit species to be assessed

The BAM Calculator predicted the following species credit species to occur within the Development Footprint (Table 4-2 below). Under the BAM, these generate additional species credits unless:

1. They are excluded because habitat constraints required are not present or,
2. Habitat quality is sufficiently degraded such that they could not occur or,
3. Survey effort has demonstrated they are not present.

Criterion 1 and 2 are addressed in the table below, excluding 15 species on this basis.

Table 4-2 Candidate species credit species requiring assessment

Species Credit Species	Habitat constraint and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Criterion 1: Presence of habitat constraints and abundance on site	Criterion 2: Suitable habitat quality and abundance on site	Included or Excluded	Reason for inclusion or exclusion
Anthochaera phrygia Regent Honeyeater (Breeding)	Breeding habitat is geographically restricted – in NSW, breeding areas are confined to two known locations.	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered	Outside of geographically restricted breeding habitat.	N/A	Excluded	Development Site outside of known breeding areas.
Burhinus grallarius Bush Stone-curlew	Inhabits open forest and woodlands with a sparse grassy ground layer. Requires fallen/standing dead timber including logs.	High Sensitivity to Potential Gain	Endangered	Not Listed	Habitat features present in all zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	Requires living or dead hollow bearing trees, where hollow is >15cm in diameter and >5m from ground.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Hollow-bearing trees present within the Development Site.	**N/A**	Included	Hollow-bearing trees present within Development Site and within known distribution.
Cercartetus nanus Eastern Pygmy-possum	Requires dense mid-story.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	N/A	Dense mid-storey absent from all zones within Development Footprint.	Excluded	This species has been excluded based on the absence of dense understorey across the Development Footprint. This species has been detected in a broad range of habitat types. However, habitat suitability is closely aligned with the presence of a dense mid-storey of shrubs, most commonly from the genera Banksia and Hakea. (Harris & Goldingay, 2005; Law et al., 2018), which was absent across the Development Site.
Chalinolobus dwyeri Large-eared Pied Bat	Requires caves (near their entrances), crevices in cliffs, old mine workings to roost.	Very High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Caves and other suitable geological features absent from Development Footprint.	N/A	Excluded	This species has been excluded based on the absence of suitable roosting sites within or near the Development Footprint, specifically caves, crevices in cliffs, and old mine workings.
Commersonia procumbens Commersonia procumbens	Grows on Pilliga sandstone.	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Growing within Pilliga sub-region, with Pilliga sandstone present within Development Footprint.	N/A	Included	Precautionary approach taken as suitable habitat potentially present within Development Site.
Dichanthium setosum Bluegrass	None	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat and associated species present in all zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Digitaria porrecta Finger Panic Grass	None	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat not present within Development Footprint.	N/A	Excluded	Development Site outside of know distribution of species. Additional associated species not present within Development Site.
Diuris tricolor Pine Donkey Orchid	None	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat and associated species present in all zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Requires living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines for breeding.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	No large waterbodies within 1km of Development Footprint.	N/A	Included	Precautionary approach taken as suitable habitat potentially present within Development Site.

Species Credit Species	Habitat constraint and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Criterion 1: Presence of habitat constraints and abundance on site	Criterion 2: Suitable habitat quality and abundance on site	Included or Excluded	Reason for inclusion or exclusion
Hieraaetus morphnoides Little Eagle (Breeding)	Requires live (occasionally dead) large old trees within suitable vegetation for breeding.	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Large trees present within wooded areas throughout Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Homoranthus darwinioides Homoranthus darwinioides	None	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat present in all wooded zones within Development Footprint, however soil likely unsuitable.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Hoplocephalus bitorquatus Pale-headed Snake	Requires high density of hollow-bearing trees (Shelton et al., 2020; Shelton et al., 2021).	High Sensitivity to Potential Gain	Vulnerable	Not Listed	High density of large hollow-bearing trees (generally Red Gums) not present within site.	N/A	Excluded	As found by Shelton et al. (2020), Pale-headed Snake has narrow habitat constraints, requiring a high density of very large hollow-bearing trees (on average >100 years old) in riparian zones. Additionally, Shelton et al. (2021) detected no Pale-headed Snakes within Pilliga Box woodland, with Red Gum forests providing the majority of Pale-headed snake observations (96%). Additionally, the closest record of this species to the Development Site is 150km north-west, in Baradine, NSW. The above factors considered, the Pale-headed Snake has considered unlikely to occur within the Development Site.
Indigofera efoliata Leafless Indigo	None	High Sensitivity to Potential Gain	Endangered	Endangered	Suitable habitat and associated species present in all wooded zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Lathamus discolor Swift Parrot (Breeding)	Breeding habitat is geographically restricted – breeds only in Tasmania.	Moderate Sensitivity to Potential Gain	Endangered	Critically Endangered	Outside of geographically restricted breeding habitat.	N/A	Excluded	Development Site outside of known breeding areas.
Lepidium aschersonii Spiny Peppercress	None	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat not detected within Development Footprint. Soils likely unsuitable and associated species not present.	N/A	Excluded	Suitable habitat not present within Development Site.
Lophochroa leadbeateri Major Mitchell's Cockatoo (Breeding)	Requires living or dead tree with hollows >15cm diameter and >5m above ground. Nests are at least 1km apart, with no more than one pair every 30 square kilometres.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in all zones within Development Footprint. However, likely insufficient water bodies within close proximity.	N/A	Included	Suitable habitat present within Development Site.
Lophoictinia isura Square-tailed Kite (Breeding)	Breeding requires live large old trees within suitable vegetation, nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in all wooded zones within Development Footprint. However, likely insufficient timbered watercourses within close proximity.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Miniopterus orianae oceanensis Large Bent-winged Bat	Caves are the primary roosting/breeding habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed	Caves and other suitable geological features not present within Development Footprint.	N/A	Excluded	This species has been excluded based on the absence of suitable roosting sites within or near the Development Footprint, specifically caves, tunnels, mines and culverts.

Species Credit Species	Habitat constraint and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Criterion 1: Presence of habitat constraints and abundance on site	Criterion 2: Suitable habitat quality and abundance on site	Included or Excluded	Reason for inclusion or exclusion
(Breeding)	on a maternity cave that is used annually in spring and summer for the birth and rearing of young.							
Monotaxis macrophylla Large-leafed Monotaxis	None	High Sensitivity to Potential Gain	Endangered	Not Listed	Habitat potentially suitable, though is unlikely to be present due to the absence of recent fire within the Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Ninox connivens Barking Owl (Breeding)	Breeding requires living or dead trees with hollows >20cm diameter and > 4m above the ground.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in all zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Petaurus norfolcensis Squirrel Glider	None	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present within all wooded PCTs, however likely insufficient number of large hollows required for persistence within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Petrogale penicillata Brush-tailed Rock-wallaby	Requires land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines.	Very High Sensitivity to Potential Gain	Endangered	Vulnerable	Required land forms not present within Development Footprint.	N/A	Excluded	This species has been excluded based on the absence of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops, and cliff lines within 1 km of the Development Footprint.
Phascolarctos cinereus Koala (Breeding)	Breeding requires areas identified as important habitat, defined by the density of koalas and quality of habitat (determined by survey).	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat present in all wooded zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Polytelis swainsonii Superb Parrot (Breeding)	Breeding requires living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera,* or *E. intertexta* with hollows > 5 cm diameter, > 4m above ground, or trees with a DBH of greater than 30cm.	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat and associated important breeding trees present within Development Footprint	N/A	Excluded	This species requires hollow-bearing trees with hollows greater than 4 cm diameter and greater than 4m above the ground for breeding. Suitable hollows were detected onsite; however, these are not to impacted by the proposed development. Additionally, diurnal avifauna surveys conducted for other species met the survey requirements for this species and did not identify any individuals.
Prasophyllum sp. Wybong *Prasophyllum sp. Wybong*	None	Moderate Sensitivity to Potential Gain	Not Listed	Critically Endangered	Known to occur in open eucalypt woodland and grassland, which are present within the Development Site.	N/A	Included	Development Site not within known distribution for species but is within predicted range. Species habitat requirements are not well defined, as such a precautionary approach has been taken to assume suitable habitat present within site.
Pteropus poliocephalus *Grey-headed Flying-fox* *(Breeding)*	Breeding habitat is restricted to known breeding camps.	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	No breeding camps present within the Development Site.	N/A	Excluded	No breeding camps present within the Development Site.
Pterostylis cobarensis Greenhood Orchid	None	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in all wooded zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.

Species Credit Species	Habitat constraint and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Criterion 1: Presence of habitat constraints and abundance on site	Criterion 2: Suitable habitat quality and abundance on site	Included or Excluded	Reason for inclusion or exclusion
Swainsona murrayana *Slender Darling Pea*	None	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Absence of appropriate soils (heavy clay-based) and associated species.	N/A	Excluded	This species is associate with heavy clay-based soils, primarily cracking clays. This species grows in vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. None of these habitat features were identified within the Development Site.
Swainsona sericea Silky Swainson-pea	None	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in all wooded zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Tylophora linearis Tylophora linearis	None	High Sensitivity to Potential Gain	Vulnerable	Endangered	Suitable habitat present in all wooded zones within Development Footprint.	N/A	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Tyto novaehollandiae Masked Owl (Breeding)	Hollow bearing trees Living or dead trees with hollows greater than 20cm diameter	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Hollow-bearing trees present within the Development Site.	N/A	Excluded	Hollow-bearing trees present within Development Site and within known distribution.
Vespadelus troughtoni Eastern Cave Bat	Caves Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds."	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed	Caves and other suitable geological features not present within Development Footprint.	N/A	Excluded	This species has been excluded based on the absence of suitable roosting sites within or near the Development Footprint, specifically caves, overhangs, escarpments, outcrops, crevices, and boulder piles.

4.2.2 Candidate species requiring surveys (confirmation of presence or absence)

As they could not be excluded on the basis of criterion 1 or 2 in the section above, the following species require survey in accordance with the BAM and other relevant guidelines or must be assumed to occur and generate credits. Table 4-3 summarises whether each species was detected during surveys and if so the area of habitat that would be impacted by the proposal and therefore are required to be offset. Details regarding the targeted surveys undertaken are provided in Section 4.2.3.

Table 4-3 Summary of species credit species surveyed at the Development Site

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey	Present on site?	Species polygon area or count
Burhinus grallarius *Bush Stone-curlew*	2	Surveyed – not present	No	N/A
Commersonia procumbens Commersonia procumbens	2	Surveyed – not present	No	N/A
Dichanthium setosum Bluegrass	2	Surveyed – not present	No	N/A
Diuris tricolor Pine Donkey Orchid	1.5	Surveyed – not present	No	N/A
Haliaeetus leucogaster White-bellied Sea-Eagle	2	Surveyed – not present	No	N/A
Hieraaetus morphnoides Little Eagle	1.5	Surveyed – not present	No	N/A
Homoranthus darwinioides Homoranthus darwinioides	2	Surveyed – not present	No	N/A
Indigofera efoliata Leafless Indigo	3	Surveyed – not present	No	N/A
Lophochroa leadbeateri Major Mitchell's Cockatoo	2	Surveyed – not present	No	N/A
Lophoictinia isura Square-tailed Kite	1.5	Surveyed – not present	No	N/A
Monotaxis macrophylla Large-leafed Monotaxis	2	Surveyed – not present	No	N/A
Ninox connivens *Barking Owl*	2	Surveyed – not present	No	N/A
Petaurus norfolcensis Squirrel Glider	2	Surveyed – not present	No	N/A
Phascolarctos cinereus	2	Surveyed – not present	No	N/A

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey	Present on site?	Species polygon area or count
Koala				
Polytelis swainsonii *Superb Parrot* *(Foraging)*	2	Surveyed – not present	No	N/A
Prasophyllum sp. Wybong *Prasophyllum sp. Wybong*	3	Surveyed – not present	No	N/A
Pterostylis cobarensis Greenhood Orchid	2	Surveyed – not present	No	N/A
Swainsona sericea Silky Swainson-pea	2	Surveyed – not present	No	N/A
Tylophora linearis Tylophora linearis	2	Surveyed – not present	No	N/A

4.2.3 Candidate species survey and results

Diurnal avifauna (White-bellied Sea-Eagle, Little Eagle, Major Mitchell's Cockatoo, Square-tailed Kite, Superb Parrot (EPBC Foraging))

Survey effort

Diurnal bird surveys were conducted by 2 ecologists over 4-days in November 2020, in accordance with 'Threatened biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft' (DEC, 2004) and EPBC 'Survey guidelines for Australia's threatened birds' (Department of Environment, Water, Heritage and the Arts, 2020). Surveys were conducted immediately following sunrise, for a duration of 30 minutes, for a total of 40 person hours. All hollow-bearing trees within the Development Site were investigated for their suitability as habitat for Glossy Black-Cockatoo, Major Mitchells Cockatoo, and Superb Parrot.

Survey results

Diurnal bird surveys and incidental observations identified one threatened diurnal bird species, Grey Crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*). This species is an ecosystem credit species and does not require additional offsets. A total of 40 person hours of bird surveys were conducted.

In relation to Glossy Black-Cockatoo, 2 HBTs with potentially large enough hollows were identified within the Development Site, however neither met the requirements of GBC nest trees. That is, neither was 5+ m above the ground, and only 1 was at a suitable angle (although hollow was occupied by a Cockatiel). Neither of these HBTs are proposed to be impacted by the development and both are in roadside vegetation currently exposed to regular local traffic. Further, the absence of Drooping Sheoak within close proximity to both HBTs likely limits the suitability of the area for nest trees (Crowley et al., 1998).

In relation to Major Mitchells Cockatoo, 8 HBTs with potentially suitable hollows were identified within the Development Site, however this species was not identified through surveys and is not considered present within the Development Site.

In relation to Superb Parrot, 8 HBTs with potentially large enough hollows were identified within the Development Site, however none were preferred breeding tree species. Additionally, this species was not identified through surveys and is not considered present within the Development Site.

Nocturnal avifauna (Bush Stone-curlew, Barking Owl)

Survey effort

Nocturnal bird surveys were conducted by 2 ecologists over 4 nights in November 2020, in accordance with 'Threatened biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft' (DEC, 2004) and EPBC 'Survey guidelines for Australia's threatened birds' (Department of Environment, Water, Heritage and the Arts, 2020) (Figure 4-1).

Call playback surveys were conducted for 4nights directly after sunset, with Bush Stone-curlew, Masked Owl and Barking Owl calls played for a minimum of 5-minutes each per night, followed by a minimum of 20 minutes listening for return calls. Pre-recorded calls were played at full volume through a 23W transistor megaphone to maximise coverage.

Stag watches were undertaken by 2 ecologists over 2 evenings at sunset for 3 person hours, targeting large trees in wooded areas. 1000 lumen torches were used to inspect large trees from within 10m of base, over 1-hour periods.

Spotlighting was undertaken over 2 nights by 2 ecologists for 3 person hours, targeting wooded areas. Linear traverses were conducted using 1000 lumen torches to inspect habitat from within 10m of base, over 1-hour periods.

All hollow-bearing trees within the Development Site were investigated for their suitability as habitat for Barking Owl and Masked Owl.

Survey results

No response calls were detected through call-playback surveys. No threatened nocturnal avifauna were detected within the Development Site through Stagwatches or Spotlighting.

In relation to hollow-dependent nocturnal avifauna (Masked Owl and Barking Owl), 1 tree within the Development Site was identified as having potential to meet this size requirement, however this hollow likely has insufficient depth to support a nesting Masked Owl. This HBT is not proposed to be impacted by the development and is positioned alongside a road which is regularly exposed to local traffic.

Mammals (Squirrel Glider, Koala)

Survey effort

Threatened mammal survey techniques were implemented in accordance with 'Threatened biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft' (DEC, 2004).

Call playback surveys were conducted for 4 nights directly after sunset, with Squirrel Glider and Koala calls played for a minimum of 5-minutes each per night, followed by a minimum of 20 minutes listening for return calls. Pre-recorded calls were played at full volume through a 23W transistor megaphone to maximise coverage.

Stag watches were undertaken by 2 ecologists over 2 evenings at sunset for 3 person hours, targeting large trees in wooded areas. 1000 lumen torches were used to inspect large trees from within 10m of base, over 1-hour periods.

Spotlighting was undertaken over 2 nights by 2 ecologists for 3 person hours, targeting wooded areas. Linear traverses were conducted using 1000 lumen torches to inspect habitat from within 10m of base, over 1-hour periods.

Two SAT surveys were conducted to detect the presence of Koalas within the Development Site in accordance with SAT guidelines (Phillips & Callaghan, 2011).

Survey results

No response calls were detected through call-playback surveys. No threatened fauna were detected within the Development Site through Stagwatches or Spotlighting. No signs of Koala (scratch marks or scat) were detected through SAT surveys.

Threatened Flora (Commersonia procumbens, Bluegrass, Homoranthus darwinoides, Leafless Indigo, Spiny, Peppercress, Large-leafed Monotaxis, Pterostylis cobarensis, Silky Swainson-pea, Tylophora linearis)

Survey effort

Parallel field traverses were conducted across 5-days in November (09/11/2020- 13/11/2020) to detect threatened flora in accordance with Section 4 of 'Surveying Threatened Plants and Their Habitats', DPIE 2020. Required survey effort was determined using the survey effort equation defined in Surveying Threatened Plants and Their Habitat (DPIE, 2020), which resulted in 7 person hours traverse in PCT 255 and 4 person hours traverse in PCT 201.

Survey results

No candidate threatened flora were detected through parallel field traverses.

4.2.4 Weather

Weather conditions recorded for these dates from the Bureau of Meteorology (BOM) at the Dubbo Airport Weather AWS (ID: 065070) Station are presented in Table 4-4.

Table 4-4 Weather summary

Survey Date	Maximum temperature (ºC)	Minimum temperature (ºC)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Surveys undertaken
09/11/2020	27	10	40	0 mm, 33.6 mm in previous 14-days	10	• Call-playback – Nocturnal Avifauna and Mammals • Parallel field traverse for threatened flora • Stag watch for nocturnal fauna • Spotlighting for nocturnal fauna.
10/11/2020	28	12	31	0 mm, 21.2 mm in previous 14-days	22	• Call-playback • Diurnal bird survey • Parallel field traverse for threatened flora.
11/11/2020	32	14	25	0mm, 12.4 mm in previous 14-days	18	• Call-playback • Diurnal bird survey • Koala SAT survey

Survey Date	Maximum temperature (ºC)	Minimum temperature (ºC)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Surveys undertaken
						• Parallel field traverse for threatened flora.
12/11/2020	29	18	38	0mm, 12.4 mm in previous 14-days	28	• Call-playback • Diurnal bird survey • Koala SAT survey • Parallel field traverse for threatened flora • Stag watch for nocturnal fauna • Spotlighting for nocturnal fauna.
13/11/2020	28	16	60	0mm, 8.6 mm in previous 14-days	18	• Diurnal bird survey • Koala SAT survey • Parallel field traverse for threatened flora.

4.2.5 Further survey recommendations

All candidate species credit species can be assumed absent from the Development Footprint in accordance with the BAM.

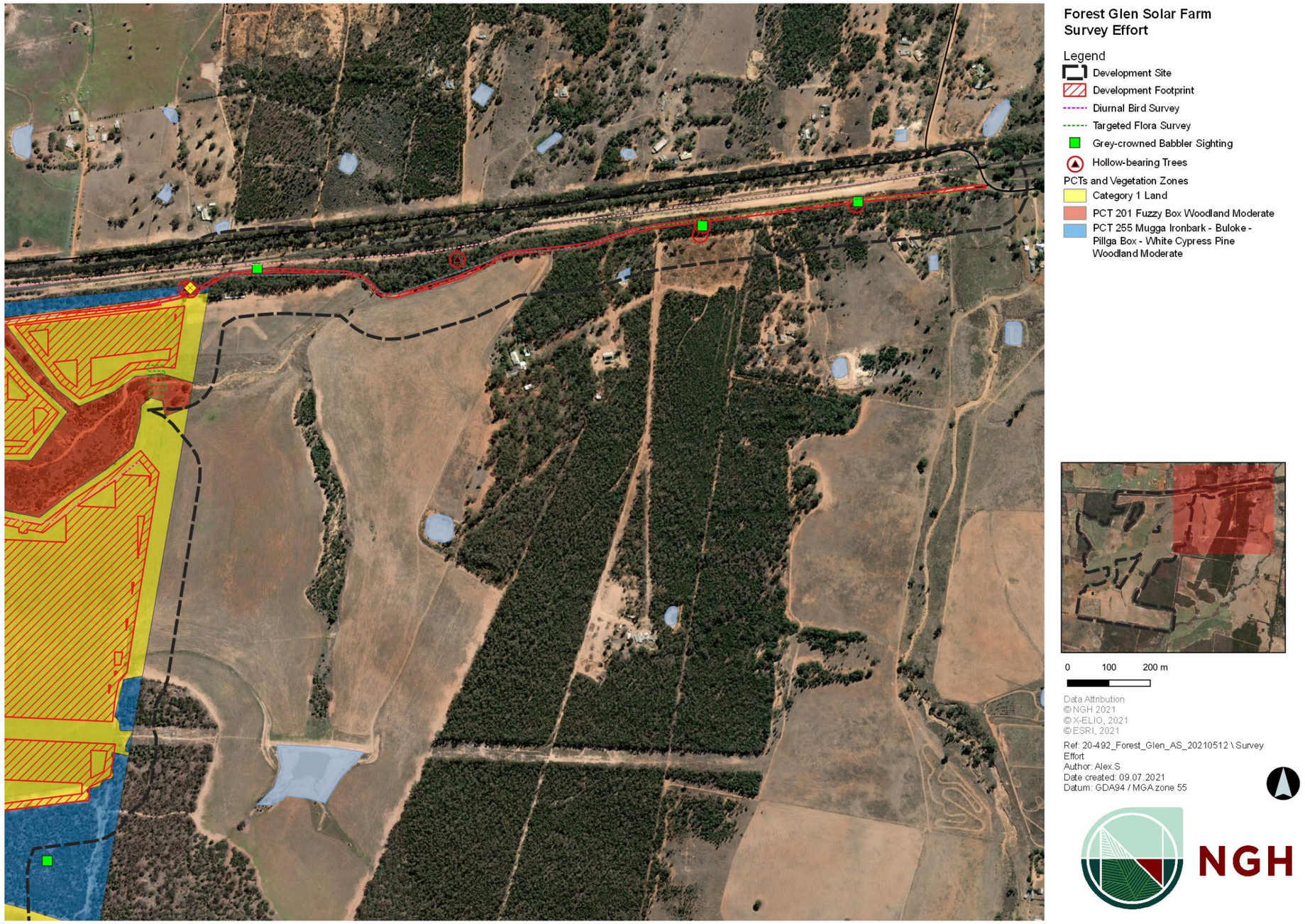


Figure 4-1 Survey effort and targeted survey locations map 1 of 5

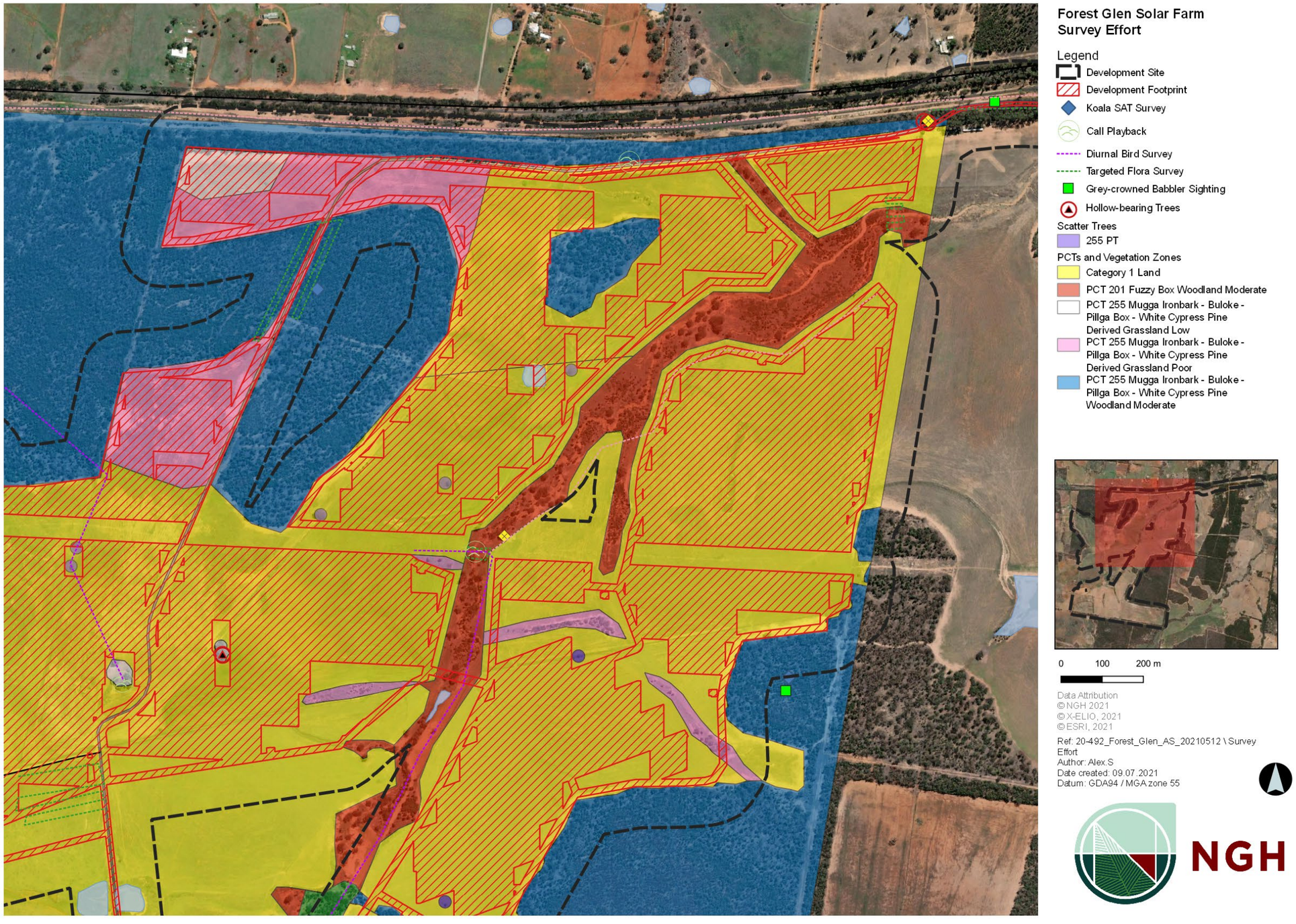


Figure 4-2 Survey effort and targeted survey locations map 2 of 5

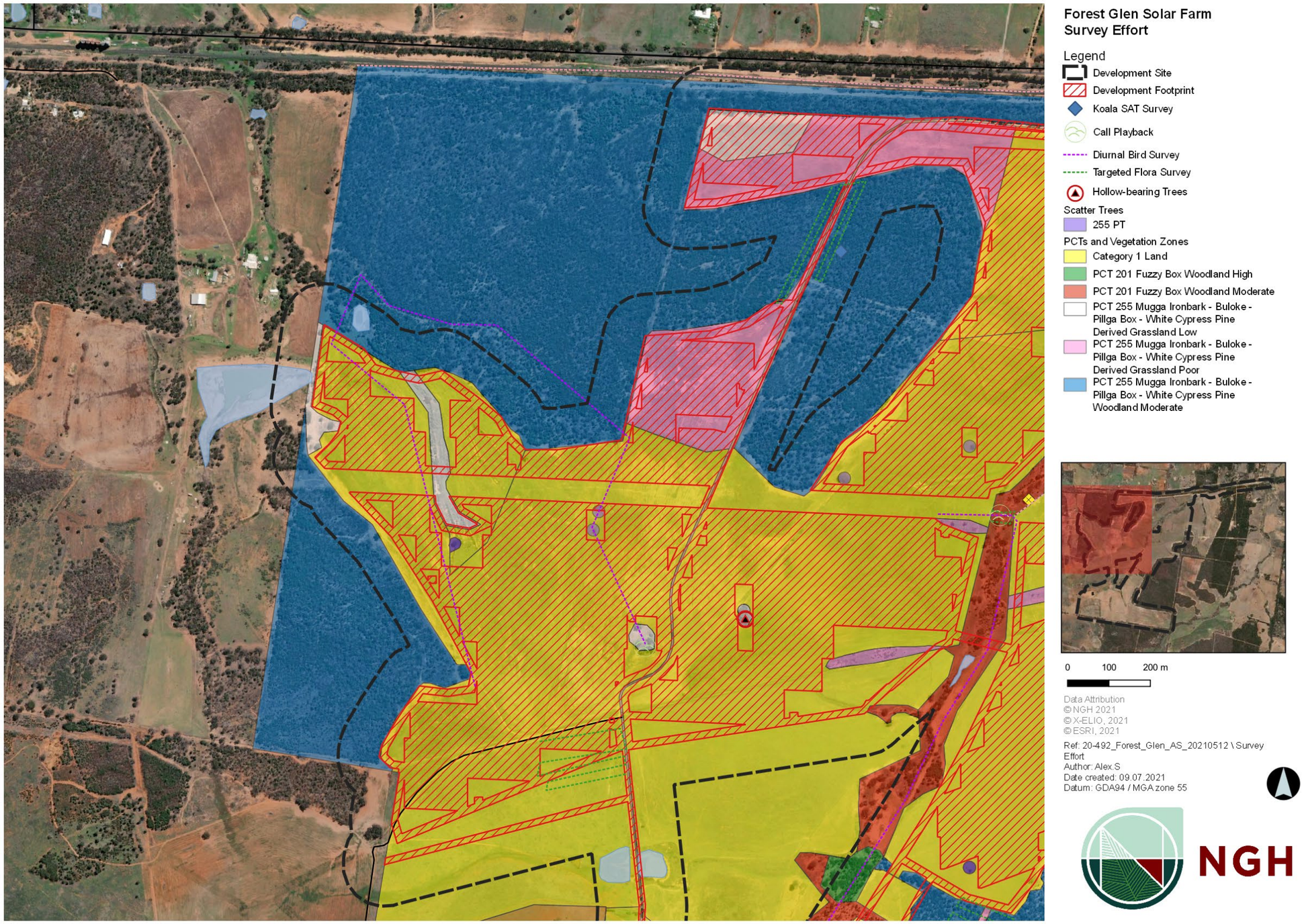


Figure 4-3 Survey effort and targeted survey locations map 3 of 5

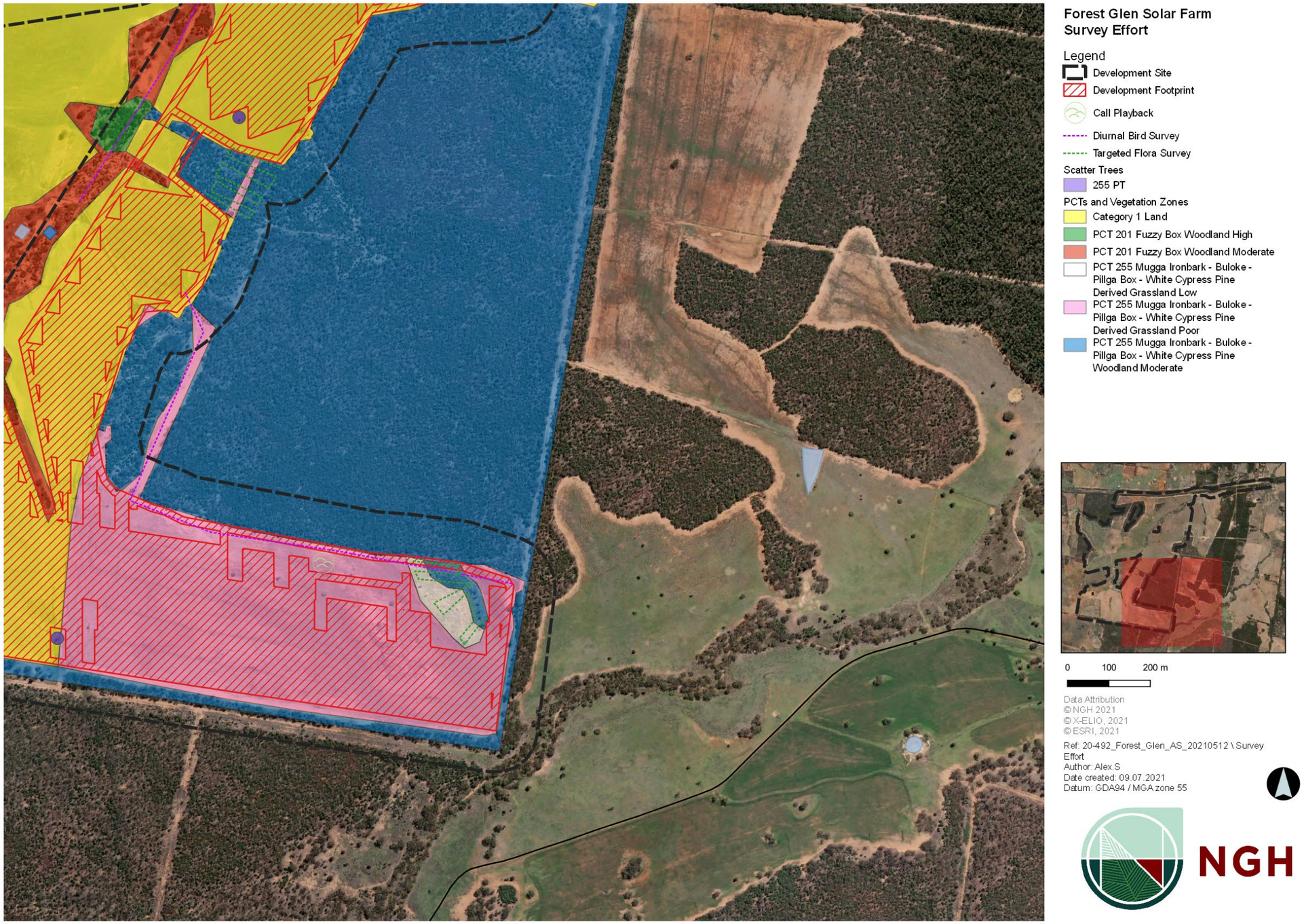


Figure 4-4 Survey effort and targeted survey locations map 4 of 5

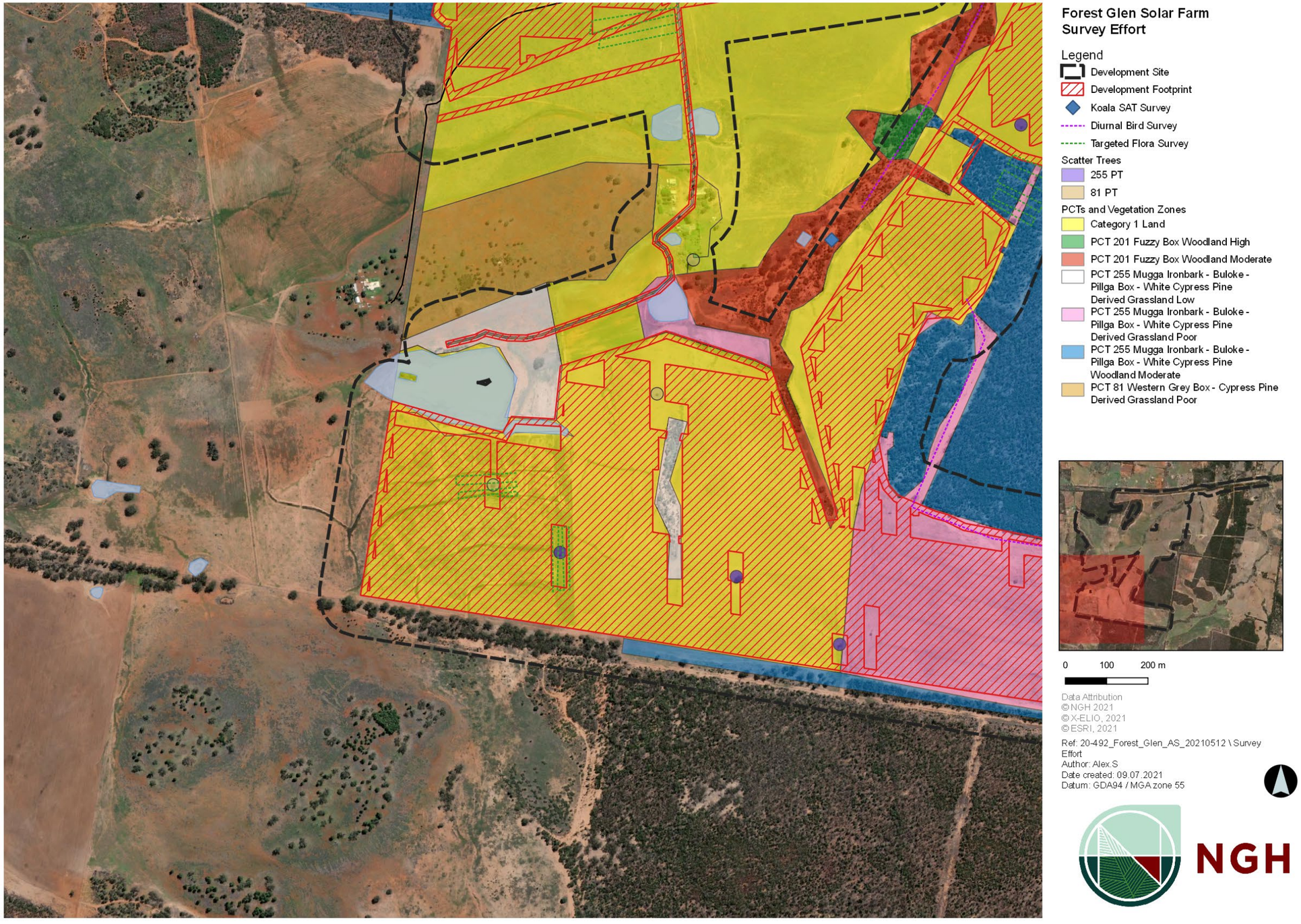


Figure 4-5 Survey effort and targeted survey locations map 5 of 5

4.3 Additional Habitat Features Relevant to Prescribed Biodiversity Impacts

4.3.1 Occurrences of karst, caves, crevices and cliffs

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

4.3.2 Occurrences of rock

No rocky outcrops were observed within the Development Site.

4.3.3 Occurrences of human made structures and non-native vegetation

No human made structures occur within the Development Footprint, however one house is within the Development Site.

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

The existing surface water environment within the proposal site is characterised by eight dams, one minor 2nd order unnamed drainage line and six 1st order unnamed tributaries (Figure 2-2). The dams are located mostly along the watercourses that traverse the site. The largest dam on site has a footprint of approximately 5.9ha and is located in the southwest of the site. The waterways within the northern portion (2nd order unnamed drainage line and two 1st order streams) of the proposal site are well vegetated (riparian) with stable banks. The 2nd order unnamed drainage line become highly disturbed midway within the proposal site, the riparian vegetation become sparse, and banks are eroded (2nd order drainage line in the south, Figure 2-2). No aquatic vegetation was observed onsite in any of the waterways. The predominate groundcover of the site is mixed pasture for grazing. All watercourses within the proposal site would be described as ephemeral and would only contain flowing water during and shortly after rainfall events. A site inspection on 8 December 2020 found all watercourses onsite contained pools of water but were not flowing. All dams were at capacity. The landowner currently uses the water available onsite for agricultural properties.

Safeguarding and mitigation measures for watercourses and hydrology, and water use, and water quality are detailed in Section 8.2.4 and Section 8.3.3 of the Forest Glen Solar Farm Environmental Impact Statement (NGH, 2021). Given the implementation of these measures, impacts to hydrological processes are deemed manageable.

5. Matters of National Environmental Significance

An EPBC Act Protected Matters Report was undertaken on the 19/11/2020 (10 km buffer of the Development Site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the Development Site (Appendix G). Relevant to biodiversity these include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species.

The potential for these MNES to occur at the site are discussed below.

5.1 Wetlands of International Importance

Four wetlands of international importance were returned from the Protected Matters Report. The nearest of these (within 200km of the Development Site) is the Macquarie Marshes. All other wetlands returned from the search are >700km away. The Macquarie Marshes occurs approximately 150-200 km upstream, north west of the Development Site. The area obtains water from flooding of the lower Macquarie River and its streams. There is no apparent connectivity between the Development Site and the Macquarie River.

5.2 Threatened Ecological Communities

Six threatened ecological communities were found in the protected matters report. These were:

- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered)
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered)
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Critically Endangered)
- Poplar Box Grassy Woodland on Alluvial Plains (Endangered)
- Weeping Myall Woodlands (Endangered)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered).

None of these three threatened ecological communities were identified within the Development Footprint. No other Commonwealth listed TECs were identified within the Development Footprint.

5.3 Threatened Species

Twenty-nine threatened species were returned from the Protected Matters Report: 10 birds, 4 fish, 5 mammals, 1 reptile and 9 plants. Of these species, 7 species were considered to have the potential to utilise the habitats within the Development Footprint (see Table 5-1 for species with potential to occur within the Development Footprint and Appendix H for habitat evaluation for EPBC listed species).

Nine listed migratory species were returned from the protected matters report. None of these species are considered likely to occur onsite (see Appendix H for habitat evaluation for EPBC listed species).

Table 5-1 EPBC listed fauna with potential to occur within Development Footprint

Fauna Species	Result
Regent Honeyeater (*Anthochaera phrygia*) – Critically endangered	Assumed present. AoS determined non-significant impact given relatively low impact on suitable foraging habitat.
Swift Parrot (*Lathamus discolor*)	Assumed present. AoS determined non-significant impact given relatively low impact on suitable foraging habitat.
Spot-tailed Quoll (*Dasyurus maculatus maculatus*)	Assumed present. AoS determined non-significant impact given absence of suitable denning habitat and relatively low impact on foraging habitat within Development Footprint.
Corben's Long-eared Bat (*Nytcophilus corbeni*)	Assumed present. AoS determined non-significant impact given relatively low impact on suitable habitat.
Grey-headed Flying Fox (*Pteropus poliocephalus*)	Assumed present. AoS determined non-significant impact given relatively low impact on suitable foraging habitat.

6. Avoid and Minimise Impacts

6.1 Avoiding and Minimising Impacts on Native Vegetation and Habitat

6.1.1 Site selection – consideration of alternative locations/routes

The Forest Glen SF site was selected after an extensive review of alternative sites by the proponent. The proposed sites were considered in accordance with DPIE's Large Scale Solar Energy Guideline for SSD 2018, which provides recommendations regarding selection of suitable proposal sites and areas of constraint that should be identified.

The proposal site's evaluation in terms of the Large-Scale Solar Energy Guideline for SSD 2018 (DPIE) described in Table 6-1 below.

Table 6-1 Evaluation of preferable conditions associated with the proposal site.

Preferable Site Condition	Observation
Optimal solar resources	The site has a high solar exposure measuring 10.5MJ/m2 (June) to 29.4MJ/m2 (December) (BOM, 2020).
Suitable land	The proposal site is located within the proposed Central West Orana REZ and the following suitable land characteristics: • Large areas of low biodiversity value: the solar farm maximises the use of extensive existing areas of disturbance and modification from past clearing and agricultural activities. Most of the site is Category 1 land. • Mostly flat to undulating land and well screened. • The land is not mapped as Biophysical Strategic Agricultural Land (BSAL). • The site has already been cleared and heavily disturbed by grazing within the proposed development areas. • The site is a large lot under one landholding.
Capacity to rehabilitate	Proposal would involve minimal site disturbance and has potential to improve land by giving the site a rest from grazing. Once the solar farm reaches the end of its operational life, the site can be remediated to its existing condition so that grazing and occasional cropping can be resumed.
Community support	Community consultation has been undertaken as part of the proposal and feedback has been considered within this EIS. During the consultation process no concerns regarding the project have been raised.
Proximity to electrical network	An existing Essential Energy 132 kV transmission line traverses the proposal site and would be used as the grid connection between the proposed solar farm and the national electricity grid. Which means the that the connection to the high voltage network can be made onsite

Preferable Site Condition	Observation
	without the need to construct any transmission lines. It also reduces the distribution loss factor risk. Forest Glen SF would connect to Essential Energy´s 132 kV which is between the Dubbo South Zone and Narromine Substation. The Dubbo South substation is located approximately 13km to the east of the site.
Connection capacity	The proposal site is located within the proposed Central West Orana REZ. The Central-West Orana region has been selected as a pilot REZ as it benefits from relatively low transmission build costs due to its proximity to the existing backbone transmission network, and it has a strong mix of energy resources. The CWO REZ is to be 'shovel ready' by the end of 2022 (NSW Government, 2020). Connection to the national grid does not require additional power lines as the proposal would connect via an existing 132kV transmission line that traverses the northern section of the site. This reduces the potential for limiting ground clearance and impacting on safe movement of agricultural machinery. Essential Energy's infrastructure network has the capacity to absorb the total output of the solar farm and deliver it anywhere in the network.

6.1.2 Proposal planning phase – detailed design

The proposed Development Footprint layout has been located and designed to avoid and minimise impacts to native vegetation as much as practical. Early-stage designs included the clearing of large sections of PCT 255 woodland and PCT 201 Riparian woodland. Detailed surveys conducted by NGH identified these areas as having high biodiversity value and identified potential habitat for Regent Honeyeater (Large Mugga Ironbarks). In response to these findings, X-ELIO altered the design to be located almost entirely within existing cleared Category-1 land.

Where features that affect the assessment or offset obligation are currently avoided, these are carried over as recommendations for avoidance in this report and in the EIS. They are shown as 'Biodiversity Exclusion Areas' and the project commits to avoid these areas (refer to Figure 10-1). Exclusion zones are not proposed in CAT-1 land or Zone 2 (PCT 255_Poor), as these areas do not generate an offset requirement. This provides certainty in terms of the assessment's approach, and clear guidance for contractors, in the developing a complying final infrastructure layout.

The final Development Footprint first avoids impacts to biodiversity by avoiding Category 2 land as much as practical, then minimises impacts through design to concentrate development in areas of poor and low condition Category 2 land. The Forest Glenn Solar Farm:

- **Avoids** impacts to biodiversity through site selection and design, utilizing existing cleared Category 1 land where possible and practical.
- **Minimises** impact through:
    - Design, utilising existing roads and tracks where possible and practical.
    - Specific mitigations strategies developed to reduce residual risks to biodiversity (refer to Section 8).
    - Commitment to avoiding impacts to biodiversity values through Biodiversity Exclusion Areas (Figure 10-1).

7. Impacts Unable to be Avoided

7.1 Direct Impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts, such as habitat clearance (and associated noise and disturbance) and ongoing existence of infrastructure (which may create barriers to movement and generate noise and disturbance). These are summarised in Table 7-1.

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

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence
Direct impacts					
Clearing for Development Footprint	A total of 308.77 ha, of which 255.52 ha are Category 1 land.	One off event	Construction (permanent impact)	• PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions – 0.37 ha.	Total loss of: • 0.37 ha of PCT 201 moderate condition • 48.08 ha PCT 255 poor condition • 3.22 ha of PCT 255 low condition • 1.53 ha PCT 255 moderate condition • 255.52 ha Category 1 exempt land
Displacement of resident fauna from vegetation clearing	A total of 308.77 ha, of which 255.52 ha are Category 1 land.	One off event	Construction (permanent impact)	• PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions – 0.37 ha.	Displacement to native fauna through vegetation clearing expected to only impact on small common ground dwelling mammals (e.g. native mice and rats), reptiles and possibly common birds relying on tree canopies for nesting sites.
Injury or death of fauna	A total of 308.77 ha, of which 255.52 ha are Category 1 land.	one-off event	Construction	• PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions – 0.37 ha	Possible loss of native fauna expected to only be on small common ground dwelling mammals (i.e. native mice and rats) and reptiles. These species are however mobile and are likely to vacate the Development Footprint into adjacent habitats.

7.1.1 Changes in vegetation integrity scores

The clearing proposed will general reduce the vegetation integrity scores in three zones to zero, as shown in Table 7-2 below.

Table 7-2 Current and future vegetation integrity scores for each vegetation zone within the Development Site

Zone ID	PCT/Zone	EEC and/or threatened species habitat?	Area Impacted (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	201_Moderate	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	0.37	51	0
2	255_Poor	N/A	48.08	5.7	0
3	255_Low	N/A	3.22	37.6	0
4	255_Moderate	N/A	1.53	48.7	0

7.1.2 Loss of species credit species habitat or individuals

As all species credit species have been ruled out, no loss of species credit species individuals or habitat is expected.

7.1.3 Loss of hollow-bearing trees

A total of 8 hollow-bearing trees (HBT's) were identified within the Development Site, including 4 along Delroy Road, which is the main access road entering the site (see Figure 3-2). None of these trees are expected to be directly impacted by the works.

As any ground survey is not confident to detect 100% of HBTs, a mitigation strategy is included for this project that if additional HBT's are identified within the Development Footprint, these would be buffered for avoidance (2 x drip line) or offset calculations updated. Additionally, any HBT clearing would be avoided as much as possible and if they need to be removed qualified ecologists are contacted prior to clearing.

7.1.4 Loss of scattered trees

A total of 25 scattered trees (excluding hollow-bearing trees) were identified within the Development Site (see Figure 3-2). Scattered trees have been buffered by 15m (in addition to 5m infrastructure footprint buffer) to ensure roots are not impacted by the development. Under these conditions, one scattered tree is expected to be impacted by the Development Footprint (see Table 7-3).

Table 7-3 Summary of scattered tree loss within the Development Footprint

PCT	Species	DBH Category	Number of Trees
255	*Eucalyptus sideroxylon*	>50 cm	1

7.2 Indirect Impacts

Indirect impacts of the proposal are anticipated during construction and operation. During construction, these include potential for soil and water contamination, generation of dust, light or noise. These are generally considered to be highly manageable and affect minimal additional impact areas temporarily. Note:

- A 5m buffer for constructability[1] has been included within the Development Footprint
- Areas within 50m of the construction program may be adversely affected by construction noise and disturbance. The program would roll out across the site such that no areas are considered likely to be impacted for the full construction program of 12-18 months.

Once operational, fences and additional tracks may fragment and create of barriers between habitat and affect fauna movement. Table 7-4 details the type, frequency, intensity, duration and consequence of the direct and indirect impacts of the proposal.

[1] This ensures the development footprint impact areas include all areas of physical ground disturbance required to construct the project; environmental control installation, vehicle movements, laydowns areas etc.

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

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Large patches of native vegetation to the south (approximately 250 ha) and east (approximately 250 ha) of the Development Site. Thin linear patches of native vegetation to the north and west of the site. PCT 81 (Western Grey Box - cypress pine shrub grass shrub tall woodland) adjacent to south-western corner of Development Footprint.	Rare	Operational phase: Long-term.	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Potential impacts to connectivity for fauna between patches on native vegetation. The risk of such impacts is considered low, as the site does not contain contiguous vegetation linking patches and the proposed clearing of native vegetation is minimal, with large patches being retained.
Reduced viability of adjacent habitat due to edge effects	Large patches of native vegetation to the south (approximately 250ha) and east (approximately 250ha) of the Development Site. Thin linear patches of native vegetation to the north and west of the site. PCT 81 (Western Grey Box - cypress pine shrub grass shrub tall woodland) adjacent to south-western corner of Development Footprint.	Rare	Operational phase: Long-term.	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Impacts to viability of adjacent habitat due to edge effects is considered very low, due to the Development Footprint largely following existing vegetation shape. I.e., limited increases in edges.
Reduced viability of adjacent habitat due to increased noise	Large patches of native vegetation to the south (approximately 250 ha) and east (approximately 250 ha) of the Development Site. Thin linear patches of native vegetation to the north and west of the site.	Rare	Construction Phase: Short – term.	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	• Disturbances to native fauna through excessive dust, noise and light during construction.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
	PCT 81 (Western Grey Box - cypress pine shrub grass shrub tall woodland) adjacent to south-western corner of Development Footprint.				
Transport of weeds and pathogens from the site to adjacent vegetation	Approximately 3 km of PCT 255 moderate condition along Delroy Rd and 2 km of PCT 255 moderate condition along the southern border of the Development Site.	Irregular	Construction and operation: long-term	N/A	The introduction of new weed outbreaks and pathogens on surrounding habitat as a result of the development is considered manageable. Spread of weeds and pathogens will be limited by restricting the use of vehicles to roads. There is a remaining risk of weed and pathogen spread by the addition of new roads within the site.
Increased risk of starvation, exposure and loss of shade or shelter	0.37 ha of PCT 201 moderate condition 1.53 ha of PCT 255 moderate condition	Rare	Construction Phase: Short-term.	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Loss of woodland habitat presents the risk of starvation, exposure and loss of shade or shelter for resident fauna. This risk is minimised by mitigation measures described in Section 8.1.
Loss of breeding habitat	N/A	Rare	Construction Phase	N/A	No threatened species credit species have been identified within the Development Footprint. Additionally, no breeding habitat (e.g. hollows, rocky outcrops, caves, termite mounds) has been identified within the Development Footprint. As such, no loss of breeding habitat for threatened species is expected as a result of the development.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Trampling of threatened flora species	N/A	Rare	Construction and operation	It is unlikely that any threatened flora exists within the Development Footprint	Moderate impact if there are threatened flora within the areas required to be fenced, however none were detected onsite.
Inhibition of nitrogen fixation and increased soil salinity	N/A	Rare	Operation Phase	N/A	It is unlikely that any adverse impact on soil microbial life and soil salinity will be made through the development and on-going operation. There is strong argument that by reducing the agricultural management intensity and providing microclimates beneath the arrays, that soil health and the persistence of ground cover throughout the year will improve.
Fertilizer drift	Large patches of native vegetation to the south (approximately 250 ha) and east (approximately 250 ha) of the Development Site. Thin linear patches of native vegetation to the north and west of the site. PCT 81 (Western Grey Box - cypress pine shrub grass shrub tall woodland) adjacent to south-western corner of Development Footprint.	Rare	Operation Phase	N/A	Unlikely to impact on-site PCTs and surrounding vegetation, as no fertilizer application is expected as a result on the development.
Rubbish dumping	Entire site and surrounding vegetation.	Rare	Construction Phase: Short-term.	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Contamination of surrounding habitat with rubbish associated with construction if this is not managed.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Wood collection	All wooded vegetation within in site and surrounding areas.	Rare	Operation	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Potential to result in reduced habitat for reptiles, insects and fungi.
Removal and disturbance of rock, including bush rock	N/A	Rare	Operation	N/A	No rocky habitat was identified within the Development Footprint.
Increase in predators	Entire site and surrounding vegetation.	Rare	Operation	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Domestic/Feral cats, foxes and other feral predators could increase due to increasing habitat edges created by development increasing movement capacity and success of feral predators. This is unlikely, as the majority of the Development Footprint follows existing vegetation and will not greatly increase the edge effect.
Increase in pest animal populations	Entire site and surrounding vegetation.	Rare	Operation	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Unlikely to impact PCTs, however increased human activity within the Development Footprint has the potential to introduce pest animals.
Changed fire regimes	Entire site and surrounding vegetation.	Rare	Operation	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling	Moderate risk of increased fire frequency given use of vehicles and machinery which may cause sparks or leak fuel on dry vegetation. This risk is considered

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
				Riverine Plains and Brigalow Belt South Bioregions.	low, as vehicles will be restricted to tracks and roads.
Disturbance to specialist breeding and foraging habitat (e.g. beach nesting for shorebirds)	N/A	Rare	Operation	PCT 201- Fuzzy Box Woodland: TEC - Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Impacts to specialist breeding and foraging habitat unlikely, given no such species were identified within the Development Footprint.

7.3 Prescribed Impacts

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.
- Impacts of development on the connectivity on movement of threatened species that maintains their life cycle.
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

These are discussed in detail below, and the necessary information required by Section 9.2 of the BAM is provided.

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

The majority of the Development Footprint is situated within unregulated Category 1 Land (255 ha). However, the installation of fencing, road construction and infrastructural development will have some impacts on connectivity. The species most likely impacted by changes to connectivity are those reliant on moving large distances such as Koala, should this species be present within the greater area surrounding the Development Site.

Short term impacts will result in species requiring relocating outside of the Development Footprint, while long term impacts could include permanent breaks in connectivity due to installation of fence lines and access roads. The loss of these areas is unlikely to have an impact that could cause a decline in a threatened species, with a modification of their behaviour over time to move within the existing and retained bushland more likely.

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

The installation of access roads within the Development Site will increase the likelihood of vehicle strike. Risk of vehicle strike will be highest where roads cross wooded vegetation, e.g., Delroy Rd intersects two patches of PCT 255 moderate condition woodland. In such areas, the risk to fauna can be mitigated by regulating speed limits. Given the speed limit of access roads will likely be relatively low and will primarily be used during daylight hours, the likelihood of vehicle strike is still considered low risk.

7.4 Impacts to Matters of National Environmental Significance

An EPBC Act habitat assessment (Appendix H) evaluation was undertaken for species predicted to occur within the broader study locality (10 km radius). The evaluation drew on NGH's detailed understanding of this site's habitat, based on vegetation and flora and fauna surveys documented in Sections 3 and 4. EPBC Act Assessments of Significance (AoS) were completed in early planning stages for species that had potential to be impacted by the development (Appendix I). An EPBC referral is not considered necessary for any MNES. This section addresses potential impacts to EPBC listed TECs, threatened and migratory species specifically.

7.4.1 Threatened Ecological Communities

NGH surveys confirmed that no threatened ecological communities identified through the protected matters search tool as having potential to occur, were present within the Development Footprint.

7.4.2 Threatened Species

Considering MNES, no EPBC listed threatened species are considered likely to be impacted by the proposed development. An initial Assessment of Significance (AoS) determined Regent Honeyeater had potential to be impacted by the development due to potential habitat within the Development Site, however updates to the Development Footprint resulted in impacts to Regent Honeyeater being deemed unlikely. Additionally, Assessments of Significance for Spot-tailed Quoll, Corben's Long-eared Bat, Swift Parrot, and Grey-headed Flying Fox concluded no significant impact was likely and EPBC referral would not be required.

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

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

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓ No evidence of Koalas detected through surveys.
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ Woodland and riparian areas contain two 'rank 3' and one 'rank 4' Koala feed tree species, including Tumbledown Redgum (*Eucalyptus dealbata)*, Western Grey Box (*Eucalyptus microcarpa*), and Mugga Ironbark (*Eucalyptus sideroxylon*).
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	
	+1 (medium)	Area is part of a **contiguous landscape** < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	✓ No areas that would be impacted are connected to outside bushland that exceeds 500 ha.
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	✓ No evidence of koala mortality from vehicle strike.
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Study area is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge.
Total	**2**	**Decision: Not habitat critical to the survival of the koala—assessment of significance not required.**	

7.4.3 Migratory Species

A habitat assessment was conducted for migratory species returned from the protected matters report. None of these species are considered likely to occur onsite, as detailed in Appendix H.

An EPBC referral is not considered necessary for any MNES.

7.5 Assumptions and Predictions

Climatic conditions may influence the species present within the Development Site at any one time (see Section 4.2.4 for weather condition during surveys). Where survey has been undertaken for candidate species requiring confirmation of presence or absence, this has been done employing appropriate methods and timing, as require under the BAM. Nevertheless, it is an unavoidable limitation that not all species that utilise an area will be detected. This is generally due to their cryptic nature or mobility and unpredictable movement throughout their habitat and prevailing drought conditions. The results in this assessment are based on the proper application of the BAM and therefore are considered sufficient to inform the development of the project's mitigation strategies and offset obligation.

The calculation of HBTs, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows (Gibbons and Lindenmayer 2000). Additional mitigation has been recommended to address this limitation.

8. Mitigating and Managing Impacts

8.1 Mitigation Measures

A general summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure, and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 Impacts from the clearing of vegetation and habitat

1. Clearing activities will be timed to avoid critical life cycle events, such as breeding and nursing. There will be instigation of clearing protocols to include pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events.
2. There will be relocation of habitat features (fallen timber, hollow logs and embedded rock) from within the Development Footprint to provide supplementary habitat for displaced fauna.
3. Clearing will be staged and supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required.

8.1.2 Indirect impacts

Adoption of clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance, including:

a. chainsaw to be used over heavy machinery to remove native vegetation for partial clearing where possible
b. using noise barriers, or daily/seasonal timing of construction and operational activities to reduce impacts of noise
c. using light shields, or daily/seasonal timing of construction and operational activities to reduce impacts of light spill
d. using adaptive dust management and monitoring programs to control air quality
e. scheduling the timing of construction activities to avoid impacts (e.g. timing the construction for when migratory species are not at the site, or when particular species known to, or likely to use the habitat on the site, are not breeding or nesting)
f. erecting temporary fencing to protect significant environmental features, such as riparian zones
g. using hygiene protocols to prevent the spread of weeds or pathogens between infected and uninfected areas
h. training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented
i. preparing a vegetation management plan to regulate activity in vegetation and habitats adjacent to residential developments. The plan may include controls on pet ownership, rubbish disposal, wood collection, fire management, and disturbance to nests and other niche habitats
j. providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on, or adjacent to, the development or clearing site or land to be biodiversity certified.

8.1.3 Prescribed Impacts

Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
timing works to avoid critical life cycle events such as breeding or nursing	• Hollow bearing tree removal should be timed to avoid August-November - breeding season for the highest number of species.	December-July (Construction)	One off	Construction contractor	Low	High risk and consequences could include injury or death to hollow dependent fauna.
instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events	• Staged clearing, supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required	Construction	Regular	Construction contractor	Moderate	High risk and consequences could include injury or death of fauna
relocation of habitat features (fallen timber, hollow logs and embedded rock) from within the Development Site.	• All embedded rock, fallen timber and hollow logs should be relocated outside of the construction area under the supervision of an Ecologist or spotter catcher.	Construction	Regular	Construction contractor	Low	Moderate risk and consequences could include loss of some species not being able to relocate to suitable habitat due to exposure or predation.
Induct all staff prior to construction to identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance;	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing.	Prior to and during construction	Regular	Construction Contractor	High	Low risk of inadvertent clearing of native vegetation and fauna habitat intended for conservation onsite

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	• No stockpiling or storage within dripline of any mature trees. • No stockpiling or storage within riparian buffers.					
Indirect impacts on native vegetation and habitat						
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Documented clearance protocols to mark and protect vegetation to be retained. • Use handheld machinery where possible and have elevated work platform check hollows prior to tree felling	Preconstruction	Regular	Construction contractor	High	With effective implementation of this protocol, risk is considered low.
Install temporary fencing to protect significant environmental features such as riparian zones	• Prior to construction commencing, exclusion fences and signage would be installed around habitat to be retained.	Construction	Regularly	Construction Contractor	Low	None
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	• Ensure machinery and equipment as clean and free from pathogens and weeds prior to entering site	Construction	Regular	Construction contractor	Moderate	With effective implementation of this protocol, risk of weed invasion is considered low.
Preparation of a Biodiversity Management Plan (BMP) for the site	BMP to include; • How to remove and dispose of vegetation and topsoil containing weeds declared	Construction, operation	One off	Developer	Moderate	New weeds into the site, plant diseases and inappropriate species established as part of

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	under the Biosecurity Act 2015 during and after construction. • Reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora.					landscaping of the subdivision which could affect adjoining native vegetation and fauna habitat. With effective implementation of this protocol, risk is considered low.
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	• An erosion and sediment control plan would be prepared and implemented. • Spill management procedures would be implemented. • Stormwater management plan prepared and implemented.	Construction	Regular	Construction Contractor	Moderate	Impacts may occur to waterway if erosion and sedimentation control plan not implemented.

8.2 Adaptive Management Strategy

Adaptive management during construction and operation will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and is key to the successful implementation of the relevant management plans. This will allow ongoing flexibility to manage objectives, allow for relevant feedback and modifications. Construction management plans will contain management plans for flora and fauna, which will have an adaptive management component. This includes measures to monitor predicted impacts of vehicle/train strikes, thresholds for species mortality, based on relevant literature, which will trigger adaptive management actions, and any measures proposed to mitigate potential impacts.

9. Serious and Irreversible Impacts (SAII)

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

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, 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.

9.1 Potential Serious and Irreversible Impact Entities

9.1.1 Threatened ecological communities

Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions was identified in association with PCT 201 within the Development Footprint. Impacts to this SAII TEC have been avoided where possible, with a maximum of 0.37 ha (0.01% of TEC within Development Site) proposed to be impacted. Clearing within this zone is not expected to have a significant impact on the community, given the large majority of the patch being retained (99% of TEC within the Development Site retained).

9.1.2 Threatened species

One threatened species which is at-risk of Serious and Irreversible Impacts was identified as having potential to occur within the Development Footprint, the Regent Honeyeater. Initial planning proposed the clearing of a total of 19.89 ha of suitable foraging habitat, i.e., areas that contain large Mugga Ironbark (*Eucalyptus sideroxylon*) trees within Box-Ironbark Woodland, which is critical to the survival of Regent Honeyeater. The AoS therefore determined the proposed development may impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable. This finding resulted in the modification of the Development Footprint to avoid all identified potential Regent Honeyeater foraging habitat. The new Development Footprint is expected to impact a maximum of 1.53ha of potential Regent Honeyeater habitat. Given the avoidance of Regent Honeyeater foraging habitat and the minimization of impacts to areas of moderate vegetation condition, significant impacts are not considered likely.

10. Requirement to Offset

10.1 Impacts Requiring an Offset

10.1.1 Ecosystem credits

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

a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or

b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or

c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset, and the ecosystem credits required, are documented in Table 10-1 and mapped in Figure 3-2.

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	201_Moderate	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	0.37	51	9
2	255_Poor	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	48.08	5.7	0
3	255_Low	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	3.22	37.6	53
4	255_Moderate	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	1.53	48.7	33

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix D.

10.1.2 Species credits

No species credits have been generated.

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix D.

10.1.3 Scatter tree credits

Offsets are required for the clearing of Class 2 and Class 3 scattered trees. Scatter trees were assigned to PCTs based on species and PCTs within close proximity to scattered trees. Although native vegetation

patches of PCT 81 will not be impacted by the proposed development, this PCT as identified within close proximity to the south-west of the Development Footprint and had two scattered trees assigned.

Table 10-2 Scatter trees that require offsets

Class of Scattered Tree	Number of Scattered Trees cleared	Hollows present	Ecosystem credits required	Number of credits required
PCT 255				
3	1	No	0.75	1

10.1.4 Offsets required under the EPBC Act

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

10.2 Impacts not Requiring an Offset

Impacts to PCTs that do not meet the thresholds identified in Section 10.1.1 of the BAM do not require offsets. These include:

- Impacts to Category 1 land (255.52 ha).
- Impacts to Category 2 land with VI scores under 15 ('poor condition'):
  - PCT 255_poor (48.08 ha).

10.3 Areas not Requiring Assessment

Impacts to Category 1 land (255.52 ha) are not regulated and do not require offset under the LLS Act (2013). These areas are mapped in Figure 10-1.

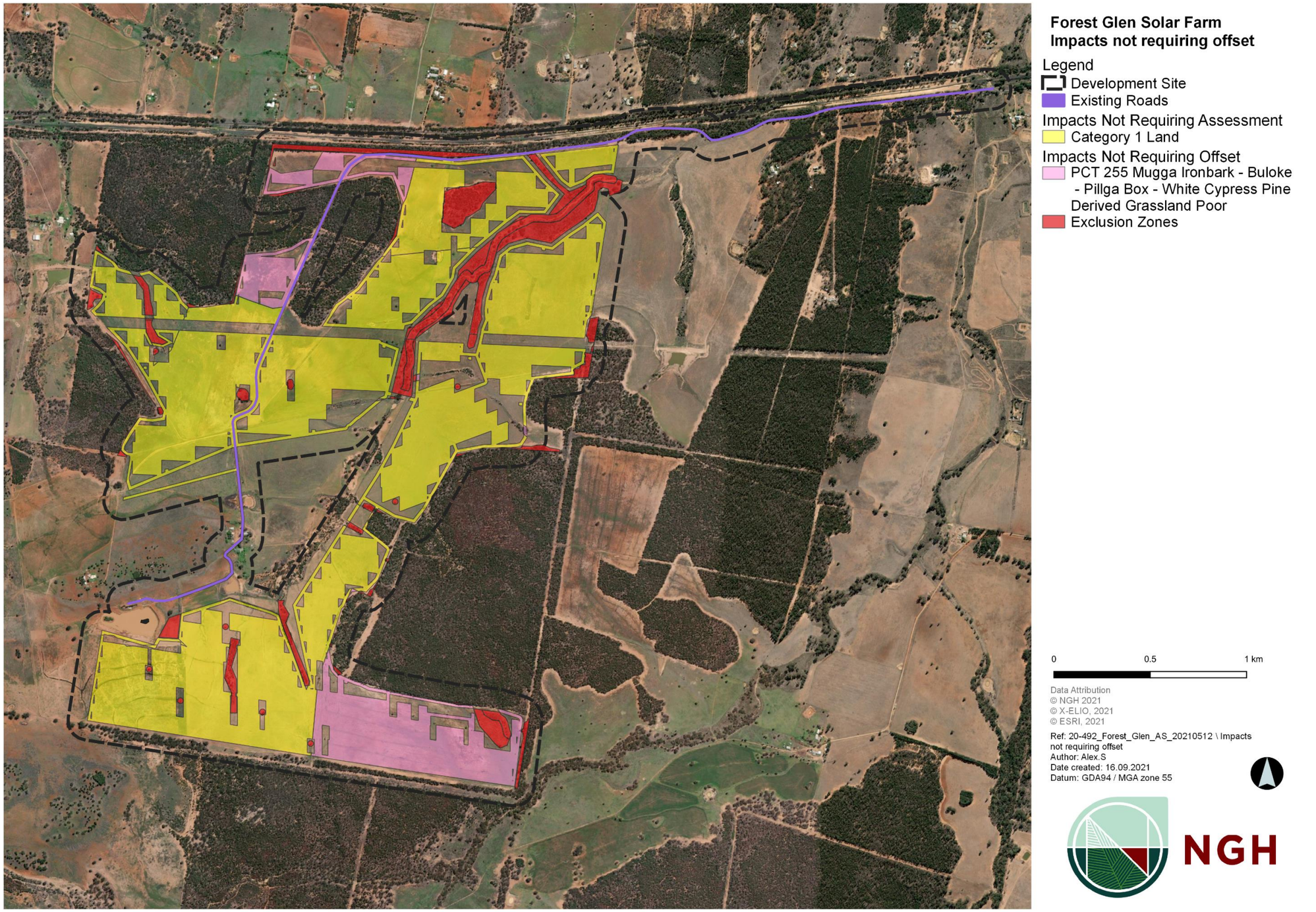


Figure 10-1 Impacts not requiring offset and not requiring assessment

11. Conclusion

NGH has prepared this BDAR on behalf of X-ELIO, to assess the biodiversity impacts of the proposal using the Biodiversity Assessment Method (BAM, 2020) as required under the *Biodiversity Conservation Act, 2017*. The Forest Glen Solar Farm proposal is classified as a State Significant Development as detailed in the State and Regional Development SEPP (2011).

In this BDAR, biodiversity impacts have been assessed through comprehensive mapping and assessment completed in accordance with the BAM (2020). Using state vegetation mapping and on-ground vegetation stratification, 3 PCTs were identified within the Development Site, 2 of which are within the Development Footprint:

1. PCT 255 – Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion (poor, low, and moderate condition)
2. PCT 201 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion (moderate condition)

PCT 201 was identified as meeting the criteria for listing under the *BC Act (2017)* as Threatened Ecological Community: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.

A total of 8 hollow-bearing trees and 21 scattered trees were identified within the Development Site and access road. All hollow-bearing trees have been excluded from the Development Footprint and are not expected to be impacted. One scattered tree could not be avoided and is expected to be removed.

All candidate species credit species were excluded based on absence of suitable habitat, or through targeted surveys. Assessments of Significance were undertaken for 5 EPBC listed species, Regent Honeyeater, Swift Parrot, Spot-tailed Quoll, Corben's Long-eared Bat, and Grey-headed Flying Fox. The initial AoS concluded a potential for significant impact on Regent Honeyeater foraging habitat. Based on this, areas of suitable Regent Honeyeater foraging habitat were excluded from the Development Footprint, resulting in the determination that a significant impact on Regent Honeyeater was unlikely. The remaining Assessments of Significance concluded no significant impact on EPBC species was likely.

Avoidance and minimisation of impacts has been conducted through the planning phases which has resulted in comprehensive mapping and assessment in accordance with the BAM, including:

- Avoidance of native vegetation by concentration of Development Footprint in Category 1 land.
- Avoidance of Regent Honeyeater habitat, by avoidance of hollow-bearing trees and large Mugga Ironbark's in Development Footprint.
- Minimisation of clearing by restricting Development Footprint to existing roads where practical.

Based on the above, the credit requirement for the Forest Glen Solar Farm has been defined in Table 11-1 and Table 11-2. Mitigation measures have been outlined to reduce the direct, indirect, and prescribed impacts to biodiversity. The credits will be retired in accordance with the Biodiversity Offset Scheme.

Table 11-1 Ecosystem credit requirement

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	201_Moderate	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South	0.37	51	9

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
		Western Slopes Bioregion			
2	255_Poor	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	48.08	5.7	0
3	255_Low	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	3.22	37.6	53
4	255_Moderate	Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	1.53	48.7	33

Table 11-2 Scattered tree credit requirement

Class of Scattered Tree	Number of Scattered Trees cleared	Hollows present	Ecosystem credits required	Number of credits required
PCT 255				
3	1	No	0.75	1

12. Reference List

Australian Bureau of Meteorology 2019. Climate data online accessible at: http://www.bom.gov.au/climate/data/?ref=ftr

Belcher, C. A., & Darrant, J. P. (2006). Habitat use by tiger quoll (Dasyurus maculatus)(Marsupialia: Dasyuridae) in south-eastern Australia. Journal of Zoology, 269(2), 183-190.

Bionet (2018) – Bionet: website for the Atlas of NSW Wildlife; accessed at www.bionet.nsw.gov.au

Crates, R. (2019). Ecology and conservation of the regent honeyeater.

Crates, R., Terauds, A., Rayner, L., Stojanovic, D., Heinsohn, R., Wilkie, C., & Webb, M. (2018). Spatially and temporally targeted suppression of despotic noisy miners has conservation benefits for highly mobile and threatened woodland birds. Biological Conservation, 227, 343-351.

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

Department of the Environment (2012). Approved Conservation Advice for Koala

Department of the Environment (2014) EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory), Commonwealth Department of Environment, 2014

Department of Environment, Climate Change and Water NSW. 2009. Draft National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus.* Prepared by Dr Peggy Eby. Department of Environment, Climate Change and Water NSW, Sydney.

Department of Planning, Industry and Environment 2020. Environment, Energy and Science. Surveying threatened plants and their habitats.

DPE (2018). Biodiversity Values Map. Accessed online https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Geering, D., & French, K. (1998). Breeding biology of the regent honeyeater Xanthomyza phrygia in the Capertee Valley, New South Wales. Emu-Austral Ornithology, 98(2), 104-116.

Gibbons, P and Lindenmayer, D. 2000. Hollow formation in eucalypts from temperate forests in Southeastern Australia. Pacific Conservation Biology 6(3):218-228

Glen, A. S., & Dickman, C. R. (2006). Home range, denning behaviour and microhabitat use of the carnivorous marsupial Dasyurus maculatus in eastern Australia. Journal of Zoology, 268(4), 347-354.

Harris, J. M., & Goldingay, R. L. (2005). Distribution, habitat and conservation status of the eastern pygmy-possum Cercartetus nanus in Victoria. Australian Mammalogy, 27(2), 185-210.

Ingwersen, D. A., Geering, D. J., & Menkhorst, P. (2015). National Recovery Plan for the Regent Honeyeater Anthochaera phrygia. BirdLife Australia, Melbourne.

Kvistad, L., Ingwersen, D., Pavlova, A., Bull, J. K., & Sunnucks, P. (2015). Very low population structure in a highly mobile and wide-ranging endangered bird species. PloS one, 10(12), e0143746.

Law, B., Chidel, M., Britton, A., & Threlfall, C. (2018). Comparison of microhabitat use in young regrowth and unlogged forest by the eastern pygmy-possum (Cercartetus nanus). Australian Mammalogy, 40(1), 1-9.

Law, B., Gonsalves, L., Chidel, M., & Brassil, T. (2016). Subtle use of a disturbance mosaic by the south-eastern long-eared bat (Nyctophilus corbeni): an extinction-prone, narrow-space bat. Wildlife Research, 43(2), 153-168.

Long, K., & Nelson, J. (2010). National recovery plan for the spotted-tailed quoll Dasyurus maculatus. Victorian Department of Sustainability and Environment.

Maron, M. (2007). Threshold effect of eucalypt density on an aggressive avian competitor. Biological Conservation, 136(1), 100-107.

NSW Central Resource for Sharing and Enabling Environmental Data (SEED) (2015). State Vegetation Type Map: Central West / Lachlan Region Version 1.4. VIS_ID 4468

NSW Department of Planning, Industry and Environment (2011) State Environmental Planning Policy (State and Regional Development).

NSW Department of Primary Industries (Fisheries) Policy and Guidelines for fish habitat conservation and management (2013 update), Wollongbar

NSW Department of Primary Industries (Fisheries) (Undated) Key Fish Habitat Moree Plains LGA. Accessed online https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/634334/MoreePlains.pdf

Office of Environment and Heritage (OEH) (2017) BioNet Vegetation Information System: Classification Database. Accessed online at http://www.environment.nsw.gov.au/research/Visclassification.htm

Office of Environment and Heritage (OEH) (2018) Koala Habitat and Feed Trees. Accessed online at https://www.environment.nsw.gov.au/topics/animals-and-plants/native-animals/native-animal-facts/koala/koala-habitat

Office of Environment and Heritage (OEH) (2018). 'Species credit' threatened bats and their habitats.

Oliver, D. L., Ley, A. J., Ford, H. A., & Williams, B. (1999). Habitat of the Regent Honeyeater Xanthomyza phrygia and the value of the Bundarra-Barraba region for the conservation of avifauna. Pacific Conservation Biology, 5(3), 224-239.

Oliver, D. L. (2000). Foraging behaviour and resource selection of the Regent Honeyeater Xanthomyza phrygia in northern New South Wales. Emu, 100(1), 12-30.

Phillips, S., Callaghan, J. 2011. *The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus*. Australian Zoologist, 35.

Piper, S. D., & Catterall, C. P. (2003). A particular case and a general pattern: hyperaggressive behaviour by one species may mediate avifaunal decreases in fragmented Australian forests. Oikos, 101(3), 602-614.

Roberts, B. (2012). The ecology and management of the grey-headed flying-fox Pteropus poliocephalus (Doctoral dissertation, Ph. D. Th

Sarker, S., Forwood, J. K., Ghorashi, S. A., Peters, A., & Raidal, S. R. (2015). Beak and feather disease virus genotypes in Australian parrots reveal flexible host-switching. Australian Veterinary Journal, 93(12), 471-475.

Sarker, S., Ghorashi, S. A., Forwood, J. K., & Raidal, S. R. (2013). Whole-genome sequences of two beak and feather disease viruses in the endangered swift parrot (Lathamus discolor). Genome Announcements, 1(6).

Saunders, D. (2008). Ecology and conservation of the swift parrot-an endangered austral migrant.

Saunders, D. L., & Heinsohn, R. (2008). Winter habitat use by the endangered, migratory Swift Parrot (Lathamus discolor) in New South Wales. Emu-Austral Ornithology, 108(1), 81-89.

Saunders, D.L. and Tzaros, C.L. 2011. National Recovery Plan for the Swift Parrot Lathamus discolor, Birds Australia, Melbourne

Shelton, M. B., & Goldingay, R. L. (2021). Comparative survey techniques for a cryptic Australian snake (Hoplocephalus bitorquatus). Australian Journal of Zoology.

Shelton, M. B., Phillips, S. S., & Goldingay, R. L. (2020). Habitat requirements of an arboreal Australian snake (Hoplocephalus bitorquatus) are influenced by hollow abundance in living trees. Forest Ecology and Management, 455, 117675.

State Government of NSW and Department of Planning, Industry and Environment 2015. State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS_ID 4467

State Government of NSW and Department of Planning, Industry and Environment 2019. Threatened Biodiversity Data Collection accessible via the NSW BioNet Atlas at: https://www.environment.nsw.gov.au/AtlasApp/Default.aspx?a=1

Strahler, A. (1952) Dynamic Basis of Geomorphology. Geological Society of America Bulletin, 63, 923-938

Thackaway and Creswell (1995) An Interim Biogeographic Regionalisation for Australia, Australian Nature Conservation Agency, Canberra

Webster, R., & Menkhorst, P. (1992). regent honeyeater (Xanthomyza phrygia). Dept. of Conservation and Environment, Victoria.

Appendix A Land Category Assessment

17th August 2020

Jesse Owen
Project Development Manager
X-Elio
L50, 120 Collins Street
Melbourne, Victoria, 3000
Jesse.owen@x-elio.com

Dear Jesse,

Re: Forest Glen project land category assessment

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

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

- Land cleared of native vegetation at 1 January 1990 or lawfully cleared of vegetation between 1 January 1990 and 25 August 2017
- Low Conservation Grasslands
- Land containing only low conservation groundcover (not being grasslands)
- Native vegetation identified as regrowth in a Property Vegetation Plan under the repealed Native Vegetation Act 2003
- Land biodiversity certified under the BC Act.

This letter report establishes the methodology, results and conclusions to evaluate the land categorisation for the development site. While we feel confident in our assessment it is noted that The LCA has not been provided to BCD and therefore the exempt areas have not yet been endorsed by this agency. It is possible they may disagree with our findings or require further supporting information.

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

Yours sincerely,

Mitch Palmer
Principal Ecologist
Accredited Assessor BAAS 17051
Ph: (02) 49173974

Introduction

This letter report establishes the methodology, results and conclusions to evaluate the land categorisation for the proposed Forest Glen Solar Farm (Lot 6 DP 755102 and Lot 1 DP1198911), off Minore Road.

Section 6.8(3) of the BC Act determines that the Biodiversity Assessment Method (BAM) is to exclude the assessment of the impacts of clearing native vegetation on Category 1-exempt land. No NSW assessment or offset obligations will apply to confirmed Category 1-exempt land. Note, Commonwealth assessment may still be required to verify the areas provide no significant impacts to Commonwealth listed entities.

Methodology

An initial desktop assessment, a literature review of the proposal scope and relevant previous studies in the region and site inspection were undertaken over the development site to determine the land categories, ecological constraints and native vegetation communities on site. Assessment of the development site as Category 1-exempt and Category 2-regulated land was undertaken using the following data sources:

- Aerial imagery of historical land use (Sourced from Google Earth and Spatial Services Delivery);
- 2017 Land Use Dataset (Australian Land Use and Management (ALUM) Classification Version 7 (Office of Environment and Heritage (OEH), 2017);
- NSW Woody vegetation extent and Foliage Projective Cover (FPC) 2011 (OEH, 2015);
- Sensitive regulated and vulnerable regulated lands on the Native Vegetation Regulatory Map portal
- Central West NSW State Vegetation Mapping (OEH, 2018);
- Field surveys via rapid assessment.

Results

The analysis of the above sources identified, in conjunction with historic aerial imagery, demonstrates evidence of broad native vegetation modification resulting from agricultural land use within the development site, and in some areas, used continuously for cropping and modified pasture grazing prior to and post 1990 (Figure 1 to Figure 5). Clear areas of historical cropping are more evident in central and southern areas of the development site, largely with cultivated areas of Wild Oats *Avena fatua*, with the northwest and eastern areas largely remnant native vegetation. The following table (Table 1) demonstrates how the above-mentioned layers were used in determining land category:

Table 1 – Summary of data sources and interpretation

Data Sources	Category 1 – Exempt Land	Category 2– Regulated Land	Excluded Land
1982 Aerial Imagery Dubbo/ Minore Locality	• Clear evidence of cropping • Clear evidence of significant groundcover modification	• Woody vegetation present at 1982 in conjunction with woody vegetation extent layer	N/A
1991 Aerial Imagery Dubbo/ Minore Locality	• Clear evidence of cropping • Clear evidence of significant groundcover modification	• Woody vegetation present at 1991 in conjunction with woody vegetation extent layer	N/A
2017 Land Use Dataset	Land use identified as; • Grazing modified pastures (excluding woody vegetation) where clear evidence of significant groundcover modification has occurred post 1990 • Cropping • Reservoir/dam	Land use identified as; • Grazing native vegetation • Grazing modified pastures where evidence of significant groundcover modification is absent (precautionary principle applied)	N/A

Data Sources	Category 1 – Exempt Land	Category 2– Regulated Land	Excluded Land
	• Residential and farm infrastructure		
NSW Woody vegetation extent	• Areas of woody vegetation regrowth that has occurred post 1990 following previous clearing events	• Woody vegetation present as at 1990 in conjunction with historic aerial imagery	N/A
Native regulatory map • Sensitive regulated land • Vulnerable regulated land • Excluded land	N/A	• All areas identified as vulnerable regulated land and sensitive regulated land (none within the development site	N/A

Another determining feature of constant agricultural use is a lack of woody canopy vegetation regrowth in the majority of areas, as represented in the aerial images. The 2011 Woody Vegetation extent does however identify several paddock trees, small drainage lines and small patches of native vegetation in the development site which has been mapped as Category 2 regulated land. Although subjected to grazing, in areas where it is not 100% conclusive whether areas with a high abundance and cover of modified pasture species have been previously cropped or significantly modified, and more established via a derived nature, a precautionary approach has been applied and mapped as Category 2 – Regulated land.

There are no areas identified as vulnerable regulated land or sensitive regulated land from the NVRM land within the development site.

Conclusion

Based on the above data sources, there is evidence to suggest that large areas of the development site have been under regular rotational cropping or pasture improvement historically. This is supported by recent and historical imagery as well as 2017 Land Use Mapping data. Where in doubt, or where data sources are conflicting, a precautionary approach has been implemented for areas deemed inconclusive in terms of determining historical land use. Draft maps of those areas considered to be Category 1 exempt land and Category 2 – regulated land has been produced and shown in Figure 1. The relevant datasets used in the assessment are included in Figures 2 to 6.

Supporting figures

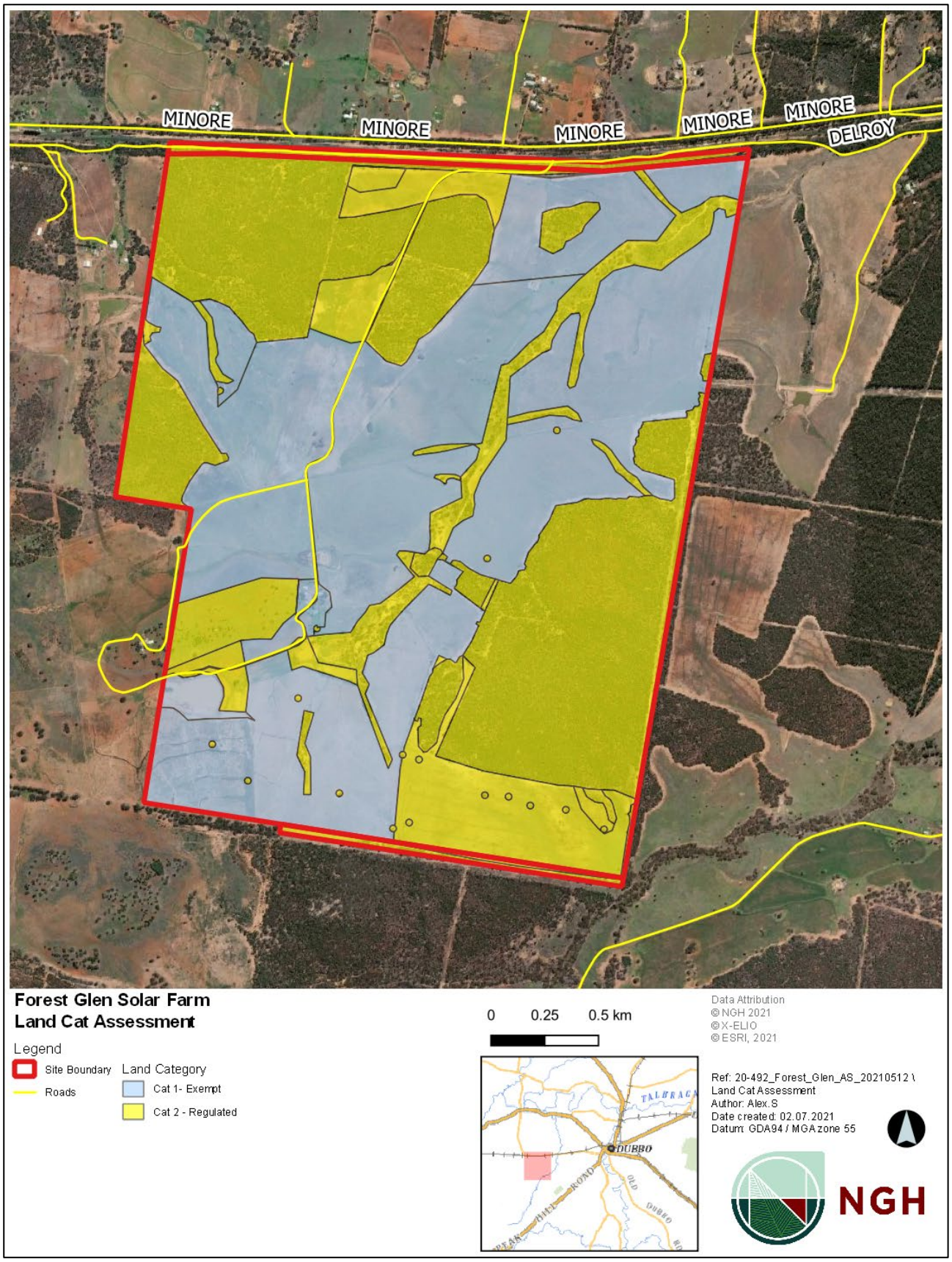


Figure 1 Development Site overview and land categorisation

Reviewed by: Mitch Palmer 17/08/2020

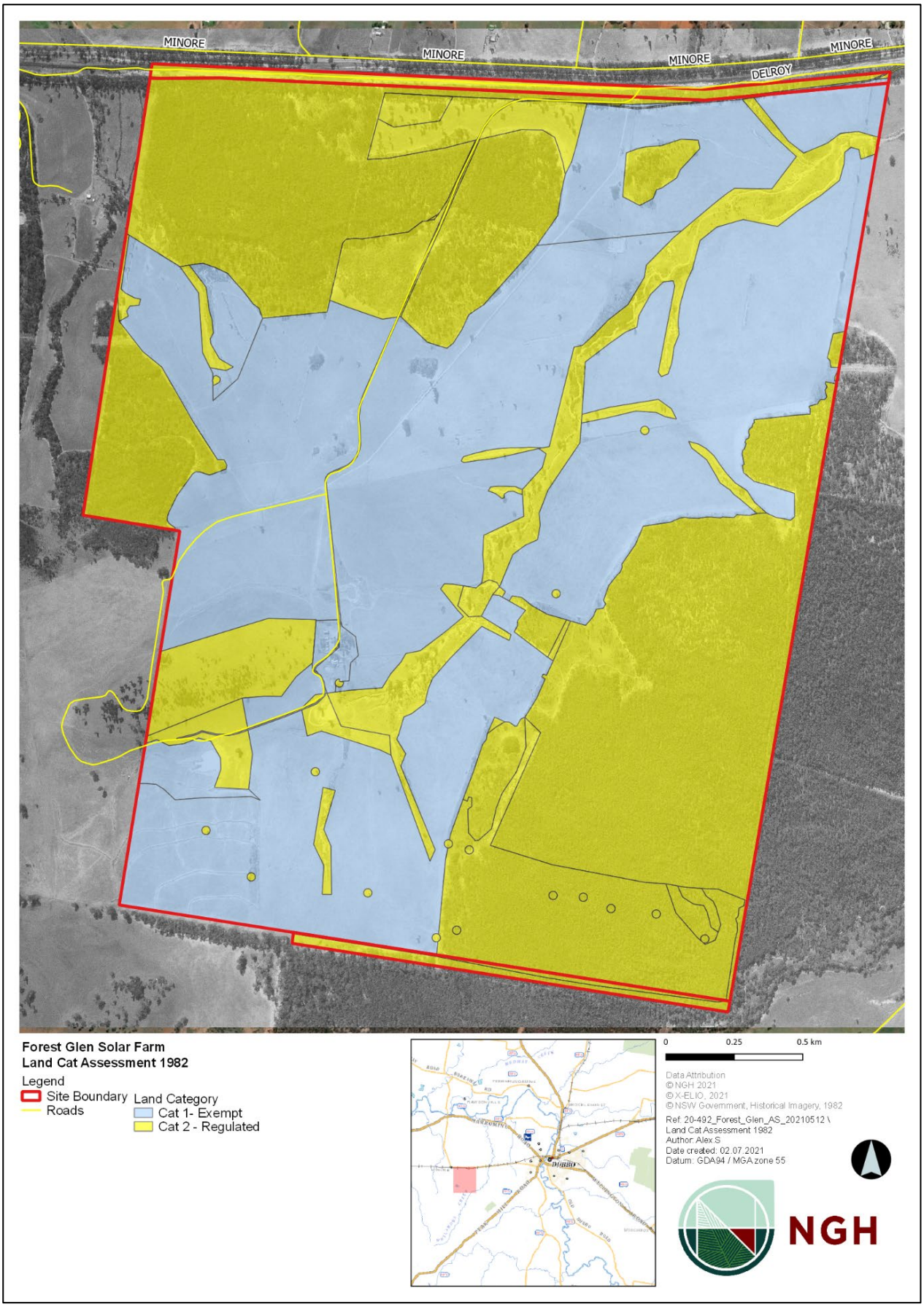


Figure 2 Development Site and land categorisation 1982 imagery

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Figure 3 Development Site and land categorisation 1995 imagery

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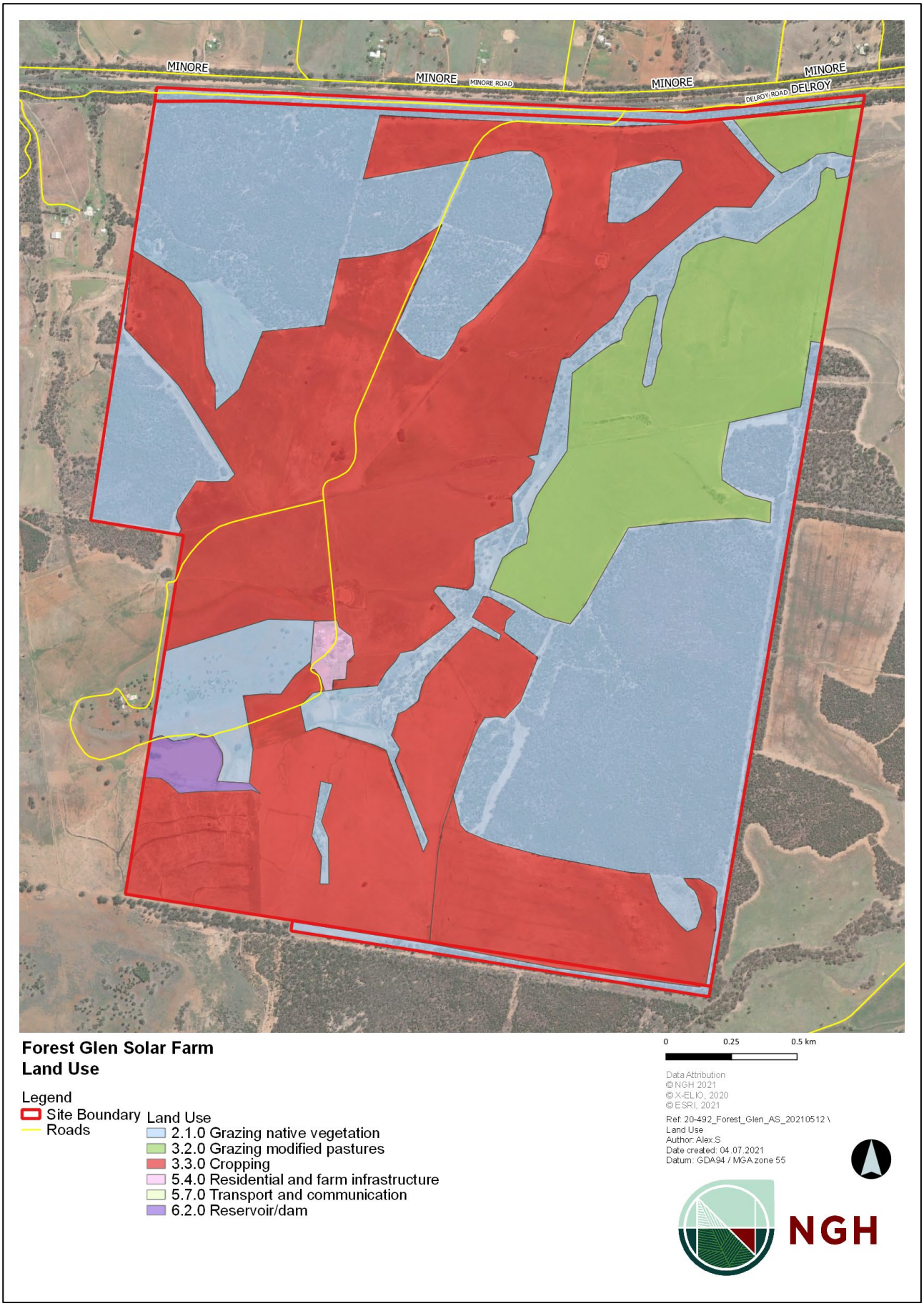

Figure 4 Development Site and 2017 Land Use Dataset

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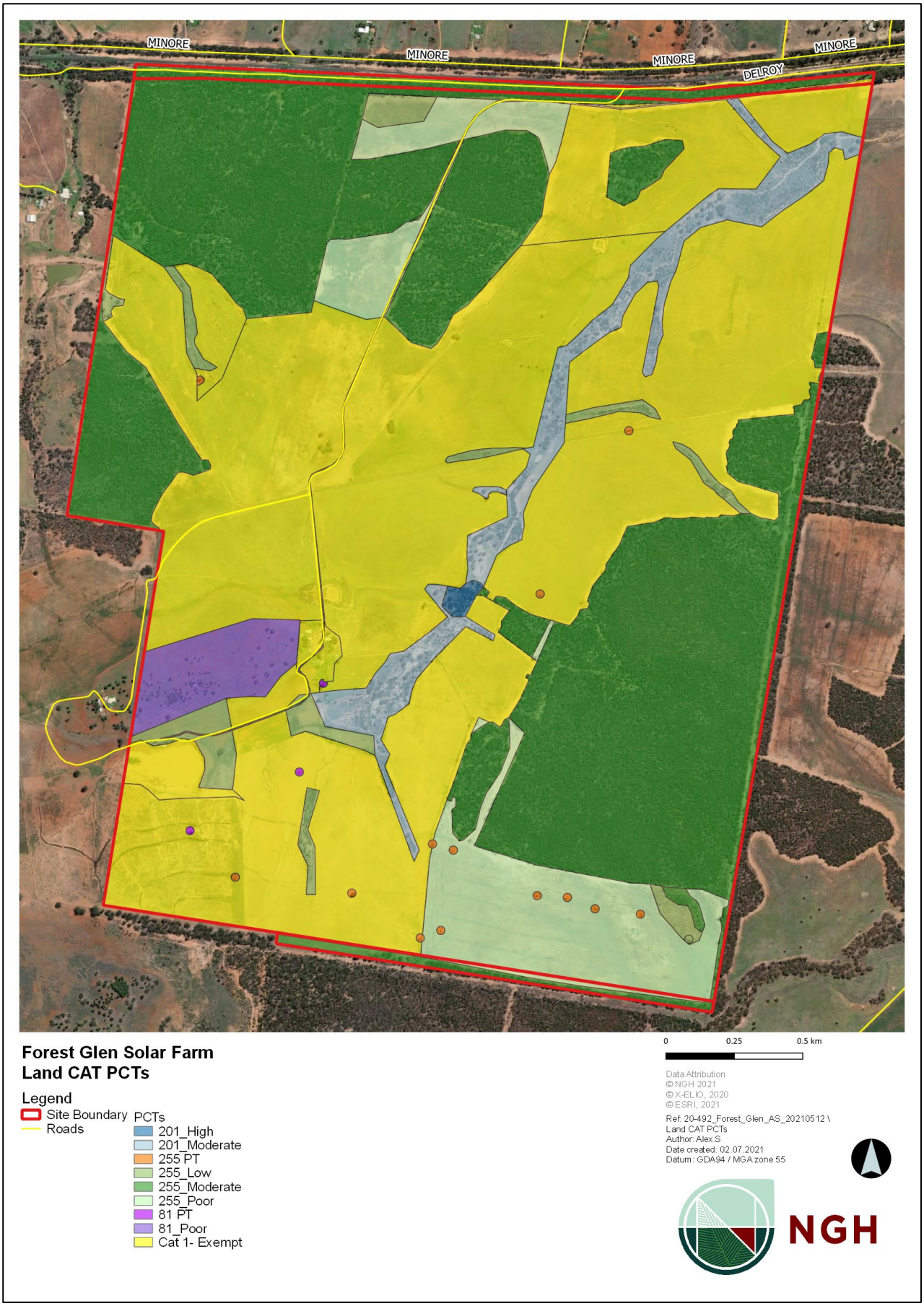

Figure 5 Development Site and 2021 PCT map

Reviewed by: Mitch Palmer 17/08/2020

Figure 6 Development Site and NSW Woody vegetation extent and FPC 2011

Reviewed by: Mitch Palmer 17/08/2020

Appendix B Survey Data

A.1 Plot data

BAM Site Field Survey									
Project:	20 492	**Plot Identifier**	3	**Pic 20x20**	9057	**Pic 20x50**			
Survey date:	13th nov 20		**Compass Orientation (head of 20x20 plot)**				329 degrees nw		
Recorders	gyoung		**PCT:**	255					
GPS Easting	638518	**GPS Northing**	6429109		**Datum**	utm	**Zone**	55	
Landform			**Soils**			**Drainage & Slope**			
Morphology			**Soil Texture**	sandy		**Slope**	1 degree		
LandF Element			**Soil Colour**	light orange		**Aspect**	south		
LandF Pattern	low rise		**Soil Depth**	20cm		**Drainage**	well drained		
Microrelief			**Geology**	sandstone ironstone		**Watercourses**	none near by		

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	0		
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	0		
Other	lots of dead callitris		

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

vacant bushland fenced from stock

Age class of trees (DBH range) , Condition of Vegetation, Hollows

10 to 45cm

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

rabbits

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**Callitris**

FUNCTION

Function attributes for	3

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	4
	Shrub (SG)	6
	Forb (FG)	21
	Grass & grasslike (GG)	6
	Fern (EG)	1
	Other (OG)	0
	TOTAL	38

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	7.7
	Shrub (SG)	0.6
	Forb (FG)	9.4
	Grass & grasslike (GG)	20.7
	Fern (EG)	0.2
	Other (OG)	0
	TOTAL Native	38.6
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	25%	24.0%	9061
	15m	10%		9062
	25m	30%		9063
	35m	25%		9064
	45m	30%		9065
Bare ground cover	5m	5%	15.0%	
	15m	5%		
	25m	15%		
	35m	50%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			0
50-79			0
30-49	7		0
20-29	4		0
10-19	3	2	0
5-9	4	3	0
<5			N/A
Length of logs (m)		159	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	3

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	0.5	3		Tree (TG)	No	
euca deal	*Eucalyptus dealbata*	Tumbledown Red Gum	Myrtaceae	0.2	2		Tree (TG)	No	
euca micr	*Eucalyptus microcarpa*	Western Grey Box	Myrtaceae	2	2		Tree (TG)	No	
euca side	*Eucalyptus sideroxylon*	Mugga Ironbark	Myrtaceae	5	2		Tree (TG)	No	
acac	*Acacia spp.*	Wattle	Fabaceae (Mi	0.1	1		Shrub (SG)	No	
cass laev	*Cassinia laevis*	Cough Bush	Asteraceae	0.1	20		Shrub (SG)	No	
dill juni	*Dillwynia juniperina*	#N/A	Fabaceae	0.1	1	#N/A	Shrub (SG)	No	#N/A
dodo hete	*Dodonaea heteromorpha*	Maple-fruited Hop-bush	Sapindaceae	0.1	1		Shrub (SG)	No	
ozot dios	*Ozothamnus diosmifolius*	White Dogwood	Asteraceae	0.1	1		Shrub (SG)	No	
sola cine	*Solanum cinereum*	Narrawa Burr	Solanaceae	0.1	5		Shrub (SG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.1	10		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
loma	*Lomandra spp.*	Mat-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
pani quee	*Panicum queenslandicun*	Yadbila Grass	Poaceae	20	5000		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.2	500		Grass & grasslike (GG)	No	
ryti long	*Rytidosperma longifoliun*	Long-leaved Wallaby Grass	Poaceae	0.2	300		Grass & grasslike (GG)	No	
acti gibb	*Actinotus gibbonsii*		Apiaceae	0.1	10		Forb (FG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	0.5	2000		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.1	20		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.5	500		Forb (FG)	No	
dian revo	*Dianella revoluta*	Blueberry Lily	Phormiaceae	0.1	1		Forb (FG)	No	
dysp glom	*Dysphania glomulifera*		Chenopodiace	0.1	1		Forb (FG)	No	
eina hast	*Einadia hastata*	Berry Saltbush	Chenopodiace	0.1	2		Forb (FG)	No	
gono tetr	*Gonocarpus tetragynus*	Poverty Raspwort	Haloragaceae	0.5	2000		Forb (FG)	No	
good hede hede	*Goodenia hederacea sub*		Goodeniaceae	5	3000		Forb (FG)	No	
hyba mono	*Hybanthus monopetalus*	Slender Violet-bush	Violaceae	0.5	300		Forb (FG)	No	
lyth hyss	*Lythrum hyssopifolia*	Hyssop Loosestrife	Lythraceae	0.1	50		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	3		Forb (FG)	No	
pora micr	*Poranthera microphylla*	Small Poranthera	Phyllanthacea	0.1	15		Forb (FG)	No	
port oler	*Portulaca oleracea*	Pigweed	Portulacaceae	0.1	1		Forb (FG)	No	
sene glos	*Senecio glossanthus*	Streaked Poverty Bush	Asteraceae	0.1	1		Forb (FG)	No	
sene quad	*Senecio quadridentatus*	Cotton Fireweed	Asteraceae	0.1	1		Forb (FG)	No	
styp glau	*Stypandra glauca*	Nodding Blue Lily	Phormiaceae	0.1	3		Forb (FG)	No	
vitt cune	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	3		Forb (FG)	No	
wahl grac	*Wahlenbergia gracilenta*	Annual Bluebell	Campanulace	0.5	500		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.5	5000		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	5		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.2	1000		Fern (EG)	No	
cony bona	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	0.1	4	*		No	
gamo purp	*Gamochaeta purpurea*	Purple Cudweed	Asteraceae	0.1	10	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.2	1000	*		No	

sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	0.1	30	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	1	*		No	
yellow daisy bush	*#N/A*	#N/A	#N/A	0.1	1	#N/A		FALSE	#N/A

BAM Site Field Survey									
Project:	20 332	**Plot Identifier**	plot 4	**Pic 20x20**	9033	**Pic 20x50**			
Survey date:	12/11/2020		**Compass Orientation (head of 20x20 plot)**				21 degrees north		
Recorders	gyoung		**PCT:**						
GPS Easting	638031	**GPS Northing**	6428493		**Datum**	gda	**Zone**	55	
Landform			**Soils**			**Drainage & Slope**			
Morphology	low rise		**Soil Texture**	sandy		**Slope**	2 degrees		
LandF Element			**Soil Colour**	light orange		**Aspect**			
LandF Pattern			**Soil Depth**			**Drainage**	well drained		
Microrelief			**Geology**	sandy ironstone		**Watercourses**	not near		

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	0		
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	1		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

vacant bush on farm

Age class of trees (DBH range) , Condition of Vegetation, Hollows

regrowth 5 to 40cm

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**same**

FUNCTION

Function attributes for	plot 4

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	4
	Shrub (SG)	4
	Forb (FG)	12
	Grass & grasslike (GG)	10
	Fern (EG)	1
	Other (OG)	0
	TOTAL	31

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	19
	Shrub (SG)	5.4
	Forb (FG)	50.5
	Grass & grasslike (GG)	47.8
	Fern (EG)	0.2
	Other (OG)	0
	TOTAL Native	122.9
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	35%	44.0%	9035
	15m	80%		9036
	25m	5%		9037
	35m	55%		9038
	45m	45%		9039
Bare ground cover	5m	%	1.0%	
	15m	0%		
	25m	0%		
	35m	1%		
	45m	3%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49	2		
20-29	5	2	
10-19	10	11	
5-9	1	10	
<5		8	N/A
Length of logs (m)		101	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	plot 4

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	5	12		Tree (TG)	No	
euca micr	*Eucalyptus microcarpa*	Western Grey Box	Myrtaceae	3	2		Tree (TG)	No	
euca pill	*Eucalyptus pilligaensis*	Narrow-leaved Grey Box	Myrtaceae	1	1		Tree (TG)	No	
euca side	*Eucalyptus sideroxylon*	Mugga Ironbark	Myrtaceae	10	5		Tree (TG)	No	
cass laev	*Cassinia laevis*	Cough Bush	Asteraceae	0.1	4		Shrub (SG)	No	
dill juni	*Dillwynia juniperina*		Fabaceae	5	35		Shrub (SG)	No	#N/A
lept diva	*Leptospermum divaricat*		Myrtaceae	0.2	5		Shrub (SG)	No	lept
sola cine	*Solanum cinereum*	Narrawa Burr	Solanaceae	0.1	3		Shrub (SG)	No	
aris behr	*Aristida behriana*	Bunch Wiregrass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
aust dens	*Austrostipa densiflora*	Foxtail Speargrass	Poaceae	45	1000		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.2	200		Grass & grasslike (GG)	No	
micr stip	*Microlaena stipoides*	Weeping Grass	Poaceae	0.1	2		Grass & grasslike (GG)	No	
pani	*Panicum spp.*	Panicum	Poaceae	1	500		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.1	2		Grass & grasslike (GG)	No	
ryti carp	*Rytidosperma carphoide*	Short Wallaby Grass	Poaceae	0.1	5		Grass & grasslike (GG)	No	
ryti long	*Rytidosperma longifoliu*	Long-leaved Wallaby Grass	Poaceae	1	400		Grass & grasslike (GG)	No	
ryti race	*Rytidosperma racemosu*	Wallaby Grass	Poaceae	0.1	20		Grass & grasslike (GG)	No	
scho apog	*Schoenus apogon*	Fluke Bogrush	Cyperaceae	0.1	1		Grass & grasslike (GG)	No	
acti gibb	*Actinotus gibbonsii*		Apiaceae	0.1	1		Forb (FG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	4	2000		Forb (FG)	No	
calo cune	*Calotis cuneata*	Mountain Burr-Daisy	Asteraceae	0.1	100		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	15		Forb (FG)	No	
eina hast	*Einadia hastata*	Berry Saltbush	Chenopodiace	0.1	20		Forb (FG)	No	
gono elat	*Gonocarpus elatus*	A Raspwort	Haloragaceae	45	5000		Forb (FG)	No	
good hede hede	*Goodenia hederacea sub*		Goodeniaceae	0.5	300		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	10		Forb (FG)	No	
poma umbe	*Pomax umbellata*	Pomax	Rubiaceae	0.2	200		Forb (FG)	No	
wahl grac	*Wahlenbergia gracilenta*	Annual Bluebell	Campanulace	0.1	100		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	200		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	50		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.2	200		Fern (EG)	No	
cony parv	*Conyza parva*	Fleabane	Asteraceae	0.1	5	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	20	*		No	
loli pere	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.1	3	*		No	
phyt octa	*Phytolacca octandra*	Inkweed	Phytolaccacea	0.1	1	*		No	

BAM Site Field Survey									
Project:	20 332	**Plot Identifier**	plot 5	**Pic 20x20**	8989	**Pic 20x50**			
Survey date:	10th nov 20		**Compass Orientation (head of 20x20 plot)**				93 degrees e		
Recorders	gyoung pwolfendon		**PCT:**						
GPS Easting	639843	**GPS Northing**	6428080		**Datum**	utm	**Zone**	55	
Landform			**Soils**			**Drainage & Slope**			
Morphology	lower slope		**Soil Texture**	sandy		**Slope**	flat		
LandF Element			**Soil Colour**	orange pink		**Aspect**	na		
LandF Pattern			**Soil Depth**	shallow		**Drainage**			
Microrelief			**Geology**			**Watercourses**			

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	1	0	
Cultivation	0		
Soil erosion	0		
Firewood	1	0	
Grazing	1	0	
Fire Damage	0		
Storm Damage	1		
Weediness	0		
Other	die back drought		

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

vacant bushland, sheep grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

1 to 15cm dbh

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

occasional sheep

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**sideroxylon**

FUNCTION

Function attributes for	plot 5

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	2
	Shrub (SG)	6
	Forb (FG)	14
	Grass & grasslike (GG)	6
	Fern (EG)	1
	Other (OG)	0
	TOTAL	29

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	7
	Shrub (SG)	0.6
	Forb (FG)	61.3
	Grass & grasslike (GG)	0.8
	Fern (EG)	5
	Other (OG)	0
	TOTAL Native	74.7
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	98%	94.2%	8991
	15m	100%		8992
	25m	85%		8993
	35m	90%		8994
	45m	98%		8995
Bare ground cover	5m	2%	9.4%	
	15m	15%		
	25m	10%		
	35m	20%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts				
DBH (cm)	Euc	Non Euc	Hollows	
>80			0	
50-79			0	
30-49			0	
20-29	1	10	0	lots of trees dead callitris
10-19	11	20	0	
5-9	3	35	0	
<5		42	N/A	
Length of logs (m)		73		

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	plot 5

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	5	7		Tree (TG)	No	
euca deal	*Eucalyptus dealbata*	Tumbledown Red Gum	Myrtaceae	2	3		Tree (TG)	No	
acac	*Acacia spp.*	Wattle	Fabaceae (Mi	0.1	1		Shrub (SG)	No	
brac daph	*Brachyloma daphnoides*	Daphne Heath	Ericaceae	0.1	1		Shrub (SG)	No	
caly tetr	*Calytrix tetragona*	Common Fringe-myrtle	Myrtaceae	0.1	1		Shrub (SG)	No	
davi mimo	*Daviesia mimosoides*		Fabaceae (Fab	0.1	1		Shrub (SG)	No	
liss stri	*Lissanthe strigosa*	Peach Heath	Ericaceae	0.1	1		Shrub (SG)	No	
meli urce	*Melichrus urceolatus*	Urn Heath	Ericaceae	0.1	1		Shrub (SG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.2	100		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	50		Grass & grasslike (GG)	No	
loma fili cori	*Lomandra filiformis subs*	Wattle Matt-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
loma mult mult	*Lomandra multiflora sub*	Many-flowered Mat-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.2	300		Grass & grasslike (GG)	No	
scho pung	*Schoenoplectus pungens*		Cyperaceae	0.1	1		Grass & grasslike (GG)	No	
acti gibb	*Actinotus gibbonsii*		Apiaceae	60	2000		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Purple Burr Daisy	Asteraceae	0.1	20		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	1		Forb (FG)	No	
euch spha	*Euchiton sphaericus*	Star Cudweed	Asteraceae	0.1	1		Forb (FG)	No	
gono tetr	*Gonocarpus tetragynus*	Poverty Raspwort	Haloragaceae	0.1	5		Forb (FG)	No	
good hede hede	*Goodenia hederacea sub*		Goodeniacea	0.1	10		Forb (FG)	No	
laxm grac	*Laxmannia gracilis*	Slender Wire Lily	Anthericacea	0.1	1		Forb (FG)	No	
micr parv	*Microtis parviflora*	Slender Onion Orchid	Orchidaceae	0.1	1		Forb (FG)	No	
sene quad	*Senecio quadridentatus*	Cotton Fireweed	Asteraceae	0.1	1		Forb (FG)	No	
styp glau	*Stypandra glauca*	Nodding Blue Lily	Phormiaceae	0.1	5		Forb (FG)	No	
tric elat	*Tricoryne elatior*	Yellow Autumn-lily	Anthericacea	0.1	5		Forb (FG)	No	
wahl grac	*Wahlenbergia gracilis*	Australian Bluebell	Campanulace	0.1	5		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	200		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	3		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	5	3000		Fern (EG)	No	
digi sang	*Digitaria sanguinalis*	Crab Grass	Poaceae	0.1	1	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	200	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	1	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	1	*		No	

BAM Site Field Survey								
Project:	20 332	**Plot Identifier**	plot 6	**Pic 20x20**	9015	**Pic 20x50**		
Survey date:	11/11/2020		**Compass Orientation (head of 20x20 plot)**				2 degrees north	
Recorders	gyoung pwolfendon		**PCT:**					
GPS Easting	639399	**GPS Northing**	6427013		**Datum**	utm	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	midrise		**Soil Texture**	sandy		**Slope**	1 degree	
LandF Element			**Soil Colour**	light orange		**Aspect**	north	
LandF Pattern			**Soil Depth**	shallow		**Drainage**	well drained	
Microrelief			**Geology**	quartz sandstone like		**Watercourses**	none	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	0		
Cultivation	0		
Soil erosion	0		
Firewood	1	O	odd cut stump
Grazing	2	R	sheep
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

5 to 30cm

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

sheep grazing

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**E dealbata**

FUNCTION

Function attributes for	plot 6

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	2
	Shrub (SG)	4
	Forb (FG)	12
	Grass & grasslike (GG)	6
	Fern (EG)	1
	Other (OG)	0
	TOTAL	25

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	22
	Shrub (SG)	0.4
	Forb (FG)	1.3
	Grass & grasslike (GG)	0.6
	Fern (EG)	0.1
	Other (OG)	0
	TOTAL Native	24.4
	TOTAL 'HTE'	0.1

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	95%	91.2%	9016
	15m	75%		9017
	25m	90%		9018
	35m	98%		9019
	45m	98%		9020
Bare ground cover	5m	5%	8.2%	
	15m	25%		
	25m	5%		
	35m	2%		
	45m	4%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			0
50-79			0
30-49			0
20-29	10		0
10-19	16	16	0
5-9	5	57	0
<5	1	40	N/A
Length of logs (m)		101	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	plot 6

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	12	60		Tree (TG)	No	
euca side	*Eucalyptus sideroxylon*	Mugga ironbark	Myrtaceae	10	9		Tree (TG)	No	
acac	*Acacia spp.*	Wattle	Fabaceae (Mi	0.1	1		Shrub (SG)	No	
meli urce	*Melichrus urceolatus*	Urn Heath	Ericaceae	0.1	1		Shrub (SG)	No	
ozot dios	*Ozothamnus diosmifolius*	White Dogwood	Asteraceae	0.1	1		Shrub (SG)	No	
phyl hirt	*Phyllanthus hirtellus*	Thyme Spurge	Phyllanthacea	0.1	1		Shrub (SG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.1	3		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
loma fili cori	*Lomandra filiformis subs*	Wattle Matt-rush	Lomandracea	0.1	2		Grass & grasslike (GG)	No	
pani effu	*Panicum effusum*	Hairy Panic	Poaceae	0.1	1		Grass & grasslike (GG)	No	
pani quee	*Panicum queenslandicun*	Yadbila Grass	Poaceae	0.1	200		Grass & grasslike (GG)	No	
ryti carp	*Rytidosperma carphoide*	Short Wallaby Grass	Poaceae	0.1	50		Grass & grasslike (GG)	No	
calo cune	*calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.1	30		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	1		Forb (FG)	No	
euch spha	*Euchiton sphaericus*	Star Cudweed	Asteraceae	0.1	50		Forb (FG)	No	
good hede hede	*Goodenia hederacea sub*		Goodeniacea	0.1	5		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	1		Forb (FG)	No	
sene quad	*Senecio quadridentatus*	Cotton Fireweed	Asteraceae	0.1	1		Forb (FG)	No	
sene quad	*Senecio quadridentatus*	Cotton Fireweed	Asteraceae	0.1	1		Forb (FG)	No	
vitt cune	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	1		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	20		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	1		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.2	2000		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	1		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.1	3		Fern (EG)	No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	1	*		HTE	
cirs vulg	*Cirsium vulgare*	Spear Thistle	Asteraceae	0.1	1	*		No	
cony bona	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	0.1	10	*		No	
gamo purp	*Gamochaeta purpurea*	Purple Cudweed	Asteraceae	0.1	1	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.2	200	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	1	*		No	

BAM Site Field Survey								
Project:	20 332	**Plot Identifier**	plot 8	**Pic 20x20**	9027	**Pic 20x50**		
Survey date:	12th nov 20		**Compass Orientation (head of 20x20 plot)**					
Recorders	gyoung pwolfden		**PCT:**					
GPS Easting	638748	**GPS Northing**	6427459		**Datum**	utm	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	creek flat		**Soil Texture**	sandy loam		**Slope**	flat	
LandF Element			**Soil Colour**	light orange		**Aspect**	na	
LandF Pattern			**Soil Depth**			**Drainage**	well drained	
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	1	O	
Cultivation	2	O	
Soil erosion	3	R	severe gully erosion
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	2		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

farm watercourse

Age class of trees (DBH range) , Condition of Vegetation, Hollows

0 to 15cm, cypress only

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

nearby cultivation

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**E camaldulense**

FUNCTION

Function attributes for	plot 8

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	0
	Forb (FG)	18
	Grass & grasslike (GG)	11
	Fern (EG)	1
	Other (OG)	2
	TOTAL	33

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	8
	Shrub (SG)	0
	Forb (FG)	12.2
	Grass & grasslike (GG)	3.1
	Fern (EG)	0.1
	Other (OG)	0.2
	TOTAL Native	23.6
	TOTAL 'HTE'	0.1

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19		1	
5-9		49	
<5		13	N/A
Length of logs (m)		13	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	0%	15.0%	9032
	15m	20%		9031
	25m	30%		9030
	35m	15%		9029
	45m	10%		9028
Bare ground cover	5m	0%	9.0%	
	15m	5%		
	25m	0%		
	35m	15%		
	45m	25%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for	plot 8

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	8	38		Tree (TG)	No	
conv micr	*Convolvulus microsepalu*		Convolvulacea	0.1	1		Other (OG)	No	
glyc taba	*Glycine tabacina*	Variable Glycine	Fabaceae (Fab	0.1	200		Other (OG)	No	
amph nerv	*Amphibromus nervosus*	Swamp Wallaby Grass	Poaceae	0.1	40		Grass & grasslike (GG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.1	50		Grass & grasslike (GG)	No	
both macr	*Bothriochloa macra*	Red Grass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
chlo trun	*Chloris truncata*	Windmill Grass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
erag brow	*Eragrostis brownii*	Brown's Lovegrass	Poaceae	0.1	2		Grass & grasslike (GG)	No	
erag parv	*Eragrostis parviflora*	Weeping Lovegrass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
junc fili	*Juncus filicaulis*		Juncaceae	0.1	1		Grass & grasslike (GG)	No	
pani	*Panicum spp.*	Panicum	Poaceae	0.2	500		Grass & grasslike (GG)	No	
pasp	*Paspalidium spp.*		Poaceae	0.1	10		Grass & grasslike (GG)	No	
pasp dist	*Paspalum distichum*	Water Couch	Poaceae	2	2000		Grass & grasslike (GG)	No	
scho	*Schoenoplectus spp.*		Cyperaceae	0.1	3		Grass & grasslike (GG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	0.1	50		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.1	3		Forb (FG)	No	
cham drum	*Chamaesyce drummondi*	Caustic Weed	Euphorbiacea	0.1	10		Forb (FG)	No	
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	10	5000		Forb (FG)	No	
cras seib	*Crassula sieberiana*	Australian Stonecrop	Crassulaceae	0.1	10	#N/A	Forb (FG)	No	#N/A
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	1		Forb (FG)	No	
dich repe	*Dichondra repens*	Kidney Weed	Convolvulacea	0.1	1		Forb (FG)	No	
halo	*Haloragis spp.*	A Raspwort	Haloragaceae	0.2	100		Forb (FG)	No	
hydr laxi	*Hydrocotyle laxiflora*	Stinking Pennywort	Apiaceae	0.1	4		Forb (FG)	No	
hype gram	*Hypericum gramineum*	Small St John's Wort	Clusiaceae	0.5	2000		Forb (FG)	No	
linu marg	*Linum marginale*	Native Flax	Linaceae	0.1	10		Forb (FG)	No	
lyth hyss	*Lythrum hyssopifolia*	Hyssop Loosestrife	Lythraceae	0.1	5		Forb (FG)	No	
ment satu	*Mentha satureioides*	Native Pennyroyal	Lamiaceae	0.1	5		Forb (FG)	No	
micr parv	*Microtis parviflora*	Slender Onion Orchid	Orchidaceae	0.1	4		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	50		Forb (FG)	No	
vitt cune	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	5		Forb (FG)	No	
wahl grac	*Wahlenbergia gracilenta*	Annual Bluebell	Campanulacea	0.1	40		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	3		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.1	200		Fern (EG)	No	
aira	*Aira spp.*	A Hairgrass	Poaceae	0.1	50	*		No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	1	*		No	
briz maxi	*Briza maxima*	Quaking Grass	Poaceae	0.1	3	*		No	
briz maxi	*Briza maxima*	Quaking Grass	Poaceae	0.1	5	*		No	
briz mino	*Briza minor*	Shivery Grass	Poaceae	0.1	50	*		No	
briz mino	*Briza minor*	Shivery Grass	Poaceae	0.1	50	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	1	*		HTE	
cent eryt	*Centaurium erythraea*	Common Centaury	Gentianaceae	0.1	1	*		No	

cirs vulg	*Cirsium vulgare*	Spear Thistle	Asteraceae	0.1	1	*		No	
cony bona	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	0.1	10	*		No	
cycl lept	*Cyclospermum leptophyl*	Slender Celery	Apiaceae	0.1	1	*		No	
gamo purp	*Gamochaeta purpurea*	Purple Cudweed	Asteraceae	0.1	1	*		No	
loli pere	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.1	20	*		No	
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	2	*		No	
sile gall	*Silene gallica*	French Catchfly	Caryophyllace	0.1	1	*		No	
sisy rosu	*Sisyrinchium rosulatum*	#N/A	Iridaceae	20	5000	*		No	#N/A
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	10	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	10	*		No	
tolp barb	*Tolpis barbata*	Yellow Hawkweed	Asteraceae	0.1	2	*		No	
trif arve	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Fab	0.2	300	*		No	
trif camp	*Trifolium campestre*	Hop Clover	Fabaceae (Fab	0.1	200	*		No	
trif repe	*Trifolium repens*	White Clover	Fabaceae (Fab	0.1	10	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	50	*		No	

BAM Site Field Survey								
Project:	20 332	**Plot Identifier**	10	**Pic 20x20**	8972	**Pic 20x50**		
Survey date:	10th nov 20		**Compass Orientation (head of 20x20 plot)**				17 degrees north	
Recorders	gyoung pwolf		**PCT:**					
GPS Easting	640018	**GPS Northing**	6429303		**Datum**	utm	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	flat		**Soil Texture**	loamy		**Slope**	flat	
LandF Element	alluvial		**Soil Colour**	red brown		**Aspect**		
LandF Pattern			**Soil Depth**	1m		**Drainage**		
Microrelief			**Geology**			**Watercourses**	20m	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	1	O	
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

farmland

Age class of trees (DBH range) , Condition of Vegetation, Hollows

5 to 45cm

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

weeds

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

nobe obs

Dominant Species outside Plot	**same as in plot**

FUNCTION

Function attributes for	10

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	4
	Forb (FG)	12
	Grass & grasslike (GG)	12
	Fern (EG)	0
	Other (OG)	1
	TOTAL	30

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	15
	Shrub (SG)	0.6
	Forb (FG)	2
	Grass & grasslike (GG)	7.6
	Fern (EG)	0
	Other (OG)	0.1
	TOTAL Native	25.3
	TOTAL 'HTE'	0.4

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			0
50-79	1		0
30-49	2		0
20-29	1		0
10-19			0
5-9		1	0
<5		5	N/A
Length of logs (m)		11	

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	95%	77.0%	8975
	15m	80%		8976
	25m	100%		8977
	35m	10%		8976
	45m	100%		8975
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	10

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
euca pill	*Eucalyptus pilligaensis*	Narrow-leaved Grey Box	Myrtaceae	15	2		Tree (TG)	No	
acac moll	*Acacia mollifolia*		Fabaceae (Mi	0.2	2		Shrub (SG)	No	
cass laev	*Cassinia laevis*	Cough Bush	Asteraceae	0.1	1		Shrub (SG)	No	
mair micr	*Maireana microcarpa*		Chenopodiace	0.2	5		Shrub (SG)	No	
sola cine	*Solanum cinereum*	Narrawa Burr	Solanaceae	0.1	2		Shrub (SG)	No	
glyc clan	*Glycine clandestina*	Twining glycine	Fabaceae (Fab	0.1	400		Other (OG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.1	10		Grass & grasslike (GG)	No	
aust bige	*Austrostipa bigeniculata*	Yanganbil	Poaceae	3	1000		Grass & grasslike (GG)	No	
aust ramo	*Austrostipa ramosissima*	Stout Bamboo Grass	Poaceae	0.5	1000		Grass & grasslike (GG)	No	
care appr	*Carex appressa*	Tall Sedge	Cyperaceae	0.1	1		Grass & grasslike (GG)	No	
care inve	*Carex inversa*	Knob Sedge	Cyperaceae	3	750		Grass & grasslike (GG)	No	
elym scab	*Elymus scaber*	Common Wheatgrass	Poaceae	0.2	200		Grass & grasslike (GG)	No	
ento	*Entolasia spp.*		Poaceae	0.1	1		Grass & grasslike (GG)	No	
erag brow	*Eragrostis brownii*	Brown's Lovegrass	Poaceae	0.1	100		Grass & grasslike (GG)	No	
gahn aspe	*Gahnia aspera*	Rough Saw-sedge	Cyperaceae	0.2	30		Grass & grasslike (GG)	No	
pani effu	*Panicum effusum*	Hairy Panic	Poaceae	0.1	1		Grass & grasslike (GG)	No	
pani quee quee	*Panicum queenslandicum*	Yabila Grass	Poaceae	0.1	20		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.1	30		Grass & grasslike (GG)	No	
alte dent	*Alternanthera denticulat*	Lesser Joyweed	Amaranthace	0.1	1		Forb (FG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	0.1	30		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.5	1000		Forb (FG)	No	
cham dall	*Chamaesyce dallachyana*		Euphorbiacea	0.1	1		Forb (FG)	No	
cras sieb	*Crassula sieberiana*	Australian Stonecrop	Crassulaceae	0.1	2		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.5	1000		Forb (FG)	No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.1	2		Forb (FG)	No	
eina nuta	*Einadia nutans*	Climbing Saltbush	Chenopodiace	0.1	100		Forb (FG)	No	
ment satu	*Mentha satureioides*	Native Pennyroyal	Lamiaceae	0.1	20		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	100		Forb (FG)	No	
wahl comm	*Wahlenbergia communis*	Tufted Bluebell	Campanulace	0.1	1		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	2		Forb (FG)	No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	20	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	1	*		HTE	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.1	50			No	
cirs vulg	*Cirsium vulgare*	Spear Thistle	Asteraceae	0.1	1	*		No	
cony parv	*Conyza parva*	Fleabane	Asteraceae	0.1	1	*		No	
cycl lept	*Cyclospermum leptophyl*	Slender Celery	Apiaceae	0.1	40	*		No	
erag cili	*Eragrostis cilianensis*	Stinkgrass	Poaceae	0.1	2	*		No	
heli ampl	*Heliotropium amplexicau*	Blue Heliotrope	Boraginaceae	0.1	1	*		HTE	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	50	*		No	
lepi afri	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	20	*		No	
lyci fero	*Lycium ferocissimum*	African Boxthorn	Solanaceae	0.2	2	*		HTE	

lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	100	*		No	
paro bras	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian	Caryophyllace	0.1	100	*		No	
phyt octa	*Phytolacca octandra*	Inkweed	Phytolaccacea	0.1	1	*		No	
sile gall	*Silene gallica*	French Catchfly	Caryophyllace	0.2	500	*		No	
sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	0.1	10	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	5	*		No	
trif arve	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Fab	0.1	30	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	20	*		No	

BAM Site Field Survey								
Project:	20 332	**Plot Identifier**	11	**Pic 20x20**	8966	**Pic 20x50**		
Survey date:	10th nov 20		**Compass Orientation (head of 20x20 plot)**					
Recorders	GYoung P Wolfendon		**PCT:**					
GPS Easting	640404	**GPS Northing**	6429494		**Datum**	utm	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**	sand		**Slope**	flat	
LandF Element	creek alluvial		**Soil Colour**	light orange		**Aspect**	na	
LandF Pattern			**Soil Depth**	1M		**Drainage**	well drained	
Microrelief			**Geology**			**Watercourses**	10m east	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	2	O	
Cultivation	0		
Soil erosion	1		sheet
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

farm land

Age class of trees (DBH range) , Condition of Vegetation, Hollows

2 to 20cm

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

farming

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**cypress glaucophylla**

FUNCTION

Function attributes for	11

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	2
	Forb (FG)	16
	Grass & grasslike (GG)	6
	Fern (EG)	1
	Other (OG)	1
	TOTAL	27

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	15
	Shrub (SG)	0.3
	Forb (FG)	1.9
	Grass & grasslike (GG)	8.4
	Fern (EG)	0.1
	Other (OG)	0.1
	TOTAL Native	25.8
	TOTAL 'HTE'	0.2

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	15	0
10-19	0	11	0
5-9	0	26	0
<5	0	210	N/A
Length of logs (m)		7	

8 8 8 21

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	50%	36.0%	8967
	15m	40%		8968
	25m	70%		8969
	35m	0%		8970
	45m	20%		8971
Bare ground cover	5m	50%	56.0%	
	15m	50%		
	25m	20%		
	35m	100%		
	45m	60%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for	11

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	15	40		Tree (TG)	No	
acac moll	*Acacia mollifolia*		Fabaceae (Mi	0.2	2		Shrub (SG)	No	
dodo visc	*Dodonaea viscosa*	Sticky Hop-bush	Sapindaceae	0.1	1		Shrub (SG)	No	
glyc clan	*Glycine clandestina*	Twining glycine	Fabaceae (Fab	0.1	500		Other (OG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	3	2000		Grass & grasslike (GG)	No	
aust ramo	*Austrostipa ramosissima*	Stout Bamboo Grass	Poaceae	5	2000		Grass & grasslike (GG)	No	
erag brow	*Eragrostis brownii*	Brown's Lovegrass	Poaceae	0.1	500		Grass & grasslike (GG)	No	
junc aust	*Juncus australis*	Rush	Juncaceae	0.1	30		Grass & grasslike (GG)	No	
pani effu	*Panicum effusum*	Hairy Panic	Poaceae	0.1	50		Grass & grasslike (GG)	No	
pani	*Panicum spp.*	Panicum	Poaceae	0.1	1		Grass & grasslike (GG)	No	
alte dent	*Alternanthera denticulat*	Lesser Joyweed	Amaranthace	0.1	1		Forb (FG)	No	
calo cune	*calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.3	3000		Forb (FG)	No	
cham dall	*Chamaesyce dallachyana*		Euphorbiacea	0.1	20		Forb (FG)	No	
dauc gloc	*Daucus glochidiatus*	Native Carrot	Apiaceae	0.1	300		Forb (FG)	No	
dich repe	*Dichondra repens*	Kidney Weed	Convolvulacea	0.1	2		Forb (FG)	No	
eina nuta	*Einadia nutans*	Climbing Saltbush	Chenopodiace	0.1	5		Forb (FG)	No	
good hede	*Goodenia hederacea*	Ivy Goodenia	Goodeniaceae	0.1	1		Forb (FG)	No	
halo hete	*Haloragis heterophylla*	Variable Raspwort	Haloragaceae	0.1	5		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	2		Forb (FG)	No	
rume brow	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	2		Forb (FG)	No	
sida corr	*Sida corrugata*	Corrugated Sida	Malvaceae	0.1	50		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	1		Forb (FG)	No	
vitt cune	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.2	1000		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	1		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	20		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	30		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	0.1	300		Fern (EG)	No	
aira	*Aira spp.*	A Hairgrass	Poaceae	0.1	10	*		No	
cent tenu	*Centaurium tenuiflorum*	Branched Centaury, Slender cer	Gentianaceae	0.1	300	*		No	
cera glom	*Cerastium glomeratum*	Mouse-ear Chickweed	Caryophyllace	0.1	6	*		No	
cony bona	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	0.1	1	*		No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.1	1			No	
gamo amer	*gamochaeta americana*	Cudweed	Asteraceae	0.1	20	*		No	#N/A
heli ampl	*Heliotropium amplexicau*	Blue Heliotrope	Boraginaceae	0.1	1	*		HTE	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	50	*		No	
kick elat crin	*Kickxia elatine subsp. cri*	Twining Toadflax	Scrophulariac	0.1	1	*		No	
lyci fero	*Lycium ferocissimum*	African Boxthorn	Solanaceae	0.1	1	*		HTE	
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	5	*		No	
paro bras	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian	Caryophyllace	0.1	1	*		No	
paro bras	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian	Caryophyllace	0.1	50	*		No	
petr nant	*Petrorhagia nanteuilii*	Proliferous Pink	Caryophyllace	0.1	3	*		No	

poly tetr	*Polycarpon tetraphyllum*	Four-leaved Allseed	Caryophyllace	0.2	2000	*		No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.1	1			No	
sile gall	*Silene gallica*	French Catchfly	Caryophyllace	0.2	500	*		No	
sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	0.2	200	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	20	*		No	
sisy rosu	*sysyrinchium rosulatum*		Iridaceae	0.1	500	*		No	#N/A
tolp barb	*Tolpis barbata*	Yellow Hawkweed	Asteraceae	0.1	1	*		No	
trif arve	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Fab	0.5	2000	*		No	
trif camp	*Trifolium campestre*	Hop Clover	Fabaceae (Fab	5	2000	*		No	
trif repe	*Trifolium repens*	White Clover	Fabaceae (Fab	0.1	1	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	1	*		No	

BAM Site Field Survey									
Project:	20 332	**Plot Identifier**	plot 12	**Pic 20x20**	9009	**Pic 20x50**			
Survey date:	11/11/2020		**Compass Orientation (head of 20x20 plot)**				350 north		
Recorders	gyoung pwolf		**PCT:**						
GPS Easting	639933	**GPS Northing**	6426736		**Datum**	utm	**Zone**	55	
Landform			**Soils**			**Drainage & Slope**			
Morphology	low hill		**Soil Texture**	sandy loam		**Slope**	2 degrees		
LandF Element			**Soil Colour**	light orange		**Aspect**	south		
LandF Pattern			**Soil Depth**	10cm		**Drainage**	well drained		
Microrelief			**Geology**	sandstone ironstone		**Watercourses**	well away		

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	2	NR	
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	0		
Other	v stony		

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

uncultivated rocky shrubby

Age class of trees (DBH range) , Condition of Vegetation, Hollows

10cm regrowth

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

possible littke eagle sighting

Dominant Species outside Plot	**C endelicheri, E dealbata**

FUNCTION

Function attributes for	plot 12

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	10
	Forb (FG)	9
	Grass & grasslike (GG)	10
	Fern (EG)	0
	Other (OG)	0
	TOTAL	30

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0.4
	Shrub (SG)	12.9
	Forb (FG)	2
	Grass & grasslike (GG)	1.9
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	17.2
	TOTAL 'HTE'	0

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			0
50-79			0
30-49			0
20-29			0
10-19	2		0
5-9	3	1	0
<5	4	2	N/A
Length of logs (m)		19	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	25%	32.0%	9010
	15m	5%		9011
	25m	50%		9012
	35m	5%		9013
	45m	75%		9014
Bare ground cover	5m	10%	30.0%	
	15m	35%		
	25m	45%		
	35m	55%		
	45m	5%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	25%	20.0%	
	15m	50%		
	25m	5%		
	35m	5%		
	45m	15%		

COMPOSITION & STRUCTURE

Species recorded for	plot 12

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
euca deal	*Eucalyptus dealbata*	Tumbledown Red Gum	Myrtaceae	0.4	1		Tree (TG)	No	
brac daph	*Brachyloma daphnoides*	Daphne Heath	Ericaceae	0.1	1		Shrub (SG)	No	
caly tetr	*Calytrix tetragona*	Common Fringe-myrtle	Myrtaceae	0.1	3		Shrub (SG)	No	
cass laev	*Cassinia laevis*	Cough Bush	Asteraceae	12	120		Shrub (SG)	No	
dill juni	*Dillwynia juniperina*		Fabaceae	0.1	5	#N/A	Shrub (SG)	No	#N/A
dodo hete	*Dodonaea heteromorpha*	Maple-fruited Hop-bush	Sapindaceae	0.1	1		Shrub (SG)	No	
hibb obtu	*Hibbertia obtusifolia*	Hoary Guinea Flower	Dilleniaceae	0.1	3		Shrub (SG)	No	
lept diva	*Leptospermum divaricat*		Myrtaceae	0.1	3		Shrub (SG)	No	
ozot dios	*Ozothamnus diosmifolius*	White Dogwood	Asteraceae	0.1	1		Shrub (SG)	No	
pult micr	*Pultenaea microphylla*	A Bush Pea	Fabaceae (Fab	0.1	2		Shrub (SG)	No	
pult	*Pultenaea spp.*		Fabaceae (Fab	0.1	2		Shrub (SG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.2	100		Grass & grasslike (GG)	No	
aust dens	*Austrostipa densiflora*	Foxtail Speargrass	Poaceae	0.1	5		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	10		Grass & grasslike (GG)	No	
enne nigr	*Enneapogon nigricans*	Niggerheads	Poaceae	0.5	500		Grass & grasslike (GG)	No	
loma fili	*Lomandra filiformis*	Wattle Matt-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
loma fili cori	*Lomandra filiformis subs*	Wattle Matt-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
loma mult mult	*Lomandra multiflora sub*	Many-flowered Mat-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
pani effu	*Panicum effusum*	Hairy Panic	Poaceae	0.5	400		Grass & grasslike (GG)	No	
pani effu	*Panicum effusum*	Hairy Panic	Poaceae	0.1	1		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	0.1	20		Grass & grasslike (GG)	No	
acti gibb	*Actinotus gibbonsii*		Apiaceae	1	1000		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	0.1	200		Forb (FG)	No	
dian revo revo	*Dianella revoluta var. rev*	A Blue Flax Lily	Phormiaceae	0.2	10		Forb (FG)	No	
gono elat	*Gonocarpus elatus*	A Raspwort	Haloragaceae	0.2	400		Forb (FG)	No	
good hede hede	*Goodenia hederacea sub*		Goodeniacea	0.1	40		Forb (FG)	No	
laxm grac	*Laxmannia gracilis*	Slender Wire Lily	Anthericacea	0.1	20		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	1		Forb (FG)	No	
wahl	*Wahlenbergia spp.*	Bluebell	Campanulace	0.1	50		Forb (FG)	No	
xero visc	*Xerochrysum viscosum*	Sticky Everlasting	Asteraceae	0.1	5		Forb (FG)	No	
erag cili	*Eragrostis cilianensis*	Stinkgrass	Poaceae	0.1	2	*		No	
sonc oler	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	1	*		No	

BAM Site Field Survey								
Project:	20 332	**Plot Identifier**	plot 14	**Pic 20x20**	8982	**Pic 20x50**		
Survey date:	10th nov 20		**Compass Orientation (head of 20x20 plot)**				128 SE	
Recorders	gyoung pwolf		**PCT:**					
GPS Easting	640109	**GPS Northing**	6428277		**Datum**	utm	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	minor creek head		**Soil Texture**	brown loam		**Slope**	1 degree	
LandF Element			**Soil Colour**	dark briwn		**Aspect**	NW	
LandF Pattern			**Soil Depth**	1m		**Drainage**	minor watercourse	
Microrelief			**Geology**			**Watercourses**	inside minor channel	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	3		
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	0		
Fire Damage	0		
Storm Damage	0		
Weediness	2		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

farmland

Age class of trees (DBH range) , Condition of Vegetation, Hollows

none

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

weeds

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**E camaldulense added to bag not in plot, mugga**

FUNCTION

Function attributes for	plot 14

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	8
	Grass & grasslike (GG)	6
	Fern (EG)	0
	Other (OG)	0
	TOTAL	14

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	15.7
	Grass & grasslike (GG)	20.6
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	36.3
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	1%	2.5%	8983
	15m	1%		8984
	25m	1%		8985
	35m	5%		8986
	45m	5%		8987
Bare ground cover	5m	75%	34.6%	
	15m	1%		
	25m	20%		
	35m	2%		
	45m	75%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19			
5-9			
<5			N/A
Length of logs (m)			

no trees

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	plot 14

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.2	50		Grass & grasslike (GG)	No	
cyno dact	*Cynodon dactylon*	Common Couch	Poaceae	20	2000		Grass & grasslike (GG)	No	
junc fili	*Juncus filicaulis*		Juncaceae	0.1	1		Grass & grasslike (GG)	No	
lach fili	*Lachnagrostis filiformis*		Poaceae	0.1	10		Grass & grasslike (GG)	No	
pani quee	*Panicum queenslandicun*	Yadbila Grass	Poaceae	0.1	10		Grass & grasslike (GG)	No	
scho	*Schoenoplectus spp.*		Cyperaceae	0.1	1		Grass & grasslike (GG)	No	
alte dent	*Alternanthera denticulat*	Lesser Joyweed	Amaranthace	0.1	20		Forb (FG)	No	
calo lapp	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.1	2		Forb (FG)	No	
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	15	5000		Forb (FG)	No	
halo hete	*Haloragis heterophylla*	Variable Raspwort	Haloragaceae	0.1	1		Forb (FG)	No	
lyth hyss	*Lythrum hyssopifolia*	Hyssop Loosestrife	Lythraceae	0.1	30		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	10		Forb (FG)	No	
wahl grac	*Wahlenbergia gracilis*	Australian Blue Bell	Campanulace	0.1	200		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	2000		Forb (FG)	No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	3	*		No	
briz mino	*Briza minor*	Shivery Grass	Poaceae	0.1	1	*		No	
erag cili	*Eragrostis cilianensis*	Stinkgrass	Poaceae	20	2000	*		No	
erag pilo	*Eragrostis pilosa*	Soft Lovegrass	Poaceae	0.1	50	*		No	
gamo purp	*Gamochaeta purpurea*	Purple Cudweed	Asteraceae	0.1	20	*		No	
junc bufo	*Juncus bufonius*	Toad Rush	Juncaceae	0.1	5	*		No	
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	3	*		No	
sile gall	*Silene gallica*	French Catchfly	Caryophyllace	0.1	3	*		No	
sisy rosu	*Sisyrinchium rosulatum*	Scourweed	Iridaceae	0.1	1000	*		No	#N/A
sper rubr	*Spergularia rubra*	Sandspurry	Caryophyllace	0.1	30	*		No	
trif camp	*Trifolium campestre*	Hop Clover	Fabaceae (Fab	0.2	500	*		No	
trif cern	*Trifolium cernuum*	Drooping-flowered Clover	Fabaceae (Fab	0.1	1	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	5	*		No	

BAM Site Field Survey									
Project:	20 332	**Plot Identifier**	plot 15	**Pic 20x20**	9040	**Pic 20x50**			
Survey date:	12/11/2020		**Compass Orientation (head of 20x20 plot)**				244 SW		
Recorders	gyoung		**PCT:**						
GPS Easting	638637	**GPS Northing**	6428466		**Datum**	utm	**Zone**	55	
Landform			**Soils**			**Drainage & Slope**			
Morphology			**Soil Texture**	sand		**Slope**	4 degrees		
LandF Element			**Soil Colour**	orange		**Aspect**	48 degrees ne		
LandF Pattern	hill top		**Soil Depth**	10cm		**Drainage**	well drained		
Microrelief			**Geology**	sandstone ironstone		**Watercourses**	none near by		

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	2	O	
Cultivation	0		
Soil erosion	0		
Firewood	0		
Grazing	3	r	sheep
Fire Damage	0		
Storm Damage	2		fallen branches high wind area
Weediness	3	r	sheep camp
Other	ironstone knob		

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

10 to 150

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

sheep camp

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**Melia azaradack might be planted**

FUNCTION

Function attributes for	plot 15

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	2
	Shrub (SG)	1
	Forb (FG)	3
	Grass & grasslike (GG)	4
	Fern (EG)	0
	Other (OG)	0
	TOTAL	10

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	12
	Shrub (SG)	0.3
	Forb (FG)	0.3
	Grass & grasslike (GG)	0.4
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	13
	TOTAL 'HTE'	0.2

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80	4		0
50-79	1		0
30-49	1		0
20-29	1		0
10-19	0		0
5-9	0		0
<5	0		N/A
Length of logs (m)		45	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	50%	41.0%	9043
	15m	20%		9044
	25m	55%		9045
	35m	40%		9046
	45m	40%		9047
Bare ground cover	5m	30%	46.8%	
	15m	70%		
	25m	44%		
	35m	50%		
	45m	40%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	10%	16.2%	
	15m	10%		
	25m	1%		
	35m	10%		
	45m	50%		

COMPOSITION & STRUCTURE

Species recorded for	plot 15

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
euca micr	*Eucalyptus microcarpa*	Western Grey Box	Myrtaceae	5	2		Tree (TG)	No	
euca sider	*Eucalyptus sideroxylon*	Mugga Ironbark	Myrtaceae	7	2	#N/A	Tree (TG)	No	#N/A
sola cine	*Solanum cinereum*	Narrawa Burr	Solanaceae	0.3	13		Shrub (SG)	No	
aust ramo	*Austrostipa ramosissima*	Stout Bamboo Grass	Poaceae	0.1	30		Grass & grasslike (GG)	No	
chlo trun	*Chloris truncata*	Windmill Grass	Poaceae	0.1	2		Grass & grasslike (GG)	No	
cyno dact	*Cynodon dactylon*	Common Couch	Poaceae	0.1	10		Grass & grasslike (GG)	No	
pani quee	*Panicum queenslandicun*	Yadbila Grass	Poaceae	0.1	5		Grass & grasslike (GG)	No	
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	0.1	1		Forb (FG)	No	
eina nuta	*Einadia nutans*	Climbing Saltbush	Chenopodiace	0.1	20		Forb (FG)	No	
port oler	*Portulaca oleracea*	Pigweed	Portulacaceae	0.1	3		Forb (FG)	No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	1	*		No	
cucu	*Cucumis spp.*		Cucurbitaceae	0.1	1	*		No	
dysp pumi	*Dysphania pumilio*	Small Crumbweed	Chenopodiace	0.1	200			No	
erag cili	*Eragrostis cilianensis*	Stinkgrass	Poaceae	0.1	1	*		No	
gali parv	*Galinsoga parviflora*	Potato Weed	Asteraceae	0.5	300	*		No	
hord lepo	*Hordeum leporinum*	Barley Grass	Poaceae	0.1	3	*		No	
loli pere	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.1	1	*		No	
lyci fero	*Lycium ferocissimum*	African Boxthorn	Solanaceae	0.1	1	*		HTE	
paro bras	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian	Caryophyllace	0.1	10	*		No	
sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	0.2	150	*		No	
sper rubr	*Spergularia rubra*	Sandspurry	Caryophyllace	0.1	10	*		No	
trif glom	*Trifolium glomeratum*	Clustered Clover	Fabaceae (Fab	0.1	1	*		No	
urti uren	*Urtica urens*	Small Nettle	Urticaceae	0.1	50	*		No	
xant spin	*Xanthium spinosum*	Bathurst Burr	Asteraceae	0.1	1	*		HTE	

BAM Site Field Survey

Project:	20-332	**Plot Identifier**	7	**Pic 20x20**	6155	**Pic 20x50**	6156	
Survey date:	10/11/2020		**Compass Orientation (head of 20x20 plot)**					
Recorders	Alex S		**PCT:**					
GPS Easting	639778.72	**GPS Northing**	6429507.8		**Datum**	gda94	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**	flat	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**	not present	
Microrelief			**Geology**			**Watercourses**	not present	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	1		patch of v3g surrounded by cleared land
Cultivation	1		as above
Soil erosion	0		
Firewood	0		
Grazing	2		
Fire Damage	0		
Storm Damage	0		
Weediness	2		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing land

Age class of trees (DBH range) , Condition of Vegetation, Hollows

callitris dominant, mostly dead, dbh range low - 12-30, plus a few big eucs

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Grazing, weedy

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	

FUNCTION

Function attributes for	7

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	0
	Forb (FG)	7
	Grass & grasslike (GG)	3
	Fern (EG)	1
	Other (OG)	0
	TOTAL	12

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	5
	Shrub (SG)	0
	Forb (FG)	74.2
	Grass & grasslike (GG)	25.5
	Fern (EG)	15
	Other (OG)	0
	TOTAL Native	119.7
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	10%	19.0%	6157
	15m	5%		6158
	25m	10%		6159
	35m	30%		6160
	45m	40%		6161
Bare ground cover	5m	15%	8.0%	
	15m	15%		
	25m	0%		
	35m	5%		
	45m	5%		
Cryptogam cover	5m	10%	5.0%	
	15m	15%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	1		
50-79			
30-49			
20-29		11	
10-19		15	
5-9		12	
<5		2	N/A
Length of logs (m)		30	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	7

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	5	2		Tree (TG)	No	
aust dens	*Austrostipa densiflora*	Foxtail Speargrass	Poaceae	20	1000		Grass & grasslike (GG)	No	
loma long	*Lomandra longifolia*	Spiny-headed Mat-rush	Lomandracea	0.5	25		Grass & grasslike (GG)	No	
ryti eria	*Rytidosperma erianthum*	Wallaby Grass	Poaceae	5	1000		Grass & grasslike (GG)	No	
acti gibb	*Actinotus gibbonsii*		Apiaceae	50	50000		Forb (FG)	No	
calo cune	*Calotis cuniefolia*	Purple Burr Daisy	Asteraceae	2	50		Forb (FG)	No	
hype gram	*Hypericum gramineum*	Small St John's Wort	Clusiaceae	2	100		Forb (FG)	No	
micr unif	*Microtis unifolia*	Common Onion Orchid	Orchidaceae	0.1	3		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	5	1000		Forb (FG)	No	
wahl flum	*Wahlenbergia fluminalis*	River Bluebell	Campanulace	0.1	2		Forb (FG)	No	
xero brac	*Xerochrysum bracteatun*	Golden Everlasting	Asteraceae	15	250		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	15	5000		Fern (EG)	No	
aira	*Aira spp.*	A Hairgrass	Poaceae	2	30	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	15	10000	*		No	
tolp barb	*Tolpis barbata*	Yellow Hawkweed	Asteraceae	0.1	2	*		No	

BAM Site Field Survey								
Project:	20-332	**Plot Identifier**	9	**Pic 20x20**	6205	**Pic 20x50**	6206	
Survey date:	11/11/2020		**Compass Orientation (head of 20x20 plot)**				8 N	
Recorders	Alex S		**PCT:**					
GPS Easting	638432	**GPS Northing**	6427579		**Datum**	GDA94	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	ephemeral creek		**Soil Texture**			**Slope**	1 m sharp drop tocreek, flat outside creek	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**	sedimentary		**Watercourses**	plot runs through dry creek	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	0		surrounding land heavily cleared
Cultivation	1		
Soil erosion	1		
Firewood	0		
Grazing	1		
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

gukly surrounded by grazing pasture

Age class of trees (DBH range) , Condition of Vegetation, Hollows

broad age class of eucs and callitris, <5->80

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**Eucalyptus pilligaenensis**

FUNCTION

Function attributes for	9

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	3
	Shrub (SG)	4
	Forb (FG)	18
	Grass & grasslike (GG)	11
	Fern (EG)	0
	Other (OG)	1
	TOTAL	37

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	27.1
	Shrub (SG)	4.2
	Forb (FG)	19.4
	Grass & grasslike (GG)	22.4
	Fern (EG)	0
	Other (OG)	1
	TOTAL Native	74.1
	TOTAL 'HTE'	0.1

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	15%	32.0%	6207
	15m	10%		6208
	25m	40%		6209
	35m	50%		6210
	45m	45%		6211
Bare ground cover	5m	85%	38.0%	
	15m	30%		
	25m	30%		
	35m	30%		
	45m	15%		
Cryptogam cover	5m	0%	7.0%	
	15m	0%		
	25m	10%		
	35m	15%		
	45m	10%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	2		
50-79			
30-49			
20-29		1	
10-19		6	
5-9		19	
<5		33	N/A
Length of logs (m)			

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	9

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
allo vert	*Allocasuarina verticillata*	Drooping Sheoak	Casuarinaceae	0.1	1		Tree (TG)	No	
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	25	12		Tree (TG)	No	
euca pill	*Eucalyptus pilligaensis*	Narrow-leaved Grey Box	Myrtaceae	2	60		Tree (TG)	No	
acac moll	*Acacia mollifolia*		Fabaceae (Mi	0.1	1		Shrub (SG)	No	
myop	*Myoporum spp.*	Boobialla	Myoporaceae	2	1		Shrub (SG)	No	
ozot dios	*Ozothamnus diosmifolius*	White Dogwood	Asteraceae	2	6		Shrub (SG)	No	
sola cine	*Solanum cinereum*	Narrawa Burr	Solanaceae	0.1	1		Shrub (SG)	No	
glyc clan	*Glycine clandestina*	Twining glycine	Fabaceae (Fab	1	15		Other (OG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	0.5	30		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	5	2000		Grass & grasslike (GG)	No	
care appr	*Carex appressa*	Tall Sedge	Cyperaceae	2	30		Grass & grasslike (GG)	No	
cype diff	*Cyperus difformis*	Dirty Dora	Cyperaceae	2	23		Grass & grasslike (GG)	No	
cype grac	*Cyperus gracilis*	Slender Flat-sedge	Cyperaceae	0.5	3		Grass & grasslike (GG)	No	
elym scab	*Elymus scaber*	Common Wheatgrass	Poaceae	0.1	1		Grass & grasslike (GG)	No	
gahn	*Gahnia spp.*		Cyperaceae	10	52		Grass & grasslike (GG)	No	
junc aust	*Juncus australis*	Rush	Juncaceae	0.1	20		Grass & grasslike (GG)	No	
loma fili	*Lomandra filiformis*	Wattle Matt-rush	Lomandracea	2	20		Grass & grasslike (GG)	No	
loma mult mult	*Lomandra multiflora sub*	Many-flowered Mat-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
ryti fulv	*Rytidosperma fulvum*	Wallaby Grass	Poaceae	0.1	20		Grass & grasslike (GG)	No	
alte dent	*Alternanthera denticulat*	Lesser Joyweed	Amaranthace	0.1	15		Forb (FG)	No	
bulb bulb	*Bulbine bulbosa*	Bulbine Lily	Asphodelacea	5	200		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Mountain Burr-Daisy	Asteraceae	2	200		Forb (FG)	No	
cham drum	*Chamaesyce drummondi*	Caustic Weed	Euphorbiacea	0.1	25		Forb (FG)	No	
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	0.1	1		Forb (FG)	No	
dich repe	*Dichondra repens*	Kidney Weed	Convolvulacea	2	1000		Forb (FG)	No	
euch spha	*Euchiton sphaericus*	Star Cudweed	Asteraceae	0.5	20		Forb (FG)	No	
halo hete	*Haloragis heterophylla*	Variable Raspwort	Haloragaceae	0.1	30		Forb (FG)	No	
hype gram	*Hypericum gramineum*	Small St John's Wort	Clusiaceae	1	200		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	2	500		Forb (FG)	No	
plan vari	*Plantago varia*		Plantaginacea	0.1	10		Forb (FG)	No	
rume brow	*Rumex brownii*	Swamp Dock	Polygonaceae	5	50		Forb (FG)	No	
tric elat	*Tricoryne elatior*	Yellow Autumn-lily	Anthericaceae	0.1	1		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	10		Forb (FG)	No	
vitt cune	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	2		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	16		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.5	35		Forb (FG)	No	
xero brac	*Xerochrysum bracteatun*	Golden Everlasting	Asteraceae	0.5	10		Forb (FG)	No	
aira	*Aira spp.*	A Hairgrass	Poaceae	0.5	25	*		No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	1	*		No	
cent eryt	*Centaurium erythraea*	Common Centaury	Gentianaceae	0.5	25	*		No	
chon junc	*Chondrilla juncea*	Skeleton Weed	Asteraceae	0.1	5	*		No	

cony parv	*Conyza parva*	Fleabane	Asteraceae	0.1	30	*		No	
cycl lept	*Cyclospermum leptophyl*	Slender Celery	Apiaceae	0.1	1	*		No	
cype erag	*Cyperus eragrostis*	Umbrella Sedge	Cyperaceae	0.1	50	*		HTE	
gamo	*Gamochaeta spp.*		Asteraceae	0.2	20	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.5	15	*		No	
junc bufo	*Juncus bufonius*	Toad Rush	Juncaceae	20	2000	*		No	
lepi	*Lepidium spp.*	A Peppercress	Brassicaceae	0.5	17	*		No	
loli pere	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.5	30	*		No	
lysi arve	*Lysimachia arvensis*	Scarlet Pimpernel	Myrsinaceae	0.1	1	*		No	
sisy rosu	*Sisyrinchium rosulatum*	#N/A	Iridaceae	1	100	#N/A		No	#N/A
sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	1	30	*		No	
sonc	*Sonchus spp.*	Sowthistle	Asteraceae	0.1	15	*		No	
trif arve	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Fab	1	26	*		No	
vulp	*Vulpia spp.*	Rat's-tail Fescue	Poaceae	0.1	2	*		No	

BAM Site Field Survey								
Project:	20-332	**Plot Identifier**	13	**Pic 20x20**	6219	**Pic 20x50**	6220	
Survey date:	12/11/2020		**Compass Orientation (head of 20x20 plot)**				157	
Recorders	Alex as		**PCT:**					
GPS Easting	638670.13	**GPS Northing**	6427405.18		**Datum**	GDA94	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology	flat with low banks		**Soil Texture**	sandy clay		**Slope**	flat	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**			**Watercourses**	100 m E	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	3		
Cultivation	3		
Soil erosion	2		
Firewood	0		
Grazing	2		
Fire Damage	0		
Storm Damage	0		
Weediness	3		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

all <20 dbh

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

very cleared and weedy

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Callitris glaucophylla

FUNCTION

Function attributes for	13

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	1
	Forb (FG)	6
	Grass & grasslike (GG)	5
	Fern (EG)	1
	Other (OG)	2
	TOTAL	16

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	1
	Shrub (SG)	0.1
	Forb (FG)	0.6
	Grass & grasslike (GG)	31.1
	Fern (EG)	5
	Other (OG)	0.2
	TOTAL Native	38
	TOTAL 'HTE'	20

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	1%	9.2%	6221
	15m	10%		6222
	25m	15%		6223
	35m	10%		6224
	45m	10%		6225
Bare ground cover	5m	80%	17.0%	
	15m	5%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	5%	1.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49			
20-29			
10-19		2	
5-9			
<5			N/A
Length of logs (m)		0	

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	13

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
acac deal	*Acacia dealbata*	Silver Wattle	Fabaceae (Mi	1	1		Tree (TG)	FALSE	
kunz parv	*Kunzea parvifolia*	Violet Kunzea	Myrtaceae	0.1	6		Shrub (SG)	No	
conv angu angu	*Convolvulus angustissim*		Convolvulace	0.1	6		Other (OG)	No	
glyc clan	*Glycine clandestina*	Twining glycine	Fabaceae (Fa	0.1	50		Other (OG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.5	25		Grass & grasslike (GG)	No	
chlo trun	*Chloris truncata*	Windmill Grass	Poaceae	0.1	50		Grass & grasslike (GG)	No	
erag lacu	*Eragrostis lacunaria*	Purple Lovegrass	Poaceae	25	50000		Grass & grasslike (GG)	No	
lach fili	*Lachnagrostis filiformis*		Poaceae	5	1000		Grass & grasslike (GG)	No	
them tria	*Themeda triandra*		Poaceae	0.5	200		Grass & grasslike (GG)	No	
calo cune	*Calotis cuneata*	Mountain Burr-Daisy	Asteraceae	0.1	2		Forb (FG)	No	
hype gram	*Hypericum gramineum*	Small St John's Wort	Clusiaceae	0.1	30		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	20		Forb (FG)	No	
phyl virg	*Phyllanthus virgatus*	Wiry Spurge	Phyllanthacea	0.1	1		Forb (FG)	No	
trip pygm	*Triptilodiscus pygmaeus*	Common Sunray	Asteraceae	0.1	50		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	20		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	5	500		Fern (EG)	No	
arct cale	*Arctotheca calendula*	Capeweed	Asteraceae	0.1	15	*		No	
cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	10	1000	*		HTE	
cent eryt	*Centaurium erythraea*	Common Centaury	Gentianaceae	0.1	11	*		No	
cony parv	*Conyza parva*	Fleabane	Asteraceae	0.1	30	*		No	
gamo	*Gamochaeta spp.*		Asteraceae	0.1	20	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	25	*		No	
junc bufo	*Juncus bufonius*	Toad Rush	Juncaceae	1	500	*		No	
pasp dila	*Paspalum dilatatum*	Paspalum	Poaceae	10	10000	*		HTE	
sisy rosu	*Sisyrinchium rosulatum*	#N/A	#N/A	0.1	30	#N/A		No	#N/A
sper rubr	*Spergularia rubra*	Sandspurry	Caryophyllace	0.1	10	*		No	
trif arve	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Fa	1	1000	*		No	
trif camp	*Trifolium campestre*	Hop Clover	Fabaceae (Fa	0.1	1	*		No	
erag	*Eragrostis spp.*	A Lovegrass	Poaceae	0.1	12	*		No	

BAM Site Field Survey								
Project:	20-492	**Plot Identifier**	16	**Pic 20x20**	6183	**Pic 20x50**	6184	
Survey date:	10/11/2020		**Compass Orientation (head of 20x20 plot)**				20	
Recorders	AS		**PCT:**					
GPS Easting	638549.38	**GPS Northing**	6426987.12		**Datum**	GDA94	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**	rocky gully with sharp drop	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**	sedimentary		**Watercourses**	dried gully	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	1		
Cultivation	2		
Soil erosion	2		
Firewood	0		
Grazing	3		
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

1-80 - no eucs

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant soil erosion

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**C. glaucophylla**

FUNCTION

Function attributes for	16

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	2
	Forb (FG)	4
	Grass & grasslike (GG)	3
	Fern (EG)	1
	Other (OG)	0
	TOTAL	11

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	20
	Shrub (SG)	0.6
	Forb (FG)	2.1
	Grass & grasslike (GG)	15
	Fern (EG)	1
	Other (OG)	0
	TOTAL Native	38.7
	TOTAL 'HTE'	0

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79		1	
30-49			
20-29		6	
10-19		21	
5-9		12	
<5		85	N/A
Length of logs (m)			

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	0%	5.0%	6185
	15m	15%		6186
	25m	0%		6187
	35m	10%		6188
	45m	0%		6189
Bare ground cover	5m	50%	35.0%	
	15m	25%		
	25m	20%		
	35m	60%		
	45m	20%		
Cryptogam cover	5m	50%	12.2%	
	15m	5%		
	25m	5%		
	35m	1%		
	45m	0%		
Rock Cover	5m	1%	32.6%	
	15m	1%		
	25m	80%		
	35m	1%		
	45m	80%		

COMPOSITION & STRUCTURE

Species recorded for	16

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	20	26		Tree (TG)	No	
dill juni	*Dillwynia juniperina*	#N/A	Fabacaea	0.5	1	#N/A	Shrub (SG)	No	#N/A
mair aphy	*Maireana aphylla*	Cotton Bush	Chenopodiace	0.1	1		Shrub (SG)	No	
chlo trun	*Chloris truncata*	Windmill Grass	Poaceae	5	1000		Grass & grasslike (GG)	No	
dian revo revo	*Dianella revoluta var rev*	A Blue Flax Lily	Phormiaceae	5	1000		Grass & grasslike (GG)	No	
ryti fulv	*Rytidosperma fulvum*	Wallaby Grass	Poaceae	5	1000		Grass & grasslike (GG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	0.5	50		Forb (FG)	No	
bulb bulb	*Bulbine bulbosa*	Bulbine Lily	Asphodelacea	0.1	10		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Purple Burr Daisy	Asteraceae	0.5	50		Forb (FG)	No	
wahl plan long	*Wahlenbergia planiflora*		Campanulace	1	50		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	1	25		Fern (EG)	No	
aira	*Aira sp*	A Hairgrass	Poaceae	0.5	50	*		No	
cony bona	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	1	30	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	1	*		No	
trif arve	*Trifolium arvensis*	Haresfoot Clover	Fabaceae (Fab	1	100	*		No	

BAM Site Field Survey								
Project:	20-492	**Plot Identifier**	1	**Pic 20x20**	6115	**Pic 20x50**	6116	
Survey date:	10/11/2020		**Compass Orientation (head of 20x20 plot)**				60 W	
Recorders	AS		**PCT:**	255				
GPS Easting	640858	**GPS Northing**	6429841.2		**Datum**	GDA94	**Zone**	55
Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**	loamy sand		**Slope**	flat	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**	not present	
Microrelief			**Geology**	granite		**Watercourses**	not present	

Plot Disturbance			
	Severity	**Age**	**Observational Evidence**
Clearing	0		inside plot uncleared though cleared surrounds
Cultivation	0		as above
Soil erosion	0		
Firewood	0		
Grazing	0		as above
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

linear roadside veg zone

Age class of trees (DBH range) , Condition of Vegetation, Hollows

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

surrounding area very cleared

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for	1

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	3
	Shrub (SG)	6
	Forb (FG)	10
	Grass & grasslike (GG)	5
	Fern (EG)	0
	Other (OG)	0
	TOTAL	24

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	105
	Shrub (SG)	9.2
	Forb (FG)	19.4
	Grass & grasslike (GG)	38.1
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	171.7
	TOTAL 'HTE'	0

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	55%	69.0%	6117
	15m	90%		6118
	25m	20%		6119
	35m	95%		6120
	45m	85%		6121
Bare ground cover	5m	5%	2.0%	
	15m	0%		
	25m	5%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49	9		
20-29	15		
10-19	22	4	
5-9	38	22	
<5	11	13	N/A
Length of logs (m)	12		

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

COMPOSITION & STRUCTURE

Species recorded for	1

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
acac deal	*Acacia dealbata*	Silver Wattle	Fabaceae (Mi	10	2		Tree (TG)	FALSE	
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	20	13		Tree (TG)	No	
euca pill	*Eucalyptus pilligaensis*	Narrow-leaved Grey Box	Myrtaceae	15	17		Tree (TG)	No	
euca side	*Eucalyptus sideroxylin*	Mugga Ironbark	Myrtaceae	70	37		Tree (TG)	No	
burs spin	*Bursaria spinosa*	Native Blackthorn	Pittosporacea	0.1	1		Shrub (SG)	No	
dill juni	*Dillwynia juniperina*	#N/A	Fabaceae	2	12	#N/A	Shrub (SG)	No	#N/A
erem debi	*Eremophila debilis*	Amulla	Myoporaceae	3	30		Shrub (SG)	No	
erem dese	*Eremophila deserti*	Turkeybush	Myoporaceae	0.1	1		Shrub (SG)	No	
myop mont	*Myoporum montanum*	Western Boobialla	Myoporaceae	1	1		Shrub (SG)	No	
ozot dios	*Ozothamnus diosmifolius*	White Dogwood	Asteraceae	3	12		Shrub (SG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	10	1000		Grass & grasslike (GG)	No	
loma fili	*Lomandra filiformis*	Wattle Matt-rush	Lomandracea	3	80		Grass & grasslike (GG)	No	
loma long	*Lomandra longifolia*	Spiny-headed Mat-rush	Lomandracea	0.1	1		Grass & grasslike (GG)	No	
ryti caes	*Rytidosperma caespitosu*	Ringed Wallaby Grass	Poaceae	20	2000		Grass & grasslike (GG)	No	
ryti race race	*Rytidosperma racemosu*	Wallaby Grass	Poaceae	5	200		Grass & grasslike (GG)	No	
bulb alat	*Bulbine alata*	Native Onion	Asphodelacea	0.1	10		Forb (FG)	No	
calo cune	*Calotis cuneifolia*	Purple Burr Daisy	Asteraceae	5	200		Forb (FG)	No	
dian revo	*Dianella revoluta*	Blueberry Lily	Phormiaceae	3	60		Forb (FG)	No	
eina hast	*Einadia hastata*	Berry Saltbush	Chenopodiace	4	200		Forb (FG)	No	
eina nuta	*Einadia nutans*	Climbing Saltbush	Chenopodiace	1	50		Forb (FG)	No	
euch spha	*Euchiton sphaericus*	Star Cudweed	Asteraceae	0.1	10		Forb (FG)	No	
hype gram	*Hypericum gramineum*	Small St John's Wort	Clusiaceae	5	500		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	1		Forb (FG)	No	
vitt grac	*Vittadinia gracilis*	Woolly New Holland Daisy	Asteraceae	0.1	1		Forb (FG)	No	
xero brac	*Xerochrysum bracteatum*	Golden Everlasting	Asteraceae	1	14		Forb (FG)	No	
chon junc	*Chondrilla juncea*	Skeleton Weed	Asteraceae	0.1		*		No	
cirs vulg	*Cirsium vulgare*	Spear Thistle	Asteraceae	0.1	1	*		No	
gali parv	*Galinsoga parviflora*	Potato Weed	Asteraceae	0.1	1	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.5	40	*		No	
loli pere	*Lolium perenne*	Perennial Ryegrass	Poaceae	5	1000	*		No	
sola nigr	*Solanum nigrum*	Black-berry Nightshade	Solanaceae	0.1	1	*		No	
sper rubr	*Spergularia rubra*	Sandspurry	Caryophyllace	0.1	1	*		No	
verb bona	*Verbena bonariensis*	Purpletop	Verbenaceae	0.1	1	*		No	

BAM Site Field Survey

Project:	20-492	**Plot Identifier**	2	**Pic 20x20**	6242	**Pic 20x50**	6243	
Survey date:	13/11/2020		**Compass Orientation (head of 20x20 plot)**				26	
Recorders	AS		**PCT:**	255				
GPS Easting	639079.15	**GPS Northing**	6429130.46		**Datum**	GDA94	**Zone**	55

Landform		**Soils**		**Drainage & Slope**	
Morphology	gentle slope approx 5 degree	**Soil Texture**	sandy clay	**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	
Microrelief		**Geology**		**Watercourses**	none

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	1		
Cultivation	0		
Soil erosion	2		
Firewood	2	within 1 year	trees felled around plot
Grazing	1		
Fire Damage	0		
Storm Damage	0		
Weediness	1		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

sheep grazing land

Age class of trees (DBH range) , Condition of Vegetation, Hollows

<5 -30 dbh

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot	**e. pillagaenensis**

FUNCTION

Function attributes for	2

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of Native Richness	Tree (TG)	2
	Shrub (SG)	3
	Forb (FG)	11
	Grass & grasslike (GG)	2
	Fern (EG)	1
	Other (OG)	0
	TOTAL	19

BAM Attribute (20x20m plot)		
	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	12
	Shrub (SG)	1.2
	Forb (FG)	6.1
	Grass & grasslike (GG)	45.1
	Fern (EG)	20
	Other (OG)	0
	TOTAL Native	84.4
	TOTAL 'HTE'	0.1

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80			
50-79			
30-49	2		
20-29	2	9	
10-19	4	32	
5-9		29	
<5		15	N/A
Length of logs (m)	111		

0.1%=63x63cm
0.5%=1.4x1.4m
1%=2×2m
5%=4×5m
25%=10×10m

BAM Attributes (1 x 1m Plots)				
	Tape length	% cover	Average %	Photos
Litter Cover	5m	30%	48.0%	6265
	15m	40%		6266
	25m	40%		6267
	35m	40%		6268
	45m	90%		6269
Bare ground cover	5m	10%	6.6%	
	15m	5%		
	25m	5%		
	35m	10%		
	45m	3%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

COMPOSITION & STRUCTURE

Species recorded for	2

Abbreviation	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status
call glau	*Callitris glaucophylla*	White Cypress Pine	Cupressaceae	10	12		Tree (TG)	No	
euca side	*Eucalyptus siderophloia*	Grey Ironbark	Myrtaceae	2	200		Tree (TG)	No	
caly tetr	*Calytrix tetragona*	Common Fringe-myrtle	Myrtaceae	0.1	5		Shrub (SG)	No	
hibb ripa	*Hibbertia riparia*		Dilleniaceae	0.1	20		Shrub (SG)	No	
meli urce	*Melichrus urceolatus*	Urn Heath	Ericaceae	1	13		Shrub (SG)	No	
aris ramo	*Aristida ramosa*	Purple Wiregrass	Poaceae	45	50000		Grass & grasslike (GG)	No	
aust scab	*Austrostipa scabra*	Speargrass	Poaceae	0.1	25		Grass & grasslike (GG)	No	
brun aust	*Brunonia australis*	Blue Pincushion	Goodeniaceae	1	50		Forb (FG)	No	
calo cuni	*Calotis cuniefolia*	#N/A	Asteracaea	0.1	10		Forb (FG)	No	
chry apic	*Chrysocephalum apicula*	Common Everlasting	Asteraceae	1	60		Forb (FG)	No	
cotu aust	*Cotula australis*	Common Cotula	Asteraceae	1	80		Forb (FG)	No	
euch spha	*Euchiton sphaericus*	Star Cudweed	Asteraceae	0.1	1		Forb (FG)	No	
good glab	*Goodenia glabra*	Smooth Goodenia	Goodeniaceae	0.5	20		Forb (FG)	No	
good hete hete	*Goodenia heterophylla s*		Goodeniaceae	2	100		Forb (FG)	No	
oxal pere	*Oxalis perennans*		Oxalidaceae	0.1	6		Forb (FG)	No	
wahl mult	*Wahlenbergia multicauli*	Tadgell's Bluebell in the local go	Campanulace	0.1	8		Forb (FG)	No	
wahl stri	*Wahlenbergia stricta*	Tall Bluebell	Campanulace	0.1	28		Forb (FG)	No	
xero brac	*Xerochrysum bracteatun*	Golden Everlasting	Asteraceae	0.1	1		Forb (FG)	No	
chei sieb	*Cheilanthes sieberi*	Rock Fern	Pteridaceae	20	30000		Fern (EG)	No	
aira	*Aira spp.*	A Hairgrass	Poaceae	0.1	50	*		No	
chon junc	*Chondrilla juncea*	Skeleton Weed	Asteraceae	0.1	6	*		No	
cony parv	*Conyza parva*	Fleabane	Asteraceae	0.1	10	*		No	
hypo radi	*Hypochaeris radicata*	Catsear	Asteraceae	0.1	28	*		No	
lepi afri	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	12	*		No	
Trad flum	*Tradescantia fluminensis*	Wandering Jew	Commelinace	0.1	3	*		HTE	

A.2 Plot Photos

<table>
<tr><td colspan="2">BAM Plot 1</td></tr>
<tr><td>Head of Plot</td><td>5 m Litter Plot</td></tr>
<tr><td> 
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<tr><td>15 m Litter Plot</td><td>25 m Litter plot</td></tr>
<tr><td> 
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<tr><td>35 m Litter Plot</td><td>45 m Litter Plot</td></tr>
</table>

	
BAM Plot 2	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot

	
35 m Litter Plot	45 m Litter Plot
	
BAM Plot 3	
Head of Plot	5 m Litter Plot

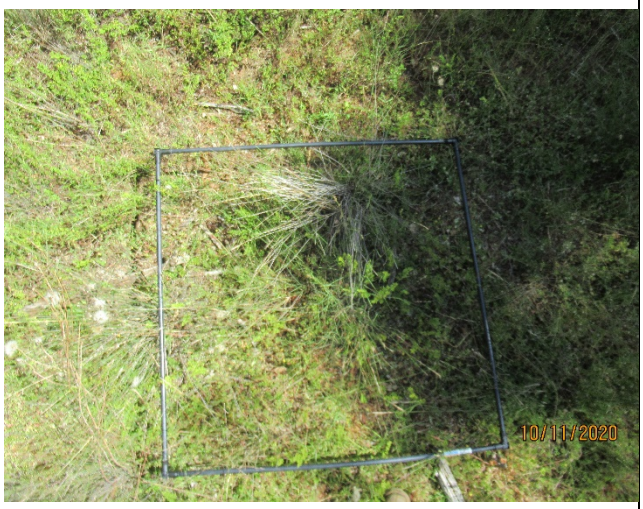
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot
	

BAM Plot 4	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot

	
BAM Plot 5	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot

	
35 m Litter Plot	45 m Litter Plot
	
BAM Plot 6	
Head of Plot	5 m Litter Plot

	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot
	

BAM Plot 7	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot

	
BAM Plot 8	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot

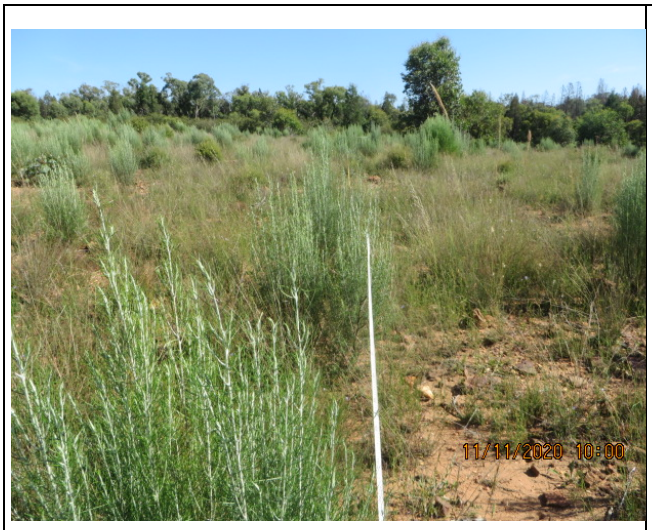
	
35 m Litter Plot	45 m Litter Plot
	
BAM Plot 9	
Head of Plot	5 m Litter Plot

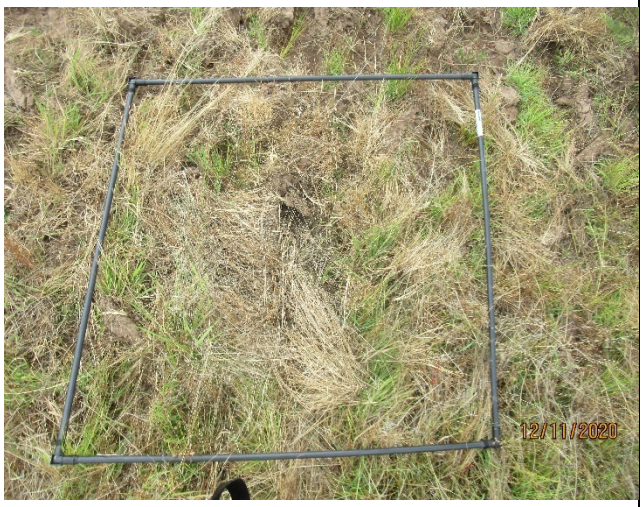
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot
	

BAM Plot 10	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot

	
BAM Plot 11	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot

	
35 m Litter Plot	45 m Litter Plot
	
BAM Plot 12	
Head of Plot	5 m Litter Plot

	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot
	

BAM Plot 13	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot

	
BAM Plot 14	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot

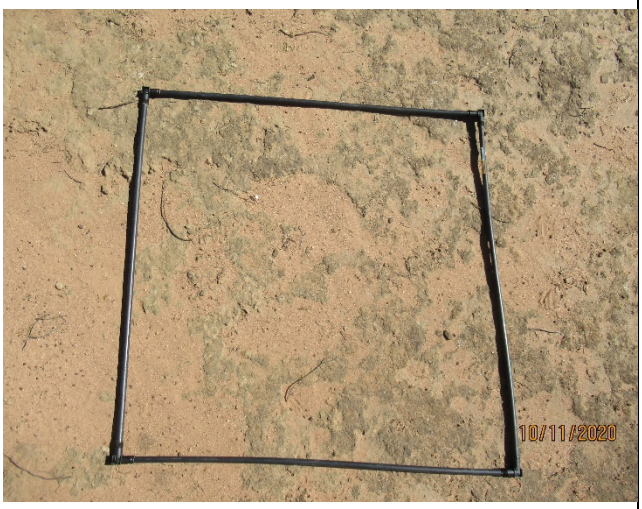
	
35 m Litter Plot	45 m Litter Plot
	
BAM Plot 15	
Head of Plot	5 m Litter Plot

15 m Litter Plot

25 m Litter plot

35 m Litter Plot

45 m Litter Plot

BAM Plot 16	
Head of Plot	5 m Litter Plot
	
15 m Litter Plot	25 m Litter plot
	
35 m Litter Plot	45 m Litter Plot


10/11/2020


10/11/2020

Appendix C Personnel

Name	Title	Qualifications	Role
Beth Noel	Senior Ecologist BAM Accredited Assessor (BAAS 19015)	Bachelor of Applied Science (Geology) (Hons) Master of Wildlife Management	BDAR review BAM Calculations
Brooke Marshall	NSW SE Manager BAM Accredited Assessor (BAAS 18149)	Bachelor of Natural Resources (Hons1) Certified Environmental Practitioner (CEnvP)	Project Director BDAR review
Gillian Young	Senior Ecologist BAM Accredited Assessor (BAAS 17086)	Bachelor of Natural Resources (Hons)	Field survey BDAR review
Alex Santiago	Ecologist	Bachelor of Biological Science (Hons1)	Field survey Primary BDAR author

Appendix D BAM Calculator Credit Report

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00023504/BAAS19015/21/00023545

Proposal Name
Forest Glen Solar Farm

BAM data last updated *
10/06/2021

Assessor Name
Elizabeth (Beth) Q Noel

Assessor Number
BAAS19015

BAM Data version *
45

Proponent Names

Report Created
12/07/2021

BAM Case Status
Open

Assessment Revision
5

Assessment Type
Major Projects

Date Finalised
To be finalised

* 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
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered Ecological Community	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

Species
Nil

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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
201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	0.4	0	9	9
255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Not a TEC	52.8	0	86	86

201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions This includes PCT's: 201, 202, 1384	-	201_moderate	No	9	Pilliga, Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_poor	No	0	Pilliga, Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_low	No	53	Pilliga, Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_moderate	No	33	Pilliga, Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00023504/BAAS19015/21/00023545

Proposal Name
Forest Glen Solar Farm

BAM data last updated *
10/06/2021

Assessor Name
Elizabeth (Beth) Q Noel

Assessor Number
BAAS19015

BAM Data version *
45

Proponent Name(s)

Report Created
12/07/2021

BAM Case Status
Open

Assessment Revision
5

Assessment Type
Major Projects

Date Finalised
To be finalised

* 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
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered Ecological Community	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

Species
Nil

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

BAM Biodiversity Credit Report (Variations)

Predicted Threatened Species Not On Site

Name
No Changes

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
201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	0.4	0	9	9.00
255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Not a TEC	52.8	0	86	86.00

201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions This includes PCT's: 201, 202, 1384	-	201_moderate	No	9	Pilliga,Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 1	201_moderate	No	9	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_poor	No	0	Pilliga,Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_low	No	53	Pilliga,Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests >=50% and <70%	255_moderate	No	33	Pilliga,Bogan-Macquarie, Castlereagh-Barwon, Inland Slopes, Kerrabee, Liverpool Plains, Liverpool Range, Pilliga Outwash and Talbragar Valley. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	255_poor	No	0	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	255_low	No	53	IBRA Region: Brigalow Belt South, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	255_moderate	No	33	IBRA Region: Brigalow Belt South, 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 options

BAM Candidate Species Report

Proposal Details

Assessment Id 00023504/BAAS19015/21/00023545	Proposal Name Forest Glen Solar Farm	BAM data last updated * 10/06/2021
Assessor Name Elizabeth (Beth) Q Noel	Report Created 12/07/2021	BAM Data version * 45
Assessor Number BAAS19015	Assessment Type Major Projects	BAM Case Status Open
Assessment Revision 5	Date Finalised To be finalised	

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List of Species Requiring Survey

Name	Presence	Survey Months
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Commersonia procumbens Commersonia procumbens	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Dichanthium setosum Bluegrass	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Diuris tricolor Pine Donkey Orchid	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Homoranthus darwinioides Fairy Bells	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Indigofera efoliata Leafless Indigo	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Lophochroa leadbeateri Major Mitchell's Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Monotaxis macrophylla Large-leafed Monotaxis	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox connivens Barking Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum sp. Wybong Prasophyllum sp. Wybong	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?

Pterostylis cobarensis Greenhood Orchid	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Swainsona sericea Silky Swainson-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Tylophora linearis Tylophora linearis	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Eastern Cave Bat	Vespadelus troughtoni	Habitat constraints
Eastern Pygmy-possum	Cercartetus nanus	Refer to BAR
Glossy Black-Cockatoo	Calyptorhynchus lathami	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
Pale-headed Snake	Hoplocephalus bitorquatus	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Spiny Peppercress	Lepidium aschersonii	Refer to BAR
Superb Parrot	Polytelis swainsonii	Refer to BAR

Swift Parrot	Lathamus discolor	Habitat constraints

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00023504/BAAS19015/21/00023545	Forest Glen Solar Farm	10/06/2021
Assessor Name	Report Created	BAM Data version *
Elizabeth (Beth) Q Noel	12/07/2021	45
Assessor Number	BAM Case Status	Date Finalised
BAAS19015	Open	To be finalised
Assessment Revision	Assessment Type	
5	Major Projects	

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion											
1	201_moderate	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	51	51.0	0.37	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	TRUE	9
										Subtotal	**9**
Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion											
2	255_poor	Not a TEC	5.7	5.7	48.1			High Sensitivity to Potential Gain	1.75		0
3	255_low	Not a TEC	37.6	37.6	3.2			High Sensitivity to Potential Gain	1.75		53
4	255_moderate	Not a TEC	48.7	48.7	1.5			High Sensitivity to Potential Gain	1.75		33
										Subtotal	**86**
										Total	**95**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00023504/BAAS19015/21/00023545		5	12/07/2021

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Elizabeth (Beth) Q Noel	BAAS19015	Forest Glen Solar Farm	Open

Assessment Type	Date Finalised
Major Projects	To be finalised

PCT list

Price calculated	PCT common name	Credits
Yes	**255 -** Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	86
Yes	**201 -** Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	9

Species list

Price calculated	Species	Credits

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

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pilliga	**255 -** Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	No	Western Slopes Dry Sclerophyll Forests >=50% and <70%	19.12%	$88.85	2.2129	$2,734.80	86	$235,192.69
Pilliga	**201 -** Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	Yes	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	19.38%	$287.12	2.3389	$8,856.14	9	$79,705.22

Subtotal (excl. GST)	**$314,897.91**
GST	**$31,489.79**
Total ecosystem credits (incl. GST)	**$346,387.70**

Biodiversity payment summary report

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total **$346,387.70**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00023504/BAAS19015/21/00023545	Forest Glen Solar Farm	10/06/2021
Assessor Name	Report Created	BAM Data version *
Elizabeth (Beth) Q Noel	12/07/2021	45
Assessor Number	Assessment Type	BAM Case Status
BAAS19015	Major Projects	Open
Assessment Revision		Date Finalised
5		To be finalised

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

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Black Falcon	Falco subniger	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Black-striped Wallaby	Macropus dorsalis	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion

Corben's Long-eared Bat	Nyctophilus corbeni	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Diamond Firetail	Stagonopleura guttata	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Gilbert's Whistler	Pachycephala inornata	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Koala	Phascolarctos cinereus	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

Large Bent-winged Bat	Miniopterus orianae oceanensis	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Little Eagle	Hieraaetus morphnoides	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Little Lorikeet	Glossopsitta pusilla	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Little Pied Bat	Chalinolobus picatus	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Major Mitchell's Cockatoo	Lophochroa leadbeateri	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Masked Owl	Tyto novaehollandiae	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Painted Honeyeater	Grantiella picta	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Pilliga Mouse	Pseudomys pilligaensis	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Regent Honeyeater	Anthochaera phrygia	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion

Scarlet Robin	Petroica boodang	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Speckled Warbler	Chthonicola sagittata	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
Square-tailed Kite	Lophoictinia isura	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Superb Parrot	Polytelis swainsonii	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Swift Parrot	Lathamus discolor	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Turquoise Parrot	Neophema pulchella	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Varied Sittella	Daphoenositta chrysoptera	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion

White-throated Needletail	Hirundapus caudacutus	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
		255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Malleefowl	Leipoa ocellata	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Malleefowl	Leipoa ocellata	Refer to BAR

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00023504/BAAS19015/21/00023545

Assessment name
Forest Glen Solar Farm

BAM data last updated *
10/06/2021

Assessor Name
Elizabeth (Beth) Q Noel

Report Created
12/07/2021

BAM Data version *
45

Assessor Number
BAAS19015

Assessment Type
Major Projects

BAM Case Status
Open

Assessment Revision
5

Date Finalised
To be finalised

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	201_moderate	201-Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	moderate	0.37	1	

2	255_poor	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	poor	48.08	4	
3	255_low	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	low	3.22	2	
4	255_moderate	255-Mugga Ironbark - Buloke - Pillga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	moderate	1.53	1	

Appendix E Hollow-bearing tree inventory

Name	Species	DBH (cm)	Small Hollow (< 10 cm),	Medium (10 – 20 cm)	Large (> 20 cm).	Fissuring	Signs of use	Removed or retained
1	*Eucalyptus microcarpa*	50	1	1	-	-	No	Retained
2	*Eucalyptus pillagaensis*	48	-	1 (depth obscured)	-	-	No	Retained
3	*Eucalyptus pillagaensis*	50	-	1	-	-	No	Retained
4	*Eucalyptus sideroxlyon*	250	-	1	1	-	No	Retained
5	*Eucalyptus sideroxlyon*	42	-	1	-	-	Yes - Cockatiel	Retained
6	*Eucalyptus pillagaensis*	120	-	-	3 (depth obscured)	-	No	Retained
7	*Stag*	80	-	-	1	1, medium	No	Retained
8	*Stag*	50	-	2 (depth obscured)	-	1, small	No	Retained

Appendix F Scatter Tree Inventory

ID	Species	DBH (cm)	Easting	Northing	Removed
1	Non native	35	639600.4	6429670	No
2	*Callitris sp*	70	638496.3	6428734	No
3	*Eucalyptus sideroxylon*	77	638508.9	6428789	Yes
4	*Brachychiton populneus*	52	639401.7	6427919	No
5	*B. populneus*	52	639061.6	6427536	No
6	Unidentified Eucalypt	48	638958.5	6426672	No
7	*E. camaldulensis*	141	638722.9	6426826	No
8	*Allocasaurina luehmannii*	110	638124.6	6427058	No
9	*E. dealbata*	23	638611.9	6428026	No
10	*Callitris glaucaofila*	57	639726.2	6428519	No
11	*E. pillagaensis*	54	638157.4	6428707	No
12	*E.sideroxylon*	28	637833.6	6429007	No
13	*C.glaucofila*	12	637835.4	6429006	No
14	*E.sideroxylon*	87	637859.3	6428995	No
15	*E.pilaganensis*	72	637831	6428940	No
16	*E.piliganensis*	38	637811	6428957	No
17	*B. populneus*	92	638200.1	6428915	No
18	*C. glaucophylla*	86	638328.2	6428913	No
19	*B. populneus*	48	638518.8	6427279	No
20	*C. glaucophylla*	82	639406	6428935	No
21	Non native	68	639700	6429217	No

Appendix G EPBC ACT Protected Matters Search

Australian Government

Department of Agriculture, Water and the Environment

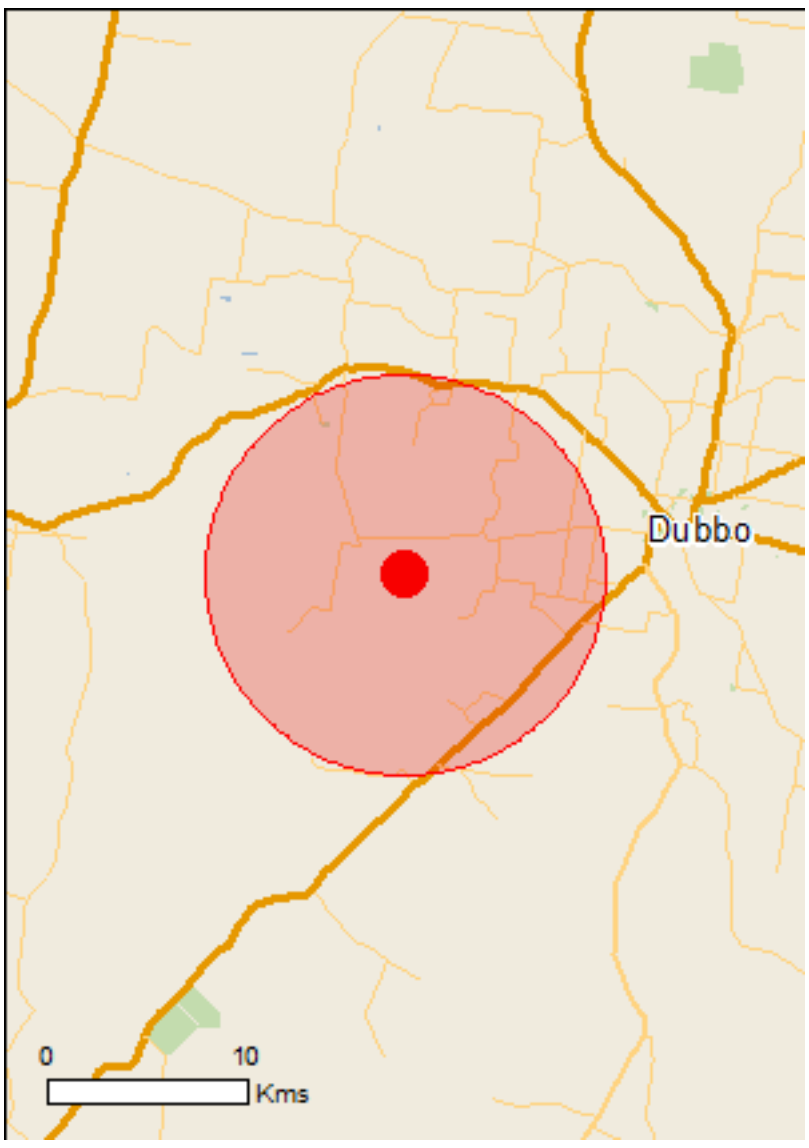
EPBC Act Protected Matters Report

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

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

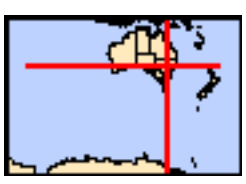
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 19/11/20 13:16:04



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	29
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	27
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	700 - 800km upstream
Riverland	700 - 800km upstream
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream
The macquarie marshes	150 - 200km upstream

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat likely to occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Androcalva procumbens [87153]	Vulnerable	Species or species habitat likely to occur within area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Homoranthus darwinioides [12974]	Vulnerable	Species or species habitat may occur within area
Indigofera efoliata [4951]	Endangered	Species or species habitat likely to occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land - Commonwealth Trading Bank of Australia

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Sappa Bulga	NSW

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula		
Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-32.27165 148.4772

Acknowledgements

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

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

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

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

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Appendix H Threatened Species Habitat Evaluation

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Flora				
Commersonia procumbens syn. Androcalva procumbens	Grows in sandy sites, often along roadsides. Recorded in *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and Callitris area. Also in *Eucalyptus fibrosa subsp. nubila, Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo.	Present	Likely to occur	Not detected during targeted searches, therefore it will not be impacted by the proposed development
Austrostipa wakoolica	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. Associated species include *Callitris glaucophylla, Eucalyptus microcarpa, E. populnea, Austrostipa eremophila, A. drummondii, Austrodanthonia eriantha* and *Einadia nutans*.	Absent	Unlikely	No, habitat unsuitable
Homoranthus darwinoides	Grows in in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge	Habitat potentially present, though soils likely unsuitable	Unlikely, not detected during surveys	No, not present onsite

[2] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.

BCD threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand. Associated species include *Callitris endlicheri, Eucalyptus crebra, E. fibrosa, C. trachyphloia, E. beyeri* subsp. *illaquens, E. dwyeri, E. rossii, Leptospermum divaricatum, Melaleuca uncinata, Calytrix tetragona, Allocasuarina* spp. and *Micromyrtus* spp.			
Indigofera efoliata	It almost certainly dies back to a substantial underground rootstock in unfavourable seasons and it is possible that aerial parts do not appear at all unless there is significant rainfall. Associated species include *Allocasuarina luehmannii, Exocarpos cupressiformis, Alectryon oleifolius, Geijera parviflora, Eucalyptus melliodora, Acacia deanei, Acacia buxifolia, Acacia hakeoides, Acacia spectabilis, Acacia lineata, Acacia oswaldii, Eremophila mitchellii, Myoporum platycarpum, Hakea leucoptera, Dodonaea viscosa, Apophyllum anomalum, Cassinia aculeata* and *Lissanthe strigosa*.	Data deficient to make determination	Unlikely, not detected during surveys	No, not present onsite
Tarengo Leek Orchid *Prasophyllum petilum*	Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with River Tussock *Poa labillardieri*, Black Gum *Eucalyptus aggregata* and tea-trees *Leptospermum* spp. near Queanbeyan and within the grassy groundlayer dominated by Kanagroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT).	Absent	Unlikely	No, species unlikely to occur on site
A Leek Orchid *Prasophyllum sp Wybong*	A perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over summer and autumn. Known to occur in open eucalypt woodland and grassland	Habitat potentially present	Unlikely, not detected during surveys	No, not present onsite

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Slender Darling-pea *Swainsona murrayana*	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. 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. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated.	Absent	Unlikely	No, species unlikely to occur on site
Small Purple-pea *Swainsona recta*	Grassy Woodlands dominated by Eucalyptus blakelyi. E. melliodora, E. rubida and E. goniocalyx.	Absent	Unlikely	No, species unlikely to occur on site
Tylophora linearis	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species.	Habitat potentially present	Unlikely, not detected during surveys	No, not present onsite
Ecological Communities				
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	A woodland community of flora and fauna is found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The structure of the community may vary from tall riparian	Absent	Not associated with PCTs present onsite	No, not present onsite

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	woodlands to very open 'savanna like' grassy woodlands with a sparse midstorey of shrubs and saplings. Typically these woodlands form mosaics with grasslands and wetlands, and are characterised by Coolibah (*Eucalyptus coolabah*) and, in some areas, Black Box (*E. largiflorens*). Other tree species may be present including River Cooba (*Acacia stenophylla*), Cooba (*A. salicina*), Belah (*Casuarina cristata*) and Eurah (*Eremophila bignoniiflora*).			
Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	The ecological community occurs in two forms, a grassy woodland form and as a derived native grassland. Grassy woodland is the most common form of the ecological community that comprises a tree layer and a native understorey with a varying proportion of shrubs, grasses and herbs. This grassy woodland form has a tree canopy that is dominated or co-dominated by Grey Box *Eucalyptus microcarpa*, Buloke *Allocasuarina luehmannii*, Kurrajong *Brachychiton populneus,* White Cypress Pine *Callitris glaucophylla,* White Box *Eucalyptus albens,* River Red Gum *Eucalyptus camaldulensis,* Fuzzy Box *Eucalyptus conica,* Black Box *Eucalyptus largiflorens,* Yellow Gum (SA blue gum) *Eucalyptus leucoxylon,* Yellow Box, *Eucalyptus melliodora,* Poplar Box (bimble box) *Eucalyptus populnea.*	Absent	Not associated with PCTs present onsite	No, not present onsite
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Walkes and southern Queensland	The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community is strongly reliant on soil type as it is associated with fine textured, often cracking clays* derived from either basalt or quaternary* alluvium. The ecological community generally occurs on flat to low slopes, of no more than 5% (or less than 1 degree) inclination. As slope increases, grassy woodlands dominated by trees such as *Acacia pendula* (Weeping Myall), *Eucalyptus coolabah* (Coolibah), *E. populnea* (Poplar Box) or *E. melliodora* (Yellow Box) occur. The ground layer component of these woodlands may be similar to the	Absent	Not associated with PCTs present onsite	No, not present onsite

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	grasslands but the soils are not generally the same cracking clays as on the plains.			
Poplar Box Grassy Woodland on Alluvial Plains	The ecological community is a type of temperate to semi-arid grassy eucalypt woodland that is sparsely scattered inland of the Great Dividing Range from around Cowra in NSW to near Collinsville in Queensland. This eucalypt woodland is mainly associated with alluvial plains including back plains, higher terraces and levees along rivers, ephemeral watercourses and depressions. The ecological community varies from a grassy woodland to grassy open woodland with an overstorey dominated by *Eucalyptus populnea* (poplar/bimble box) and an understorey mostly composed of native perennial forbs and grasses but may include some shrubs and sedges, depending on the season, rainfall and location in the landscape. Patches of the ecological community generally lack a substantial mid (tall shrub) layer. Shrubby forms of poplar box woodland typically occur on lower nutrient sandier soils, and are not part of the proposed national ecological community.	Absent	Not associated with PCTs present onsite	No, not present onsite
Weeping Myall Woodlands	Weeping Myall Woodlands occur in a range of forms from open woodlands to woodlands, in which weeping myall (*Acacia pendula*) trees are the sole or dominant overstorey species. Although weeping myall trees are often the only tree species in these woodlands, other trees can occur in the overstorey of the ecological community. The understorey of Weeping Myall Woodlands often includes an open layer of shrubs above an open ground layer of grasses and herbs, though the ecological community can exist naturally as either a shrubby, or grassy woodland.	Absent	Not associated with PCTs present onsite	No, not present onsite
White Box-Yellow Box Blakley's Red Gum Grassy Woodland and Derived Native Grassland	The ecological community can occur either as woodland or derived native grassland (i.e. grassy woodland where the tree overstorey has been removed). It is characterised by a species-rich understorey of native tussock grasses, herbs and scattered	Absent	Not associated with PCTs present onsite	No, not present onsite

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box (*Eucalyptus albens*) and/or Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*) trees. In the Nandewar bioregion, Grey Box (*E. microcarpa* or *E moluccana*) may also be dominant or co-dominant. In the woodland state, tree cover is generally discontinuous and of medium height with canopies that are clearly separated.			
Birds				
Regent Honeyeater *Anthochaera phrygia*	Temperate woodlands and open forests of the inland slopes of south-east Australia, in particular dry open forest, woodland, Box-Ironbark woodland, and riparian forests of River Sheoak.	Present – Box Ironbark Woodlands present within the Development Site.	Possible – within areas deemed likely to occur (Ingwersen et al., 2015).	Yes, AoS completed.
Australasian Bittern *Botaurus poiciliptilus*	Permanent freshwater wetlands with tall, dense vegetation.	Absent	Unlikely	No – Unlikely to occur on site
Curlew Sandpiper *Calidris ferruginea*	Intertidal mudflats in both fresh and brackish waters in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. Also recorded inland, including around ephemeral and permanent lakes, dams, and waterholes, usually with bare edges of mud or sand.	Absent	Unlikely	No – Unlikely to occur on site
Grey Falcon *Falco hypoleucos*	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.	Absent	Unlikely	No – Unlikely to occur on site
Painted Honeyeater *Grantiella picta*	Boree/Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests.	Present	Unlikely – not detected during site surveys	No – Not detected during surveys
White-throated Needletail *Hirundapus caudacutus*	Migratory and usually seen in eastern Australia from October to April. More common in coastal areas, less so inland.	Absent	Unlikely	No – Unlikely to occur on site

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Swift Parrot *Lathamus discolor*	On the coast and southwest slopes in areas with abundant flowering eucalypts or lerp. Feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box.	Present	Possible.	Yes, AoS completed.
Malleefowl Leipoa ocellata	Semi-arid to arid shrublands and low woodlands, especially those dominated by Mallee and/or Acacia which are tall, dense, and floristically rich. A sandy to sandy-loam substrate and abundance of leaf litter are required for breeding.	Absent	Unlikely	No – Unlikely to occur on site
Superb Parrot *Polytelis swainsonii*	Box-Gum, Box-Cypress, and Boree Woodlands and River Red Gum Forests. They nest in hollows of large trees in tall open forest or woodland.	Present	Unlikely, not detected during surveys	No, not present onsite
Australian Painted Snipe *Rostratula australis*	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Absent	Unlikely	No – Unlikely to occur on site
Mammals				
Large-eared Pied Bat *Chalinolobus dwyeri*	Low to mid elevation dry open forest and woodland near roosts. Roosts in caves (near entrance), crevices in cliffs, old mine workings and in disused mud nests of Fairy Martins.	Absent	Unlikely	No – Unlikely to occur on site
Spot-tailed Quoll *Dasyurus maculatus maculatus (SE mainland population)*	Range of habitat types, including open forest, woodland, and inland riparian forest, using Hollow-bearing trees, fallen logs, small caves, rock outcrops, and rocky cliff faces as den sites. Females occupy home ranges of up to about 750ha and males up to 3500ha.	Present	Possible – absence of require den habitat features (rock crevices, large log hollows, etc.) and likely insufficient patch size to support species.	Yes, AoS completed.
Corben's Long-eared Bat *Nytcophilus corbeni*	Variety of vegetation types, most commonly Mallee, Bulloak, and Box-dominated communities, but most common in	Present	Possible	Yes, AoS completed.

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	vegetation with distinct canopy and dense understorey. Roost in tree hollows, crevices, and under loose bark.			
Koala *Phascolarctos cinereus*	Temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils.	Present	Unlikely – not detected during site surveys	No, not present onsite
Grey-headed Flying Fox *Pteropus poliocephalus*	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines.	Present	Possible – foraging only	Yes, AoS completed.
Fish				
Flathead Galaxias *Galaxias rostratus*	Still or slow-moving water bodies such as wetlands and lowland streams. Range of habitats including rock and sandy bottoms and aquatic vegetation.	Absent	Unlikely	No – No suitable habitat
Trout Cod *Maccullochella macquariensis*	Rivers with large in stream woody debris or snags.	Absent	Unlikely	No – No suitable habitat
Murray Cod *Maccullochella peelii*	Wide range of warm water habitat including clear rocky streams, slow flowing turbid rivers, and billabongs, most frequently in main river channel and larger tributaries but occasionally in floodplain channels during floods. Near complex structural cover such as large rocks, woody debris, and overhanging vegetation.	Absent	Unlikely	No – No suitable habitat
Macquarie Perch *Macquaria australasica*	Both river and lake habitats; especially the upper reaches of rivers and their tributaries. Clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	Absent	Unlikely	No – No suitable habitat
Reptiles				

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Pink-tailed Worm Lizard *Aprasia parapulchella*	Inhabits open woodland areas with predominantly native grassy ground layers. Commonly found beneath small, partially-embedded rock.	Absent	Unlikely	No – No suitable habitat
Pale-headed Snake *Hoplocephalus bitorquatus*	The Pale-headed Snake is a highly cryptic species that can spend weeks at a time hidden in tree hollows. As found by Shelton et al. (2020), Pale-headed Snake has narrow habitat constraints, requiring a high density of very large hollow-bearing trees (on average >100 years old) in riparian zones. Additionally, Shelton et al. (2021) detected no Pale-headed Snakes within Pilliga Box woodland, with Red Gum forests providing the majority of Pale-headed snake observations (96%). The above factors considered, the Pale-headed Snake has considered unlikely to occur within the Development Site.	Absent	Unlikely	No – No suitable habitat
Migratory Wetland Species				
Common Sandpiper *Actitis hypoleucos*	In Australia, the Common Sandpiper is found in coastal or inland wetlands, saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers.	Absent	Unlikely	No – Unlikely to occur on site
Sharp-tailed Sandpiper *Calidris acuminata*	The Sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches.	Absent	Unlikely	No – Unlikely to occur on site
Pectoral Sandpiper *Calidris melanotos*	Breeds in coastal tundra. Winters in freshwater wetlands, saltwater wetlands, wet grassland, mudflats, lake shores.	Absent	Unlikely	No – Unlikely to occur on site
Latham's Snipe *Gallinago hardwickii*	Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among	Absent	Unlikely	No – Unlikely to occur on site

Species	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
	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.			
Migratory Terrestrial Species				
White-throated Needletail *Hirundapus caudacutus*	Migratory and usually seen in eastern Australia from October to April. More common in coastal areas, less so inland.	Absent	Unlikely	No – Unlikely to occur on site
Yellow Wagtail *Motacilla flava*	Data deficient for Australian occupation.	Absent	Unlikely	No – Unlikely to occur on site
Satin Flycatcher *Myiagra cyanoleuca*	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Absent	Unlikely	No – Unlikely to occur on site

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

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

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

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

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

ROKAMBA = Republic of Korea–Australia Migratory Bird Agreement

Appendix I Assessment of Significance

Regent Honeyeater (*Anthochaera phrygia*)

Critically Endangered

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) lead to a long-term decrease in the size of a population

The recovery plan of this species deems habitat critical to survival as any breeding or foraging areas where the species is likely to occur. The development footprint has been identified as a subsidiary area of the regularly used Bundarra-Barraba area, within which the Regent Honeyeater is likely to occur. Additionally, Mugga Ironbark (*Eucalyptus sideroxlyon*) has been identified as the preferred foraging tree for Regent Honeyeater and is present in abundance across the development site (Oliver, 2000). As such, **the development site is likely to provide foraging habitat for this species**. **Breeding is unlikely to be impacted by the proposed development**, as the development site is a significant distance away from the closest known breeding area, Bundarra-Barraba. Given this species high dispersal capabilities (recorded distances of 580 km travelled by individuals), **direct mortality through clearing of native vegetation is unlikely.**

b) reduce the area of occupancy of the species

Avifauna surveys conducted in across 4 days in November 2020 did not identify Regent Honeyeater. This species is not considered to be currently occupying habitat within the development footprint, and as such the **proposed development is not expected to reduce the area of occupancy for Regent Honeyeater.** However, there is potential for this species to utilise these areas, given the large dispersal recorded for this species and its propensity to change foraging sites (Ingwersen et al., 2015).

c) fragment an existing population into two or more populations

Habitat within the development footprint is likely to provide only limited foraging habitat for Regent Honeyeater. Given the high dispersal capabilities of this species, impacts to connectivity associated with the Forest Glen Solar Farm development are unlikely. The loss of mature scatter (paddock) trees is deemed likely to impact connectivity between patches for Regent Honeyeater (Webster and Menkhorst, 1992). However, given the abundance of large trees in patches of native vegetation in the surrounding area, **removal of scatter (paddock) trees from within the development footprint is deemed unlikely to fragment Regent Honeyeater population**, given their ability to disperse distance of 580 km (Ingwersen et al., 2015). Additionally, scatter trees have been avoided where practical, resulting in a maximum of 1 scatter tree being impacted by the development.

d) adversely affect habitat critical to the survival of a species

The recovery plan of this species deems habitat critical to survival as any breeding or foraging areas where the species is likely to occur. The development footprint has been identified as a subsidiary area of the regularly used Bundarra-Barraba area, within which the Regent Honeyeater is likely to occur. The preferred foraging tree, *Eucalyptus sideroxlyon*, occurs in relatively high abundance throughout the vegetation zones proposed for clearing (255 moderate and 201 moderate). Informed by this, the Development Footprint has been redesigned to avoid impacts to PCT 255 and 201 where possible, resulting in a maximum of 1.53 ha of PCT 255 moderate, 0.37 ha of PCT 201 moderate, and 1 Mugga Ironbark scatter tree being impacted. Additionally, these impacts will be mostly restricted to trimming of trees for vehicle access along Delroy Rd. **Given the**

relatively low impact to potential Regent Honeyeater habitat, adverse impacts to habitat critical for survival is not considered likely.

e) disrupt the breeding cycle of a population

There are three known key Regent Honeyeater breeding areas in NSW – the Hunter Valley, Capertee Valley and Bundarra-Barraba regions. All of which are a significant distance from the development site. As such, the **breeding cycle of Regent Honeyeater is unlikely to be disrupted by the proposed development.**

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The development footprint contains Box-Ironbark and Riparian habitat which are preferentially inhabited by Regent Honeyeater (Oliver et al., 1999; Geering & French, 1998). *Eucalyptus sideroxylon* is the preferred tree species for foraging of Regent Honeyeater, with large mature trees being prioritised (Oliver, 2000). The loss of mature *E. sideroxylon* trees has the potential to reduce the availability and quality of Regent Honeyeater habitat. Informed by this, the Development Footprint has been redesigned to avoid impacts to PCT 255 and 201 where possible, resulting in a maximum of 1.53 ha of PCT 255 moderate, 0.37 ha of PCT 201 moderate, and 1 Mugga Ironbark scatter tree being impacted. Additionally, these impacts will be mostly restricted to trimming of trees for vehicle access along Delroy Rd. **Given the relatively low impact to potential Regent Honeyeater habitat, impacts to Regent Honeyeater habitat features to an extent that causes further decline of the species are not considered likely.**

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Increasing the fragmentation of native vegetation patches within the development site increases the likelihood of Noisy Miner (*Manorina melanocephala*) occurrence, which adversely impacts Regent Honeyeater (Crates et al., 2018; Maron, 2007; Piper and Catterall, 2003). **The extent of fragmentation associated with the proposed development an in context with the existing cleared land is not considered significant enough to result in a dramatic increase to Noisy Miner abundance within Regent Honeyeater Habitat. No additional pest species are considered likely to become established within Regent Honeyeater habitat as a result of the proposed development.**

h) introduce disease that may cause the species to decline

Spread of Root-rot Fungus *Phytophthora cinnamomi* causing tree dieback is considered a potential threat to Regent Honeyeater by reducing available foraging habitat. This threat will be mitigated through hygiene protocols applied throughout the development and ongoing management. No other diseases are considered likely to be introduced as a result of the development. Given this, the introduction of disease that may cause the decline of the species is considered unlikely.

i) interfere with the recovery of the species.

The removal of habitat critical to the survival of Regent Honeyeater is not considered likely, given the avoidance measures taken in design. As the site is located outside of known breeding locations, impacts to the breeding cycle of this species are unlikely.

Conclusion

Regent Honeyeater is thought to be comprised of a singular population with exchange of genetic material occurring at regularly used areas (Kvistad et al., 2015; Crates, 2019). The recovery plan of this species deems habitat critical to survival as any breeding or foraging areas where the species is likely to occur. The development footprint has been identified as a subsidiary area of the regularly used Bundarra-Barraba area, within which the Regent Honeyeater is likely to occur. The development site therefore has potential to provide foraging habitat for this species.

Reduced foraging habitat availability through the significant clearing of PCT 255 moderate and PCT 201 moderate has the potential to lead to reduced population carrying capacity and subsequently reduce population viability of Regent Honeyeater. The species recovery plan for Regent Honeyeater highlights the habitat loss and fragmentation as a key threatening process, especially in relation to clearing of habitat containing key preferred eucalypt species, such as *Eucalyptus sideroxylon* (present in relatively high abundance onsite). Increasing fragmentation of remnant patches such as those found within the development footprint has potential to reduce habitat availability and lead to population decline.

In response to issues identified above, the development footprint has been redesigned so as to avoid all areas of moderate condition woodlands, scatter trees, and hollow-bearing trees where practical. This has resulted in a maximum of 1.53 ha of PCT 255 moderate, 0.37 ha of PCT 201 moderate, and 1 Mugga Ironbark scatter tree being impacted. These impacts will be mostly restricted to trimming of trees for vehicle access along Delroy Rd. Additionally, clearing will primarily follow existing vegetation lines, minimising adverse changes from edge effects. The footprint will not significantly increase the distance between patches, so impacts to connectivity are also deemed unlikely. Given the relatively low impact to potential Regent Honeyeater habitat, adverse impacts to habitat critical for survival is not considered likely. EPBC referral is not considered warranted.

Swift Parrot (*Lathamus discolor*):

Critically Endangered

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) lead to a long-term decrease in the size of a population

Swift Parrot occupies mainland Australia during winter for foraging, between February and September. Clearing associated with the proposed development which is untaken outside of this window is unlikely to result in any direct mortality of this species. Direct mortality through clearing between February and September is considered relatively low, given the high dispersal ability of this species and the low likelihood of roosting in hollows while on the mainland (Saunders, 2008). The risk of mortality will be reduced to an acceptable level through supervision by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required.

b) reduce the area of occupancy of the species

Within the Western Slopes of NSW, Swift Parrot has been recorded utilizing tree species recorded within the Development Footprint, namely Mugga Ironbark (*Eucalyptus sideroxylon*) and Grey Box (*E. macrocarpa*), recorded in PCT 255 moderate (Saunders & Heinsohn, 2008). As such, extensive clearing of PCT 255 has the potential to reduce the area of suitable foraging habitat for Swift Parrot. Impacts to PCT 255 moderate have been the avoided where practical, resulting in 1.5 ha with potential to be impacted. Within the Development Footprint, PCT 255 moderate is primarily located within the 5 m buffer around the Development Plan and is not expected to result in significant tree clearing. Clearing associated with the Development Footprint is therefore not considered likely to reduce the area of occupancy for Swift Parrot.

c) fragment an existing population into two or more populations

The Swift Parrot occurs as a single migratory population (Saunders & Tzaros, 2011). The Development Site is not located within an Important Mapped Area (IMA) (Saunders & Tzaros, 2011). Given the high dispersal ability of Swift Parrot, the relatively small area of tree clearing and the abundance of treed vegetation patches in the area surrounding the development footprint, it is deemed unlikely that the proposed development would fragment a population.

d) adversely affect habitat critical to the survival of a species

The development footprint is not within known a known Swift Parrot Important Mapped Area (based on IBRA subregion) (Saunders & Tzaros, 2011). However, Saunders & Tzaros (2011) indicate that Swift Parrot have been recorded on the mainland outside of this range, which likely represent opportunistic foraging, rather than providing reliable resources. As such, it is expected that although the development footprint contains valuable Swift Parrot foraging habitat (Mugga Ironbark and Grey Box in PCT 255 moderate), it does not represent a vital habitat resource and is unlikely to impact population viability.

e) disrupt the breeding cycle of a population

Swift Parrot breeding is restricted entirely within Tasmania. As such, it is deemed unlikely that the proposed development will impact the breeding cycle of this species.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The development footprint does contain valuable Swift Parrot foraging habitat in the form of Mugga Ironbark and Grey trees within Box-Ironbark Woodland (Saunders & Heinsohn, 2008), however given the footprint is surrounded by suitable habitat and does not represent a priority habitat resource (site fidelity not expected), it is deemed unlikely that the proposed development would reduce the availability or quality of habitat to an extent that causes Swift Parrot to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Introduced pest species European honeybees *Apis mellifera* and European Starlings *Sturnus vulgaris* are both considered likely to compete with Swift Parrot for resources (Saunders & Tzaros, 2011). Neither of these species are considered likely to increase as a result of the proposed development.

Native nectar feeders Noisy Miner *Manorina melanocephala* and Rainbow Lorikeet are both considered likely to compete with Swift Parrot (Saunders & Tzaros, 2011). The extent of fragmentation associated with the proposed development an in context with the existing cleared land is not considered significant enough to result in a dramatic increase to Noisy Miner abundance within Swift Parrot Habitat. No additional pest species are considered likely to become established within Swift Parrot habitat as a result of the proposed development.

Native Sugar Gliders are considered a significant threat to breeding Swift Parrots (Heinsohn et al., 2015). As this species does not breed on mainland Australia, this is not considered a potential threat within the development footprint.

h) introduce disease that may cause the species to decline

Psittacine Beak and Feather Disease (PBFD) is considered a potentially significant threat to Swift Parrot. This disease is spread through many species of Australian parrots (Sarker et al., 2013; Sarker et al., 2015). The spread is exacerbated by the release of captive birds into the environment. The development is considered unlikely to result in any increase to the likelihood of PBFD occurrence within the development site.

Spread of Root-rot Fungus *Phytophthora cinnamomi* causing tree dieback is considered a potential threat to Swift Parrot by reducing available foraging habitat (Saunders & Tzaros, 2011). This threat may be mitigated through hygiene protocols applied throughout the development and ongoing management.

i) interfere with the recovery of the species

The development site is likely to represent only potential opportunistic foraging habitat for Swift Parrot. The availability of suitable habitat in the areas immediately surrounding the footprint indicate impacts to the survival and persistence of this species in response to the proposed development are unlikely. It is not considered likely that the development will increase the occurrence of pests and diseases which have potential to adversely impact Swift Parrot. As such, it is deemed unlikely that the proposed development will adversely impact the recovery of Swift Parrot.

Conclusion

Swift Parrot is a critically endangered migrant bird, which forages in NSW over winter. As breeding is restricted to Tasmania, the proposed development is considered unlikely to impact the breeding cycle of this species.

The development footprint contains habitat deemed suitable for foraging, in the form of Mugga Ironbark and Grey Box trees within Box-Ironbark woodland. However, the development footprint is outside of priority Swift Parrot habitat and site fidelity is unlikely. Some use of habitat within the development footprint by Swift Parrot is possible, however it is deemed unlikely that the clearing associated with the development will adversely impact the persistence of this species. Although the development is unlikely to impact population viability, clearing of large Mugga Ironbark and Grey Box trees (including scatter/paddock trees) should be avoided where possible, as these habitat features may provide resources to Swift Parrots moving through the site. Only 1 scatter tree (Mugga Ironbark) is expected to be impacted by the development. It is not considered likely that the development will increase the occurrence of pests and diseases which have potential to adversely impact Swift Parrot. In consideration of the above factors, the development is not considered likely to significantly impact Swift Parrot.

Corben's Long-eared Bat (*Nyctophilus corbeni*)

Vulnerable

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) lead to a long-term decrease in the size of a population

Corben's Long-eared Bat (CLEB) is found across a range of vegetation types, including box/ironbark/cypress-pine vegetation (OEH, 2017). Given the potential for this species' presence, there is potential for direct mortality through clearing of treed areas. The risk of mortality will be reduced to an acceptable level through supervision by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required.

b) reduce the area of occupancy of the species

Treed zones (PCT 255 moderate and PCT 201 moderate) within the Development Footprint may provide roosting and foraging habitat for CLEB, while grassland zones (PCT 255 poor and low) are likely to only provide foraging habitat. As such, this species has been assumed present as an ecosystem credit species. Given this species high dispersal capability, the relatively small area proposed for clearing, and the relatively high surrounding vegetation, area of occupancy for CLEB is not considered likely to be significantly impacts by the development.

c) fragment an existing population into two or more populations

The proposed development avoids treed areas of vegetation where practical. Where treed areas are to be impacted, the vegetation edge lines are generally followed, with only thin strips of vegetation to be impacted. In consideration of the relatively low impact clearing and the high dispersal capability of CLEB, it is deemed unlikely that the development will fragment an existing population.

d) adversely affect habitat critical to the survival of a species

The Development Footprint contains areas which may be suitable for CLEB roosting and foraging (Law et al., 2016). However, as the development footprint has been designed to avoid treed vegetation where practical, the proposed impacts to CLEB roosting and foraging habitat is not considered significant enough to impact the persistence of this species.

e) disrupt the breeding cycle of a population

The Development Site contains habitat which may be suitable for maternal roosting. The risk to disruption of maternal roosting may be mitigated to an acceptable level through supervision by Ecologist or trained spotter catcher to identify roosting bats and avoid trees where required.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Development Footprint contains areas which may be suitable for CLEB roosting and foraging (Law et al., 2016). However, as the development footprint has been designed to avoid treed vegetation where practical, the proposed impacts to CLEB roosting and foraging habitat is not considered significant enough to impact the persistence of this species.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The development is not expected to result in the introduction of invasive species which impact the persistence of CLEB.

h) introduce disease that may cause the species to decline

The development is not expected to result in the introduction of diseases which impact the persistence of CLEB.

i) interfere with the recovery of the species.

Although the Development Footprint is expected to impact vegetation which may be suitable habitat for CLEB, the design and relatively small area proposed for clearing are not expected to reduce habitat to a degree which results in the decline of CLEB.

Conclusion

The Development Site is likely to contain habitat suitable for CLEB roosting and foraging. As such, this species will be assumed present and offset as an ecosystem credit species. Direct mortality of individuals and interruptions to maternal roosting will be avoided through the employment of ecologists and fauna spotters during clearing activities. Impacts to CLEB habitat are not large enough to result in impacts to the persistence of CLEB long-term.

Grey-headed Flying Fox (*Pteropus poliocephalus*)

Vulnerable

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) lead to a long-term decrease in the size of a population

Grey-headed Flying Fox (GHFF) roosting camps have not been identified within or in proximity to the Development Site. The Development Site is considered to provide only limited foraging opportunities, in the form of flowering Eucalypts (DECCW, 2009). Given this, direct mortality of individuals is considered unlikely, however the risk of mortality will be reduced to an acceptable level through supervision by ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required.

b) reduce the area of occupancy of the species

As the Development Site is considered to provide only limited foraging opportunities, GHFF is not considered likely to occupy the site long-term.

c) fragment an existing population into two or more populations

Grey-headed Flying Fox generally have high site fidelity (Roberts, 2012). As there are no known roosting camps within or in proximity to the Development Site, use of the Development Site by GHFF is likely to be limited to foraging, and as such it is unlikely that impacts as a result of the development will fragment existing populations.

d) adversely affect habitat critical to the survival of a species

The Development Footprint is expected to impact a relatively small area of suitable treed habitat (1.53 ha PCT 255 moderate and 0.37 ha PCT 201 moderate), with the broader landscape maintaining large patches of native vegetation. As such, the development is not considered likely to impact habitat critical to survival to an extent which impacts persistence of GHFF.

e) disrupt the breeding cycle of a population

As no breeding camps have been identified within the Development Site, impacts to the breeding cycle of Grey-headed Flying Fox are considered unlikely.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Development Footprint contains trees which may be suitable foraging habitat for GHFF. Given the large home range of GHFF, the relatively small tree clearing area, and the relatively large remaining patches of vegetation within the broader landscape, it is considered unlikely that the availability or quality of habitat will be reduced to the extent that GHFF is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The development is not expected to result in the introduction of invasive species which impact the persistence of GHFF.

h) introduce disease that may cause the species to decline

The development is not expected to result in the introduction of diseases which impact the persistence of GHFF.

i) interfere with the recovery of the species.

Although the Development Footprint is expected to impact vegetation which may be suitable foraging habitat for GHFF, the design and relatively small area proposed for clearing are not expected to reduce habitat to a degree which results in the decline of GHFF.

Conclusion

The Development Site is likely to provide only limited foraging habitat for GHFF. Direct mortality if therefor considered unlikely. Impacts to GHFF foraging habitat is not expected to be great enough to result in significant impacts to this species persistence.

Spot-tailed Quoll (*Dasyurus maculatus*):

Endangered

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) lead to a long-term decrease in the size of a population

No Spot-tailed Quoll (STQ) important populations are known within the Development Site region (Long & Nelson, 2010). Given the absence of suitable denning sites (rocky outcrops, large hollow logs, and hollow-bearing trees) from within the Development Footprint, direct mortality as a result of clearing is considered unlikely. The risk of mortality will be reduced to an acceptable level through supervision by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required.

b) reduce the area of occupancy of the species

Belcher and Darrant (2006) identify gullies and riparian flats as preferred habitat for STQ, given these areas generally having higher densities of prey and suitable den sites. Although all suitable den sites are to be avoided by the Development Footprint, PCT 201 moderate (riparian vegetation) may provide suitable prey densities for STQ. Given the relatively low impact on this PCT (0.37 ha), a significant reduction of STQ habitat is not considered likely as a result of the development.

c) fragment an existing population into two or more populations

Given the high dispersal ability of STQ (Glen & Dickman, 2006), and the abundance of vegetation patches in the area surrounding the development footprint, it is deemed unlikely that the proposed development would fragment a population.

d) adversely affect habitat critical to the survival of a species

Belcher & Darrant (2006) found the most important factors influencing STQ habitat use were prey density and preferred den sites. Prey density was found to be highest in gullies and riparian flats, and STQ showed a preference for these areas within the landscape. Given the relatively low impact on this PCT (0.37 ha), a significant reduction of STQ habitat is not considered likely as a result of the development.

e) disrupt the breeding cycle of a population

Belcher and Darrant (2006) show that STQ requires suitable den sites for breeding. Where available, complex rocky outcrops and large hollow logs are preferentially used as denning sites for STQ (Belcher & Darrant, 2006; Glen & Dickman, 2006). Where absent, STQ has been recorded using hollow-bearing trees for denning. No rocky outcrops were detected within or in proximity to the development footprint. No large hollow logs were identified within the Development Footprint, and all hollow-bearing trees have been avoided. Additionally, STQ are known to occupy very large home range (up to several thousand hectares) and use multiple dens (up to 20) (Long & Nelson, 2010). Given these factors, the development is not considered likely to disrupt the breeding cycle of STQ.

f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Spotted-tailed Quoll is a primarily forest-dependent species that occupies a wide range of habitat types (Long & Nelson, 2010). As such, treed zones PCT 255 moderate and PCT 201 moderate could contain STQ habitat. Although the relative abundance of prey within these zones is unknown, the absence of critical habitat features for denning (rocky outcrops, large hollow logs, and hollow-bearing trees) suggests these zone are unlikely to support STQ. Given this, impacts to 1.53 ha of PCT 255 moderate and 0.37 ha of PCT 201 are not considered likely to result in a significant decrease in the availability or quality of habitat to the extent that STQ is likely to decline.

g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Dietary overlap between STQ and feral species, Red Fox (*Vulpes vulpes*) and Wild Dog (*Canis lupus ssp.*) presents strong competition for resources. Glen & Dickman (2008) found the most important prey for all 3 predators were medium-sized mammals. However, Glen & Dickman (2008) note that the primary prey species of STQ differ to Red Fox and Wild Dog by primarily being arboreal. Additionally, although the development will increase tracks through the site, a significant increase in feral predators is not expected to occur.

h) introduce disease that may cause the species to decline

Ectoparasites have been recorded on STQ within NSW, however these are not considered to pose a risk to the persistence of STQ. No diseases are considered likely to be introduced as a result of the development.

i) interfere with the recovery of the species

The development site is likely to represent only potential opportunistic foraging habitat for STQ. The availability of suitable habitat in the areas immediately surrounding the footprint indicate impacts to the survival and persistence of this species in response to the proposed development are unlikely. It is not considered likely that the development will increase the occurrence of pests and diseases which have potential to adversely impact STQ. As such, it is deemed unlikely that the proposed development will adversely impact the recovery of STQ.

Conclusion

Spot-tailed Quoll is the largest extant marsupial carnivore on mainland Australia. STQ is listed as Vulnerable in NSW and Endangered federally. Although STQ has been recorded across a broad range of wooded habitat types, the low abundance of suitable denning sites (only hollow-bearing trees present within site – all of which have been avoided) suggests the Development Site may provide only limited foraging opportunities for STQ. The development is not expected to increase the occurrence of pests and diseases to an extent which causes the decline of STQ. Considering the above, the development is not considered likely to significantly impact STQ.