



Biodiversity Development Assessment Report

SEBASTOPOL SOLAR FARM



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ACRONYMS AND ABBREVIATIONS

BAM	Biodiversity Assessment Methodology
BC Act	Biodiversity Conservation Act 2016 (NSW)
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
CEEC	Critically Endangered Ecological Community
DBH	Diameter at Breast Height
DPE	(NSW) Department of Planning and Environment
EEC	Endangered Ecological Community
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GHG	Greenhouse Gases
ha	hectares
HBT	Hollow-bearing Tree
km	kilometres
LRET	Large-scale renewable energy target
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (<i>c.f.</i>)
NSW	New South Wales
REAP	Regional Environmental Action Plan (NSW)
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PV	Photovoltaic
SSD	State Significant Development
SEARS	Secretary's Environmental Assessment Requirements
SAIL	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy (NSW)
sp/spp	Species/multiple species
TEC	Threatened Ecological Community

EXECUTIVE SUMMARY

ib vogt is planning for the construction and operation of a 108-megawatt photovoltaic solar farm at Sebastopol, in Temora Local Government Area, NSW. The proposal would develop approximately 248 ha of the 546 ha subject land. This Biodiversity Development Assessment Report (BDAR) has been prepared by NGH Environmental on behalf of the proponent, ib vogt.

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

The Biodiversity Assessment Methodology (BAM) is the required assessment methodology for SSDs that trigger the NSW Biodiversity Offsets Scheme, under the NSW *Biodiversity Conservation Act 2016*. This report follows the field work methodologies and assessment format required by the BAM.

Comprehensive mapping and field surveys were completed in accordance with the requirements of the BAM. The proposal involves the removal of the following vegetation:

- Clearing of approximately 0.07ha of White Cypress Woodland resulted in the generation of 1 Ecosystem Credits.
- Clearing of approximately 0.19ha of Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion resulted in the generation of 4 Ecosystem Credits.
- The removal of 11 paddock trees generating 9.75 ecosystem credits.

One species credit species, the Superb Parrot (*Polytelis swainsonii*), was observed within the development site during the site surveys. No breeding habitat would be impacted within vegetation zones for this species. Habitat for another candidate species, the Major Mitchell Cockatoo was identified within the development site. This species was unable to be surveyed for in the recommended survey period. However, no breeding habitat would be impacted within vegetation zones for this species. Therefore, no species credits were generated for both the Superb Parrot and the Major Mitchell's Cockatoo. In accordance with the BAM, paddock trees were assessed under the streamlined paddock tree assessment and were not considered as species credit polygons.

Four flora candidate species, A Spear grass (*Austrostipa metatoris*), Pine Donkey Orchid (*Diuris tricolor*), Small Purple Pea (*Swainsona recta*) and Silky Swainson-pea (*Swainsona sericea*) were unable to be surveyed for during the recommended survey period and are therefore assumed to occur on site for the purpose of this assessment. 12 species credits were generated for these species based on the potential habitat that would be impacted. (*Swainsona recta* produced an error value of 0 in the calculator of which has been adjusted to 3).

An additional assessment of impacts on entities listed under the EPBC Act, was also completed. Impacts were assessed for the Superb Parrot (*Polytelis swainsonii*), Corben's Long eared Bat (*Nyctophilus corbeni*), Swift parrot (*Lathamus discolor*) and spear grasses *Austrostipa metatoris* and *Austrostipa wakoolica*. These impacts have been assessed in accordance with the EPBC guidelines and are not considered likely to be significant. No referral is considered necessary to the Federal Department of Environment and Energy.

Spring flora surveys targeting EPBC listed *Austrostipa metatoris* and *Austrostipa wakoolica* were completed on the 9th October 2018. These species were not detected and therefore no impacts are expected for these species.

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

The retirement of the credits generated will be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Proposals. The total number of credits produced for the proposal will be retired through direct payment into the Biodiversity Conversation Fund. With the retirement of credits and effective implementation of the mitigation measures, the proposal is consistent with the requirements of the BAM.

1 INTRODUCTION

The proposed Sebastopol Solar Farm is classified as 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 Sebastopol Solar Farm (the proposal) using the 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 (ib vogt).

The following terms are used in this document:

- **Development footprint** – The area of land that is directly impacted by the proposal. Including, solar array design, perimeter fence, access roads, transmission line footprint and areas used to store construction materials. The development footprint is approximately 248 ha.
- **Development site** – The area of land that is subject to the proposed development. The development site is approximately 412 ha. The development site is the area surveyed for this assessment.
- **Subject land** – All land within the affected lot boundaries. The subject land is approximately 546 ha.
- **Buffer area** – All land within 1500 m of the outside edge of the boundary of the development site.

1.1 THE PROPOSAL

Sebastopol Solar Farm would occupy around 248 hectares (ha) of the 546ha subject land. The proposal would comprise the installation of a solar plant that would generate around 108 MW of renewable energy for the national electricity grid.

Key development and infrastructure components would include:

- Single axis tracker photovoltaic (PV) solar panels, mounted on steel frames over most of the site (up to approximately 308,000 PV solar panels).
- Battery storage to store energy on-site.
- Electrical conduits and transformers.
- On site substation.
- Site office, parking, access tracks and perimeter fencing.
- Operations and maintenance buildings with associated car parking.
- Access point via Eurolee Road.
- Electrical transmission infrastructure to connect the proposal to the existing 132 kV transmission line located to the west of the site.

The Proposed Infrastructure map in Figure 6-1 illustrates the indicative layout, including a concept development footprint for proposed solar arrays.

The proposal would require subdivision of the subject land.

In total, the construction phase of the proposal is expected to take 10 to 12 months, and the facility would be expected to operate for up to 30 years. Two to three operations and maintenance personnel would

operate the plant. At the end of its operational life the solar farm would be decommissioned. All above ground infrastructure, and below ground infrastructure less than 500 mm deep, would be removed in consultation with the landowner, and the site returned to its existing land capability.

1.2 THE DEVELOPMENT SITE

1.2.1 Site location

The proposed location of Sebastopol Solar Farm is in Temora Shire Local Government Area, around 17 km south of the township of Temora. The subject land comprises of Lot 4 DP 1186823, Lot 1 DP 133994 Lots 62, 88, 90, 91, and 92 of DP 751424 (Figure 1-1). The development footprint comprises of Lot 1 DP 133994, Lots 90, 91 and 92 of DP 751424 (solar array area), and Lot 4 DP 1186823, and lots 62 and 88 of DP751424 (transmission line footprint). These properties are privately owned by landholders.

The development footprint also extends into areas of the road reserve of Eurolee Road and Goldfields Way.

1.2.2 Site description

Eurolee Road runs along the southern boundary of the subject land, accessed from Goldfields Way. The proposed solar farm would connect to the existing 132kv transmission line which passes from north to south at the western boundary of the development site.

Sebastopol development footprint comprises about 248ha of freehold land. The majority of the development site has been cleared of native vegetation and cultivated for agriculture, which is the dominant land use in the area. Specific to the subject land, this has included:

1. Extensive clearing of native vegetation.
2. Paddocks sown with crops and pasture.
4. Previous alteration of drainage lines through clearing cropping and damming.

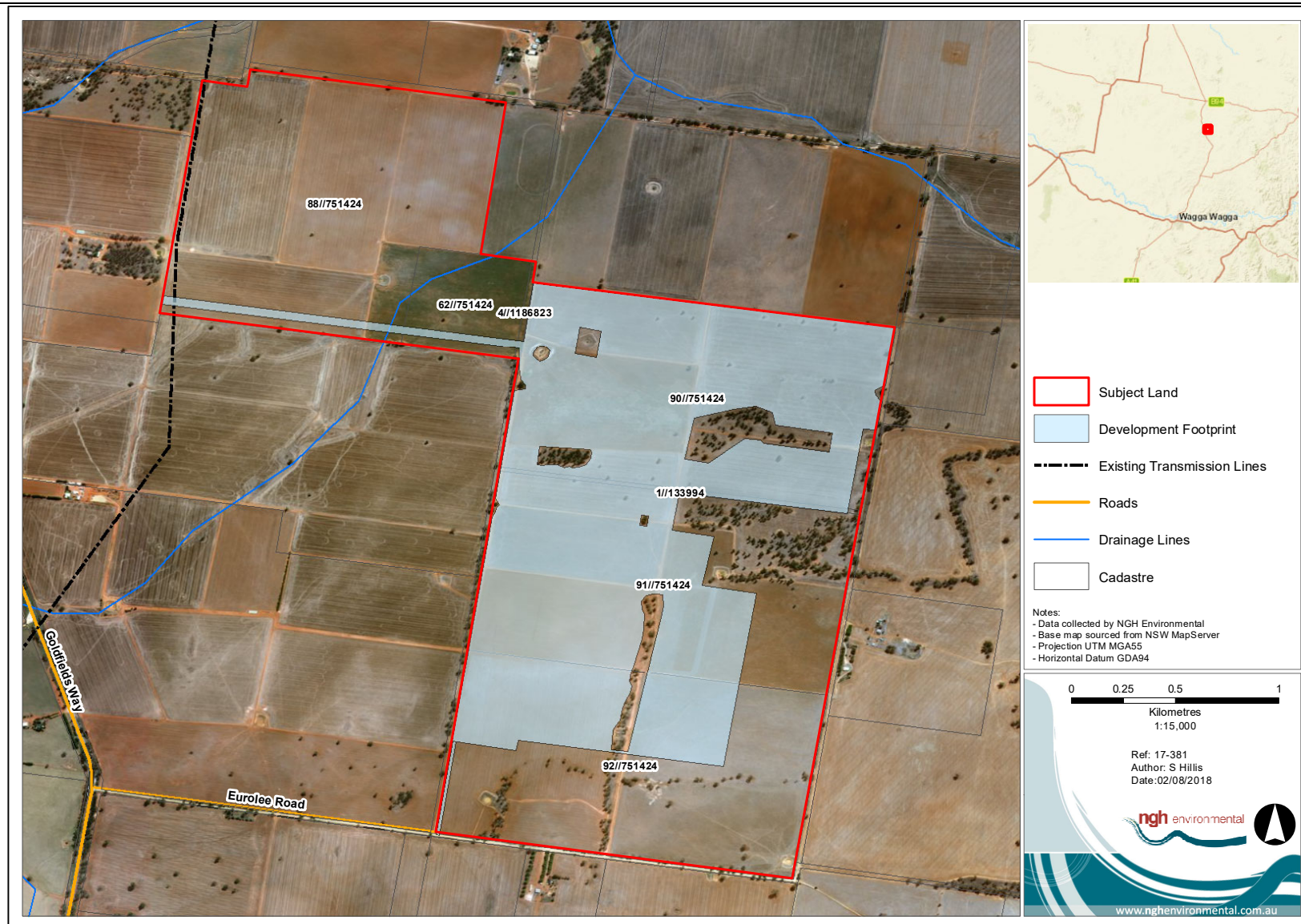


Figure 1-1 Site Map A

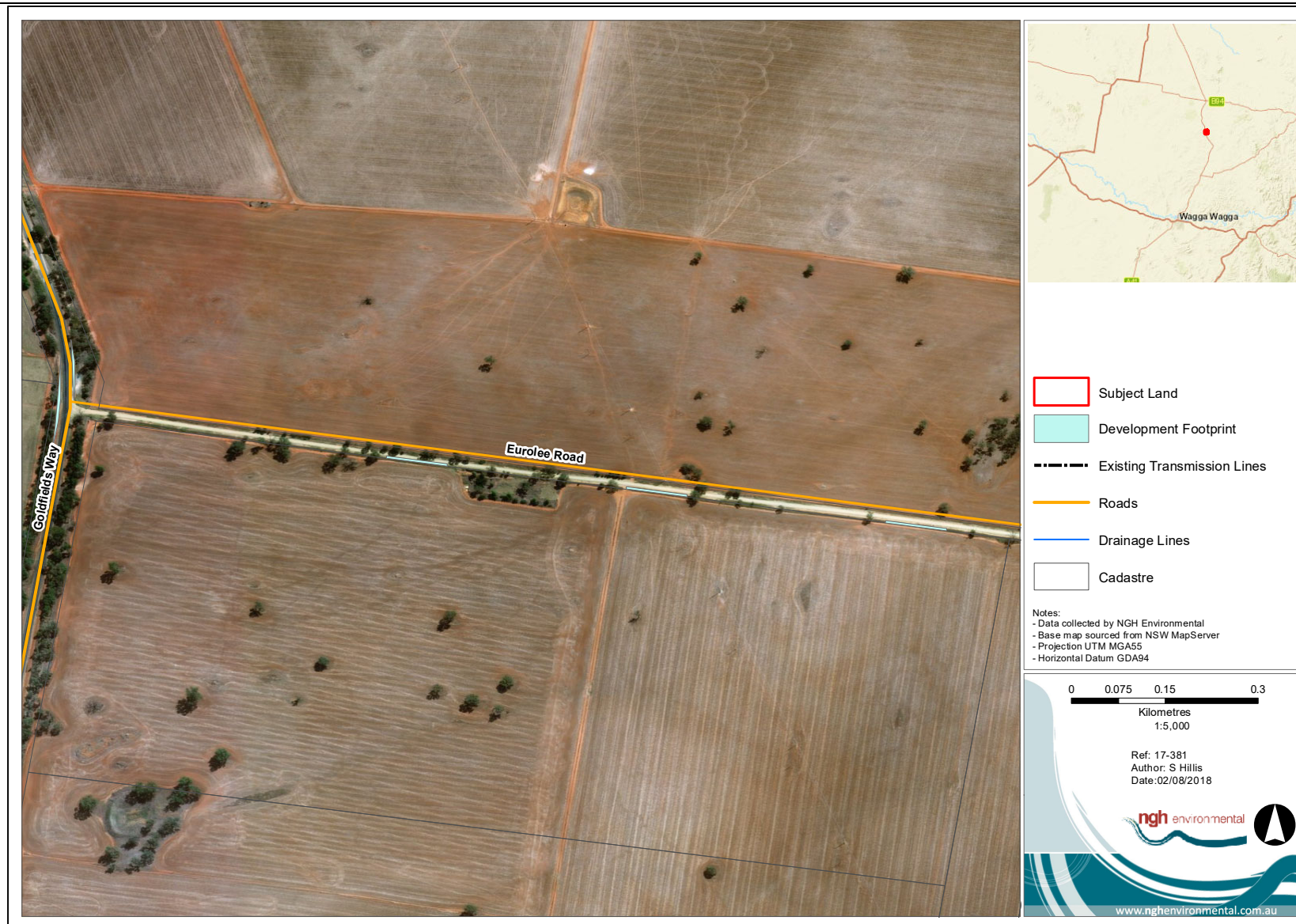


Figure 1-2 Site Map B Road upgrade along Eurolee Road and Goldfields Way

1.3 STUDY AIMS

This BDAR has been prepared by NGH Environmental on behalf of ib vogt.

The aim of this BDAR is to address the requirements of the Secretary's Environmental Assessment Requirements (SEARs) listed below:

Secretary's Environmental Assessment Requirement

The EIS must address the following specific issues:

- **Biodiversity** – including an assessment of the likely biodiversity impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW), a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW).

Responses from the Office of Environment and Heritage (OEH) indicated The Biodiversity Assessment Method (BAM) must be used to assess impacts to biodiversity in accordance with the *Biodiversity Conservation Act 2016* (BC Act) and documented in a Biodiversity Development Assessment Report (BDAR).

This BDAR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.4 SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in this BDAR:

- Proposal layers, construction methodology and concept designs provided by ib vogt.
- Australian Government's Species Profiles and Threats (SPRAT) database
<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- NSW OEH's Threatened Species Profiles
<http://www.environment.nsw.gov.au/threatenedspeciesapp/>
- DPI profiles of threatened species, population, and ecological communities
- Commonwealth Department of Environment and Energy Protected Matters Search Tool
Accessed online at <http://environment.gov.au/epbc/protected-matters-search-tool>
- Australia's IBRA Bioregions and sub-bioregions. Accessed
<http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps>
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2.
- NSW OEH's Biodiversity Assessment Method (BAM) calculator
(<http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>).
- NSW OEH's BioNet threatened biodiversity database
Accessed online via login at <http://www.bionet.nsw.gov.au/>.
- NSW OEH Threatened Species Profiles
<http://www.environment.nsw.gov.au/threatenedSpeciesApp/> and
www.environment.nsw.gov.au/AtlasApp/UI_Modules/
- 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>

1.5 CONSULTATION

Consultation with relevant departments is shown in Table 1-1 Consultation with relevant departments

Table 1-1 Consultation with relevant departments.

Date	Contact	Reason	Response
13/07/18	OEH, land management biodiversity conservation support.	Confirmation of zero credits returned for Small Purple Pea (<i>Swainsona recta</i>).	Michelle Cox from OEH confirmed that the calculator is in error and produced an incorrect credit value for Small Purple Pea. The credits required for this species needs to reflect the true value of 3 credits. This has been updated in this report.
16/07/18	Shannon Simpson, OEH Ecosystem Assessment Project Officer	Mapped Important areas for the Swift Parrot and Regent Honeyeater	Lots fell outside mapped important areas for both the Swift parrot and Regent honeyeater. Nearest important habitat for swift parrot is 10km away.
14/08/18	Michelle Cox, OEH	Confirmation of applying Species credit species to paddock trees	Species credit species are not accounted for in the paddock tree assessment. Either apply the paddock tree assessment or the full BAM assessment. Discussion involved that applying the BAM assessment would likely result in a VIS score less than 17 and no credits would be required and more suitable to generate the ecosystem credits from the paddock trees.

2 LANDSCAPE FEATURES

2.1 IBRA BIOREGIONS AND SUBREGIONS

Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The development site is located within the NSW South Western Slopes Bioregion. Prior to European development, the higher rainfall areas to the east included open woodlands dominated by White box (*Eucalyptus albens*). Vegetation communities dominated by Grey Box (*Eucalyptus microcarpa*) and White Cypress Pine (*Callitris glaucophylla*) were dominant west and north of the bioregion.

The IBRA subregion impacted by the proposal is the Lower Slopes subregion. This was entered into the BAM Calculator for the proposal.

2.2 NSW LANDSCAPE REGION

The development site occurs within the Ardlethan Hills and Murrumbidgee- Tarcutta Channels and Floodplains Mitchell landscapes.

2.3 NATIVE VEGETATION

As determined by GIS mapping from aerial imagery and Central Southern NSW Vegetation Mapping (ADS40_VIS 3884), about 224ha of native vegetation (woody and non-woody) occurs in the 1500m buffer area. The vegetation in the buffer area includes grassy woodland communities varying in dominance of White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*), White Cypress Pine (*Callitris glaucophylla*), and Yellow Box (*Eucalyptus melliodora*).

2.4 CLEARED AREAS

Cleared areas in the development site are primarily sown exotic pastures and cropping for agriculture (Figure 2-1). This vegetation provides limited fauna habitat for native species, however common species including parrots, raptors, and introduced species such as foxes and rabbits may utilise the area for foraging.

About 364ha (88.41%) of cleared non-native vegetation occurs within the development site.



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

2.5 RIVER AND STREAMS

No rivers or streams occur within the development site. The closest watercourse is Wattle Fall Creek located about 500m from the development site west of Goldfields Way. Houlaghans Creek occurs about 5.5 km to the east. Wattle Fall Creek is a Second order stream and Houlaghans Creek is a Fourth order stream under the Strahler stream classification system (Strahler, 1952).

An unnamed drainage line occurs to the north of the development site and passes south through the proposed transmission line footprint. This is a First Order Stream (Strahler, 1952). This drainage line has been extensively modified through the construction of dams, internal roads, and periodic cultivation. No evidence of hydrology or riparian features was observed in the transmission line footprint.

2.6 WETLANDS

No wetlands occur in or adjacent to the development site. The nearest important wetland listed under the EPBC Act is Hattah-Kulkyne Lakes, which occurs 400 – 500 km upstream of the locality.

Six farm dams occur within the development site (Figure 1-1). These dams provide limited habitat quality. The dams are heavily grazed by livestock and no riparian vegetation is present. The dam banks are mostly devoid of vegetation or dominated by agricultural weeds including Wild oats (*Avena fatua*), Bromes (*Bromus spp.*) and Rye Grass (*Lolium rigidum*) (Figure 2-2).



Figure 2-2 Example of farm dam in the development site.

2.7 CONNECTIVITY FEATURES

There are no significant connectivity features in or adjacent to the development site. Remnant vegetation within the development site mostly occurs as isolated patches and paddock trees. Roadside vegetation along Eurolee Road and extending to Goldfield Way may provide limited connectivity for disturbance tolerant and mobile species to traverse the landscape.

2.8 AREAS OF GEOLOGICAL SIGNIFICANCE

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

2.9 AREAS OF OUTSTANDING BIODIVERSITY VALUE

Based on a search of the NSW Biodiversity Values Map, no areas of outstanding biodiversity value or other sensitive biodiversity value areas occur within the development site. The closest sensitive biodiversity area is Wattle Fall Creek which occurs about 400 m from the development site west of Goldfields Way (Figure 2-3).

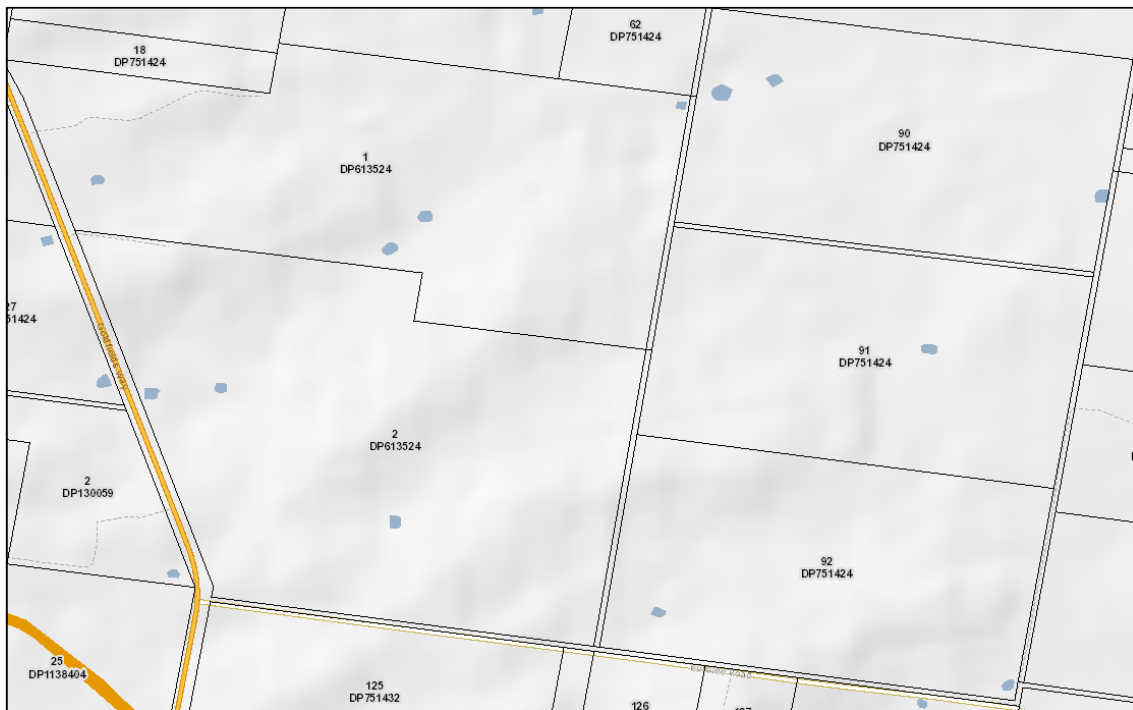


Figure 2-3 NSW Biodiversity Values Map (DPE, 2018).

2.10 SITE CONTEXT COMPONENTS

Method applied

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

Percent Native Vegetation Cover

The Percent Native Vegetation Cover within the 1500 m buffer area surrounding the development site prior to the development was calculated to be 7.11%. This was entered into the BAM calculator for the proposal. This Percent Native Vegetation was calculated by estimating the area of native vegetation (woody and non-woody) within the 1500m buffer area. Areas of native vegetation were calculated using GIS mapping and aerial photography. The total area of the 1500m buffer area is 3142ha. The area of native vegetation within the buffer area is estimated to be 223.56ha. This puts the native vegetation cover into the cover class of <10%.

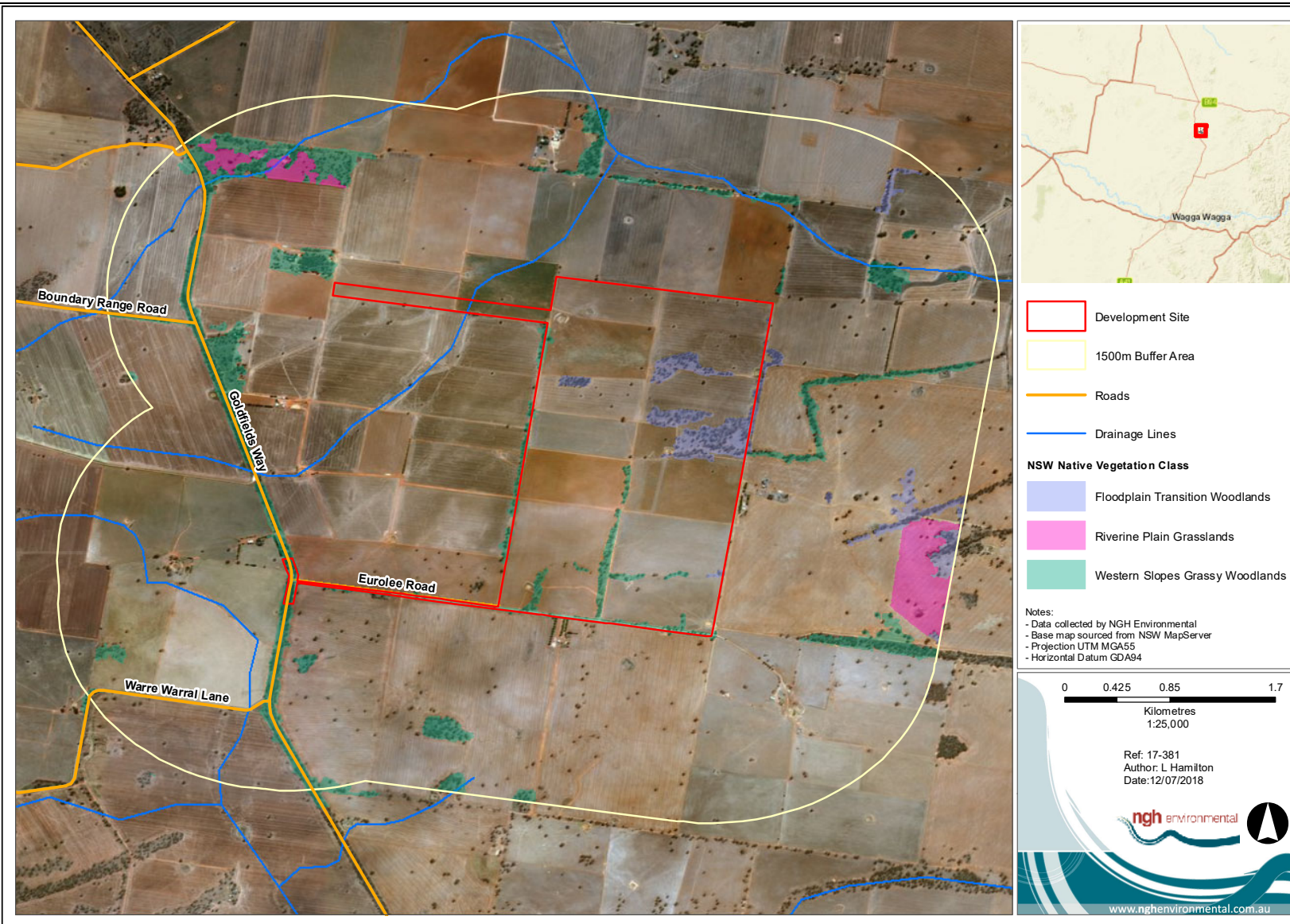


Figure 2-4 Location and native vegetation extent

3 NATIVE VEGETATION

3.1 NATIVE VEGETATION EXTENT

About 48ha of native vegetation occurs within the development site (Figure 3-1). This is comprised of:

- About 7ha of remnant White Cypress (*Callitris glaucophylla*) in the northern section of the development site.
- About 21ha of remnant Grey box /White Cypress Woodland within the centre of the development site
- About 20ha of remnant White Box/ Grey Box/ Yellow Box/ White Cypress Woodland in the southern section of the development site, along Eurolee Road and extending onto Goldfields Way.

About 364ha occurs as non-native vegetation within the development site. This vegetation is comprised of sown exotic pastures, farm tracks and broadacre crops including Canola (**Brassica sp.*), Wheat (**Triticum aestivum*) and Lupins (**Lupinus*).

18 paddock trees occur within the development site (Figure 3-1). Paddock trees were defined as:

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

+Stage release of the regulatory land mapping is occurring under the *Local Land Services Act 2016* (LLS Act). Stage 1b has not been yet been published. During the transitional period, land categories are to be determined in accordance with the definitions of regulated land in the LLS Act. In this case, the paddock trees are located on land with native vegetation present since January 1990, surrounded by land that has been cleared of native vegetation since January 1990.

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

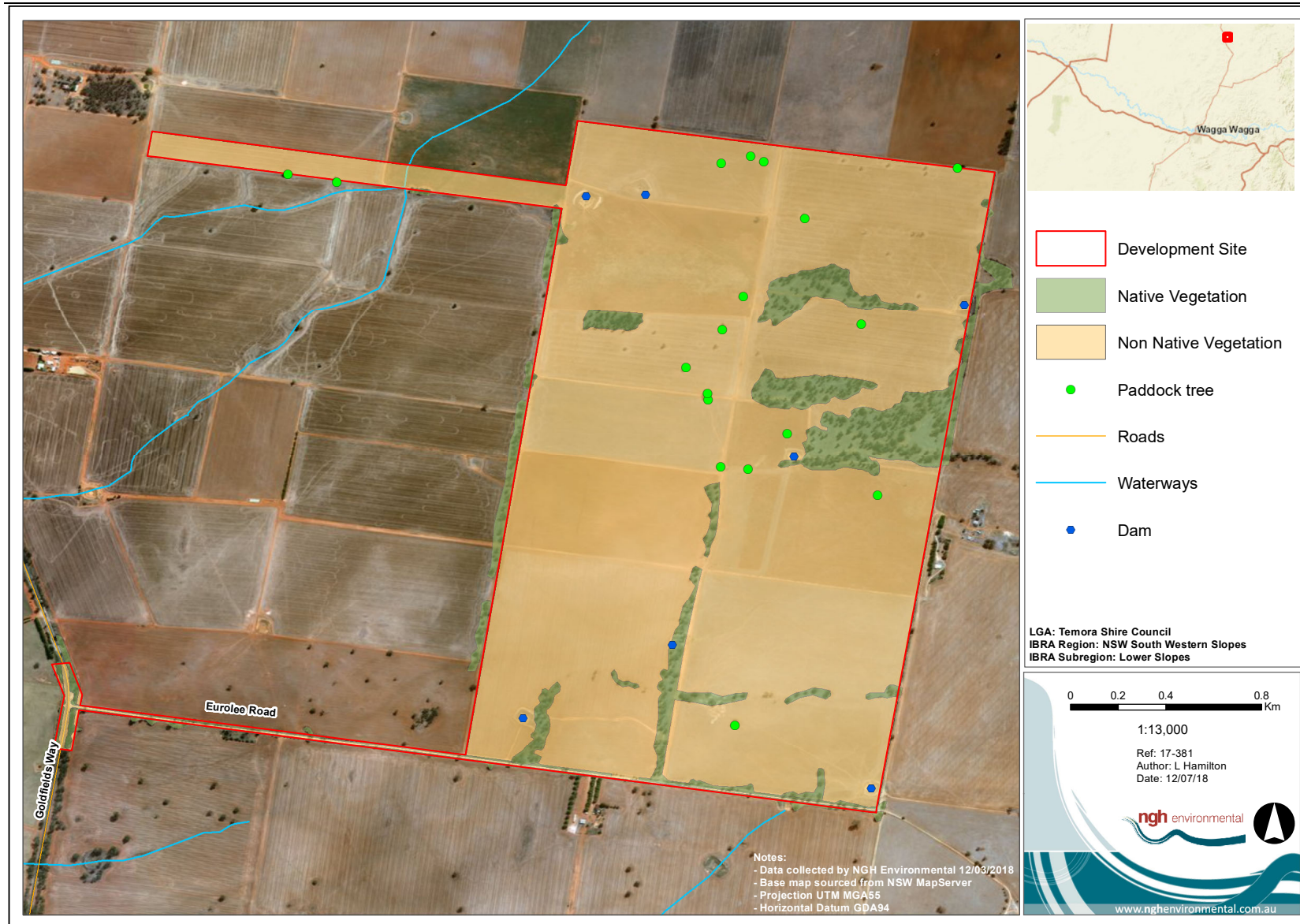


Figure 3-1 Native vegetation extent within the development site.

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 Information System (BioNET VIS) database and the NSW Seed Mapping Portal to access existing vegetation mapping information within the development site. One relevant existing vegetation map provided comprehensive mapping of the development site.

- OEH (2011) Central Southern NSW_ADS40_VIS 3884. This identified three PCT's within and surrounding the development site including:
 - PCT 76: *Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregion* occurring in the centre of the development site.
 - PCT 267: *White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion* within the southern areas of the development site.
 - PCT 266: *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion* along Eurolee Road and sections of Goldfields Way.
- NSW Government Seed Mapping Portal showed similar PCT and native vegetation extent as the OEH Bionet VIS Mapping.

Floristic survey

A site overview was undertaken on the 24th November 2017. The entire subject land was surveyed by one ecologist. The aim of the survey was to confirm the plant community types (PCT's) present in the development site, along with their condition and extent. Random meander searches were conducted to gain an overview of the plant species present and determine variation within vegetation types. 400m² (20m by 20m) floristic plots were undertaken in areas of native vegetation to gain a comprehensive plant list. PCT's were identified using the BioNet VIS, based on the native species present, landform, physiography and location in the IBRA subregion. The PCTs were then stratified into areas of similar condition class to determine vegetation zones for each PCT.

Detailed floristic surveys were undertaken on the 20th April 2018 and the 31st May 2018 by two ecologists. The surveys were undertaken using the methodology presented in the BAM (2017). The required number of vegetation integrity plots of 20m by 50m were established in each vegetation zone. Data was collected on the composition, structure and function of the vegetation. Personnel undertaking the field work have been trained in the BAM and were directed by persons accredited under the BAM (Appendix A).

3.2.2 PCTs identified in the development site

Four plant community types were identified within the development site including:

- PCT 70 White Cypress Pine woodland on sandy loams in central NSW wheatbelt.
- PCT 80 Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion.
- PCT 267 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion.

- PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.

Descriptions of the PCTs identified are provided in Table 3-1 to Table 3-4.

Table 3-1 Description of PCT 70 within the development site.

PCT 70 White Cypress Pine woodland on sandy loams in central NSW wheatbelt.		
Vegetation formation	Grassy Woodlands	
Vegetation class	Floodplain Transitional Woodlands	
Vegetation type	PCT ID	70
	Common Community Name	White Cypress Pine Woodland
Approximate extent within the development site	6.89ha occurs within the development site.	
Species relied upon for PCT identification	Species name	Relative abundance
	White Cypress (<i>Callitris glaucophylla</i>)	30%
Justification of evidence used to identify the PCT	<p>White Cypress is the dominant overstorey and only native flora species remaining within this vegetation community. The native understorey has been entirely lost. One 20m x 20m floristic plot was undertaken in this community (Reference: Floristic Survey 6).</p> <p>PCT 70 is considered to be the most appropriate PCT based on:</p> <ul style="list-style-type: none"> • Occurs as a tall to mid-high woodland dominated by White Cypress Pine that occupies >90% of the canopy cover. • Occurs within the wheat belt of the Southwest slopes bioregion. • Located on loamy soils on alluvial plains. • Grades into Western Grey Box Woodlands with similar understorey species. <p>Based on these factors, PCT 70 was selected for this vegetation community.</p>	
TEC Status	This community does not occur as a TEC under the BC Act or EPBC Act.	
Estimate of percent cleared	65%	

PCT 70 White Cypress Pine woodland on sandy loams in central NSW wheatbelt.

Examples



Figure 3-2 Example of PCT 70 looking in a northerly direction.

Table 3-2 Description of PCT 80 within the development site.

PCT name		
Vegetation formation	Grassy woodlands	
Vegetation class	Floodplain transition Woodlands	
Vegetation type	PCT ID	80
	Common Community Name	Western Grey Box - White Cypress Pine tall woodland
Approximate extent within the development site	17.87Ha occurs within the development site.	
Species relied upon for PCT identification	Species name	Relative abundance
	Grey Box (<i>Eucalyptus microcarpa</i>)	25%
	White Cypress (<i>Callitris glaucophylla</i>)	30%
	Yellow Box (<i>Eucalyptus melliodora</i>)	5%
	Bulloak (<i>Allocasuarina lehmannii</i>)	<1%
	Corrugated Sida (<i>Sida corrugata</i>)	1%
	Oxalis (<i>Oxalis perennans</i>)	1%

PCT name		
	Lomandra (<i>Lomandra filiformis</i>)	2%
	Wheat Grass (<i>Elymus scaber</i>)	<1%
	Bunch wire grass (<i>Aristida ramosa</i>)	1%
	Spear Grass (<i>Austrostipa scabra</i>)	5%
	Yellow Autumn Lily (<i>Tricoryne elatior</i>)	1%
	Blue bell (<i>Wahlenbergia sp.</i>)	1%
	Fuzz weed (<i>Vittadinia gracilis</i>)	1%
	Rock fern (<i>Cheilanthes sieberi</i>)	1%
Justification of evidence used to identify the PCT	<p>Two 20m x 20m floristic plots (Reference flora survey 6 and 7) were completed for this community. The Overstory is co dominated by White Cypress and Grey Box, with the occasional presence of Yellow Box and Bulloak.</p> <p>PCT 80 is considered to be the most appropriate PCT based on:</p> <ul style="list-style-type: none"> • The co-dominance of White Cypress and Grey Box in the overstory • The presence of less dominant overstory species characteristic of this PCT (Yellow Box and Bulloak) • Understory species characteristic of this PCT (Listed above) • Location within the Lower Slopes IBRA subregion • Located on alluvial plain • OEH mapping showing this PCT as potential in the area (Central Southern NSW_ADS40_VIS 3884) <p>Based on these factors, PCT 80 was selected for this community.</p>	
TEC Status	<p>Forms part of the <i>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregion</i> EEC listed under the BC Act.</p> <p>The community does not conform to the EPBC listed <i>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</i>.</p>	
Estimate of percent cleared	83%	


PCT name	
Examples	 <p>Figure 3-3 Example of PCT 80</p>

Table 3-3 Description of PCT 267 in the development site.

PCT name		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodlands	
Vegetation type	PCT ID	267
	Common Community Name	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland
Approximate extent within the development site	12.86ha occurs within the southern section of the development, along Eurolee Road and Goldfields Way.	
Species relied upon for PCT identification	Species name	Relative abundance
	White Box (<i>Eucalyptus albens</i>)	30%
	Grey Box (<i>Eucalyptus microcarpa</i>)	5%
	Yellow Box (<i>Eucalyptus melliodora</i>)	5%
	White Cypress Pine (<i>Callitris glaucophylla</i>)	20%
	Corrugated Sida (<i>Sida corrugata</i>)	2%
	Western Silver wattle (<i>Acacia decora</i>)	2%

PCT name		
	Red Grass (<i>Bothriochloa macra</i>)	5%
	Blue Flax Lily (<i>Dianella revoluta</i>)	10%
	Many-flowered Matt Rush (<i>Lomandra multiflora</i>)	1%
	Twining glycine (<i>Glycine clandestina</i>)	<1%
Justification of evidence used to identify the PCT	<p>Six floristic plots were completed in this community (Reference flora survey 1,4,9,10,11 and 12). The overstory varies in its dominance between White Box and White Cypress, to White Box with scattered Grey Box.</p> <p>PCT 267 is considered to be the most appropriate PCT based on:</p> <ul style="list-style-type: none"> • The dominance of White Box and White Cypress Pine. • The presence of less dominant overstory species characteristic of this PCT (Grey box and Yellow Box). • Understory species characteristic of this PCT (Listed above). • Location within the Lower Slopes IBRA subregion. • Located on the low rises of the landscape • Community contains elements of PCT 266, 70 and 80 which have also been identified in the development site. • This PCT was selected over 266 due to its presence of Grey Box in the overstory. The variation in the presence of White cypress (from dominant to scarce) in areas is likely a result of modification of land use. • OEH mapping showing this PCT in the area (Central Southern NSW_ADS40_VIS 3884). 	
TEC Status	<p>This community forms part of the <i>White Box Yellow Box Blakely's Red Gum Woodland</i> EEC under the BC Act.</p> <p>The community does not conform to the EPBC listed White Box Yellow Box Blakely's Red Gum Grassy Woodland as its understorey is dominated by exotic species.</p>	
Estimate of percent cleared	89%	

PCT name

Examples



Figure 3-4 Example of PCT 267 along southern fence line.

Table 3-4 Description of PCT 266 within development site.

PCT name		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodlands	
Vegetation type	PCT ID	266
	Common Community Name	White Box Grassy Woodland

PCT name		
Approximate extent within the development site	0.79ha along Eurolee Road.	
Species relied upon for PCT identification	Species name	Relative abundance
	White Box (<i>Eucalyptus albens</i>)	40%
	Yellow Box (<i>Eucalyptus melliodora</i>)	10%
	Kurrajong (<i>Brachychiton populosa</i>)	2%
	Corrugated Sida (<i>Sida corrugata</i>)	5%
	Red Grass (<i>Bothriochloa macra</i>)	5%
	Blue Flax Lily (<i>Dianella revoluta</i>)	10%
	Many-flowered Matt Rush (<i>Lomandra multiflora</i>)	1%
Justification of evidence used to identify the PCT	<p>One 20m x20m floristic plot was completed in this community. The overstory is dominated by White Box</p> <p>PCT 266 is considered to be the most appropriate PCT based on:</p> <ul style="list-style-type: none"> • The dominance of White Box often as the only tree species. • The presence of less dominant overstory species characteristic of this PCT (Kurrajong and Yellow Box). • Understory species characteristic of this PCT (Listed above). • Presence of sparse or absent shrub layer. • Location within the Lower Slopes IBRA subregion. • Located on the low rises of the landscape. • OEH mapping showing this PCT in the area (Central Southern NSW_ADS40_VIS 3884). 	
TEC Status	<p>This community forms part of the <i>White Box Yellow Box Blakely's Red Gum Woodland</i> EEC under the BC Act.</p> <p>The community does not conform to the EPBC listed White Box Yellow Box Blakely's Red Gum Grassy Woodland as its understorey is dominated by exotic species.</p>	
Estimate of percent cleared	94%	

PCT name

Examples



Figure 3-5 Example of PCT 266 along Eurolee Road.

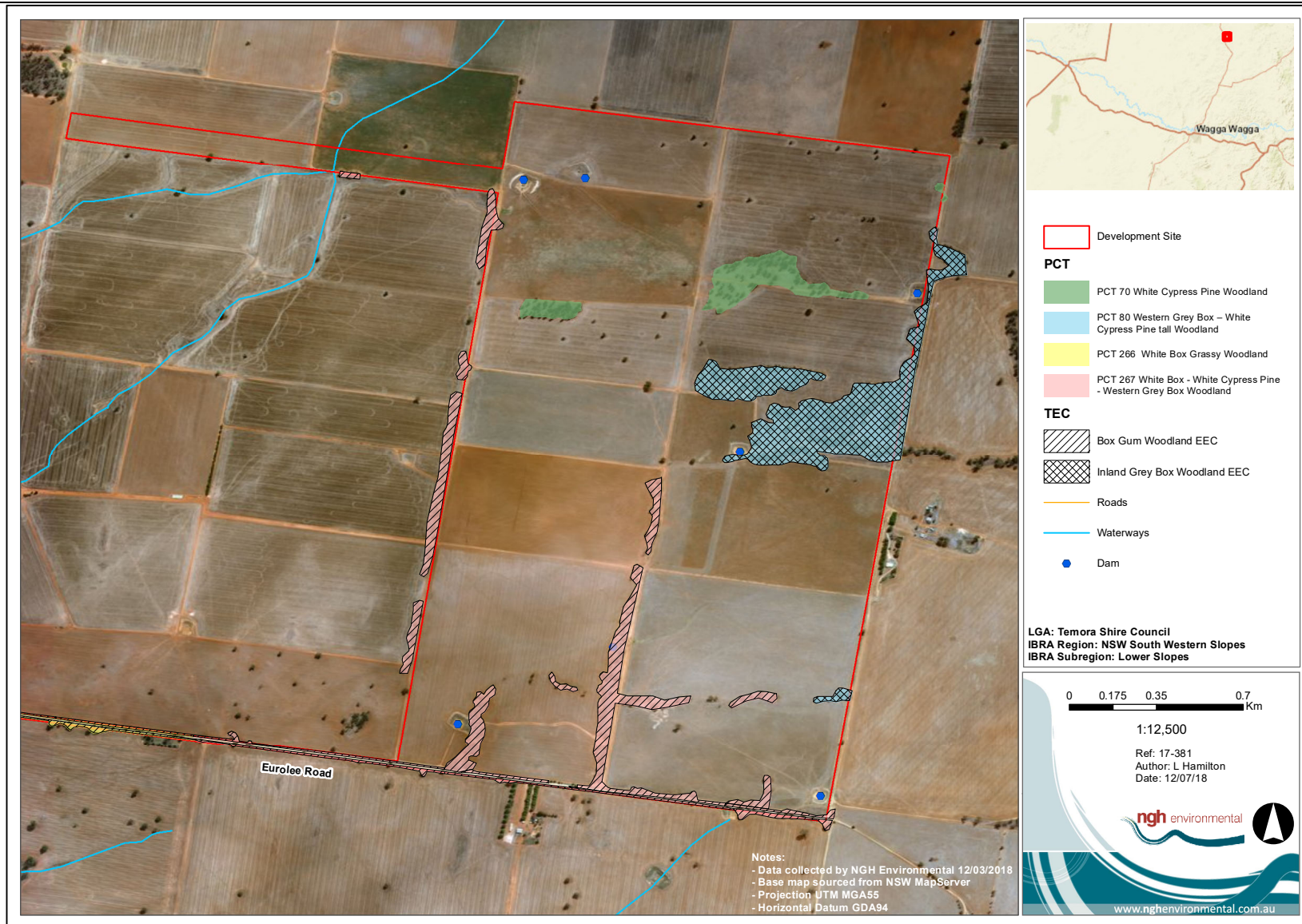


Figure 3-6 (a) PCTs and TECs at the development site

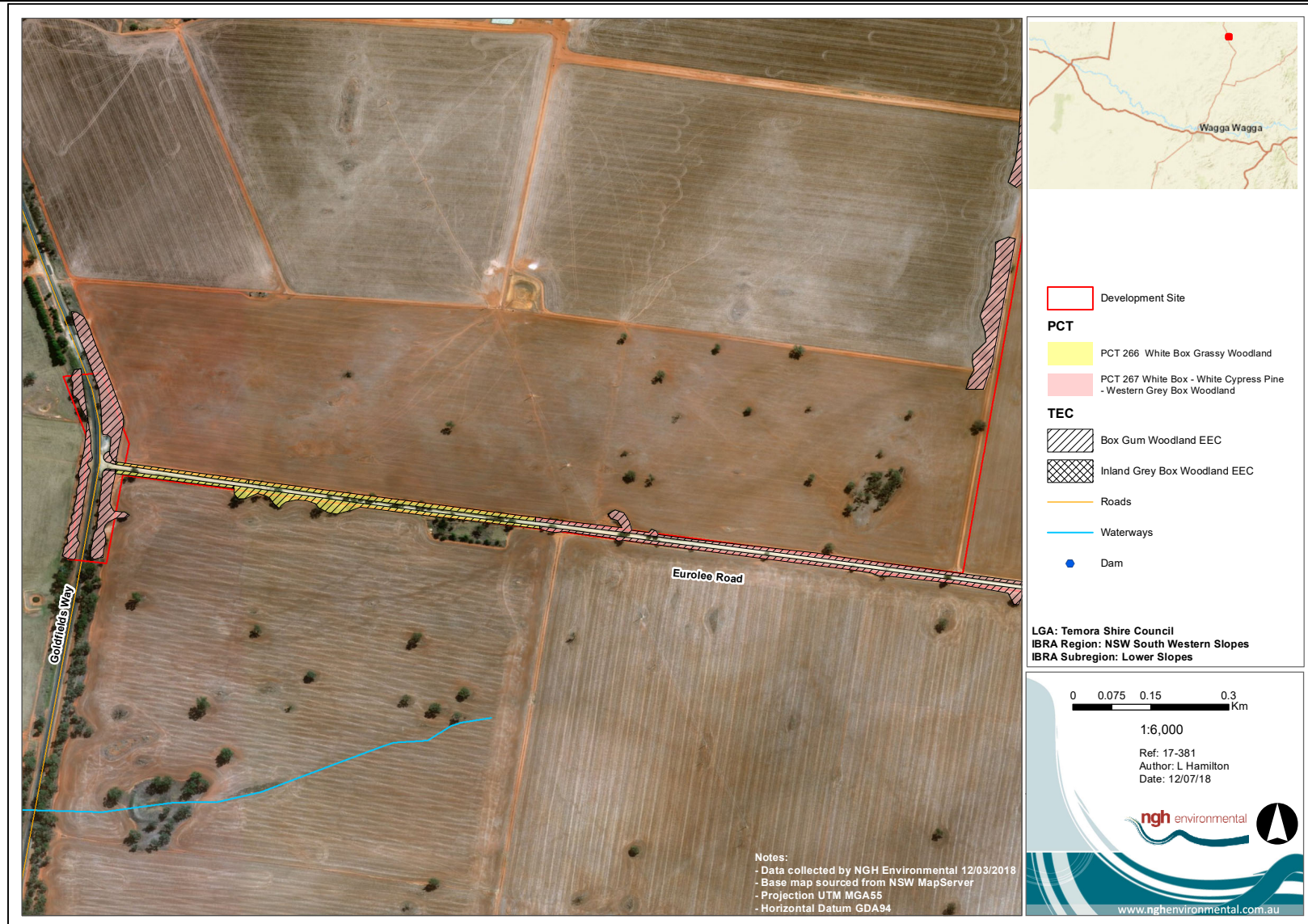


Figure 3-7 (b) PCTs and TECs at the development site

3.3 VEGETATION INTEGRITY ASSESSMENT

3.3.1 Vegetation zones and survey effort

The random meander, overview inspection and detailed floristic plots have been used to assist the delineation of vegetation zones. Four PCTs were identified in the development site. Each PCT was stratified into zones representative a similar broad condition state. These zones were based on the overstory condition, understorey condition and observed land management practices described in Table 3-5.


3.3.2 Paddock trees


18 paddock trees occur in the development site within the exotic vegetation in Zone 9. These were predominantly a mix of White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*) and White Cypress Pine (*Callitris glaucophylla*). PCTs were assigned to the paddock trees based on the species and proximity to identified PCT zones in the development site. Threatened species that would use the paddock trees are assumed to be the same threatened species that are returned by the BAM Calculator for the vegetation zones. Where targeted fauna surveys were required by the BAM Calculations, paddock trees were also included in the surveys. Assessments of threatened species that would use the paddock trees as habitat has been incorporated into this BDAR under Section 4 and 5.


All paddock trees were mapped in the field using a handheld GIS Tablet. Trees were identified to genus and species. The Diameter at Breast Height (DBH) of the tree was assessed and assigned a paddock tree class relevant to the large tree benchmark. The Large tree benchmark for PCT 80, 266, 267 and 70 is 50cm DBH. The trees were visually assessed from the ground to determine whether any hollows were present. 9 of the paddock trees contained hollows, ranging in size from small to large.


The paddock trees occurring in the development site are shown in Figure 3 11 and details provided in Appendix E.


Table 3-5 Vegetation zones for the development site

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
1	70	<p>Low</p> <p>This zone occurs within the northern section of the development site. The overstory is dominated solely by mature White Cypress Pine (<i>Callitris glaucophylla</i>) with no evidence of juvenile successional growth. The understorey is heavily disturbed by cropping and dominated by exotic annual species.</p> <p>This vegetation zone is not listed as an TEC.</p>	0.079ha	1 (Reference Flora survey 6)	6.89ha	


Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
2	267	<p>267_Grazed_understory</p> <p>This zone occurs as all PCT 267 within the farm property. The overstory is dominated by White Box (<i>Eucalyptus albens</i>) with occasional Grey Box (<i>Eucalyptus microcarpa</i>) and Yellow Box (<i>Eucalyptus melliodora</i>). The understory is heavily modified by grazing or cropping and devoid of native vegetation or is dominated by exotic species.</p> <p>This vegetation zone forms part of the White Box Yellow Box Blakey's Red Gum Woodland EEC listed under the BC Act.</p>	0.06ha	4 (9,4,12 & 3)	9.23	


Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
3	267	<p>Moderate</p> <p>This zone occurs as PCT 267 along Eurolee Road in which the overstory of White Box, Yellow Box and White Cypress has predominantly been cleared. Overstory Eucalyptus species occur as isolated trees or scattered regrowth. Shrubs including Western Silver wattle (<i>Acacia decora</i>) also occur. Native forbs and grasses are present but occupy less than 50% of the projected foliage cover.</p> <p>Exotic grasses include Wild Oats (<i>Avena fatua</i>) and the high threat weed Paspalum (<i>Paspalum dilatatum</i>).</p> <p>This vegetation zone forms part of the White Box Yellow Box Blakey's Red Gum</p>	0.07	2	2.69	


Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
		Woodland EEC listed under the BC Act.				
4	267	<p>Good</p> <p>This zone occurs as PCT 267 along Goldfields Way. The overstory is dominated by White Cypress, White Box and Grey Box. The understory consists of shrubs including <i>Acacia decora</i> and <i>Acacia deanei</i>.</p> <p>Native forbs and grasses are present but occupy less than 50% of the projected foliage cover. Flax Lily (<i>Dianella revoluta</i>) is a dominant forb species.</p> <p>This vegetation zone forms part of the White Box Yellow Box Blakey's Red Gum Woodland EEC listed under the BC Act.</p>	0.03	1	0.95	


Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
5	266	<p>Moderate</p> <p>This occurs as PCT 266 along Eurolee Road where the overstory dominance changes to White Box.</p> <p>The understory consists of shrubs including <i>Acacia decora</i>. Native forbs and grasses are present but occupy less than 50% of the projected foliage cover including <i>Bothriochloa macra</i>, <i>Austrostipa</i> sp. and <i>Dianella revoluta</i>.</p> <p>Species richness for forbs is higher in this zone including species <i>Sida corrugata</i>, <i>Convolvulus angustissimus</i>, and <i>Glycine clandestina</i>.</p> <p>This vegetation zone forms part of the White Box Yellow Box Blakey's Red Gum Woodland EEC listed under the BC Act.</p>	0.03	1	0.59	
6	266	Low	0	0	0.20	n/a

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
		<p>This zone occurs as PCT 266 which has lost its overstory species and its understory is dominated by exotic species. Native understory has been lost.</p> <p>This vegetation zone forms part of the White Box Yellow Box Blakey's Red Gum Woodland EEC listed under the BC Act.</p>	(not being impacted by the development)			

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
7	80	<p>Low</p> <p>This zone occurs as PCT 80 which has been heavily modified by Agriculture. Grey Box occurs as the remaining overstory species with the native understory being completely lost and dominated by exotic species.</p> <p>This vegetation zone forms part of the Inland grey Box Woodland EEC listed under the BC Act.</p>	0 (not being impacted by the development)	1	0.37	

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
8	80	<p>Moderate</p> <p>This zone is comprised of PCT 80 within the centre of the development which at the time of the survey had a relatively intact native understory.</p> <p>Overstory is co dominated by Grey Box and White Cypress with an occasional Yellow Box.</p> <p>The understory species occupied less than 50 % of the foliage cover however includes a higher species richness of native grasses and forbs. Common native forbs include <i>Tricoryne elatior</i> and <i>Sida cunninghamii</i>. <i>Dichopogon sp.</i> were also observed.</p> <p>This vegetation zone forms part of the Inland grey Box Woodland EEC listed under the BC Act.</p>	0 (not being impacted by the development)	1	17.50	

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
9	n/a	Exotic vegetation Vegetation dominated by crops such as Wheat (<i>Triticum aestivum</i>) and Canola (<i>Brassica sp.</i>). These areas have been frequently cultivated, or include disturbed areas including tracks and are devoid of native vegetation.	n/a	2 (Reference flora survey 3 and 5)	363.6	

Zone ID	PCT ID	Stratification unit condition	Area impacted (ha)	Survey effort (# plots)	Zone size (ha)	Example
10	n/a	Paddock trees Scattered paddock trees of Grey Box (<i>Eucalyptus microcarpa</i>) and White Cypress (<i>Callitris glaucophylla</i>) over an exotic crop. Paddock trees are more than 50m apart. This zone is assessed under the streamlined paddock tree assessment (section 3.3.2).	n/a	Paddock tree assessment	n/a	

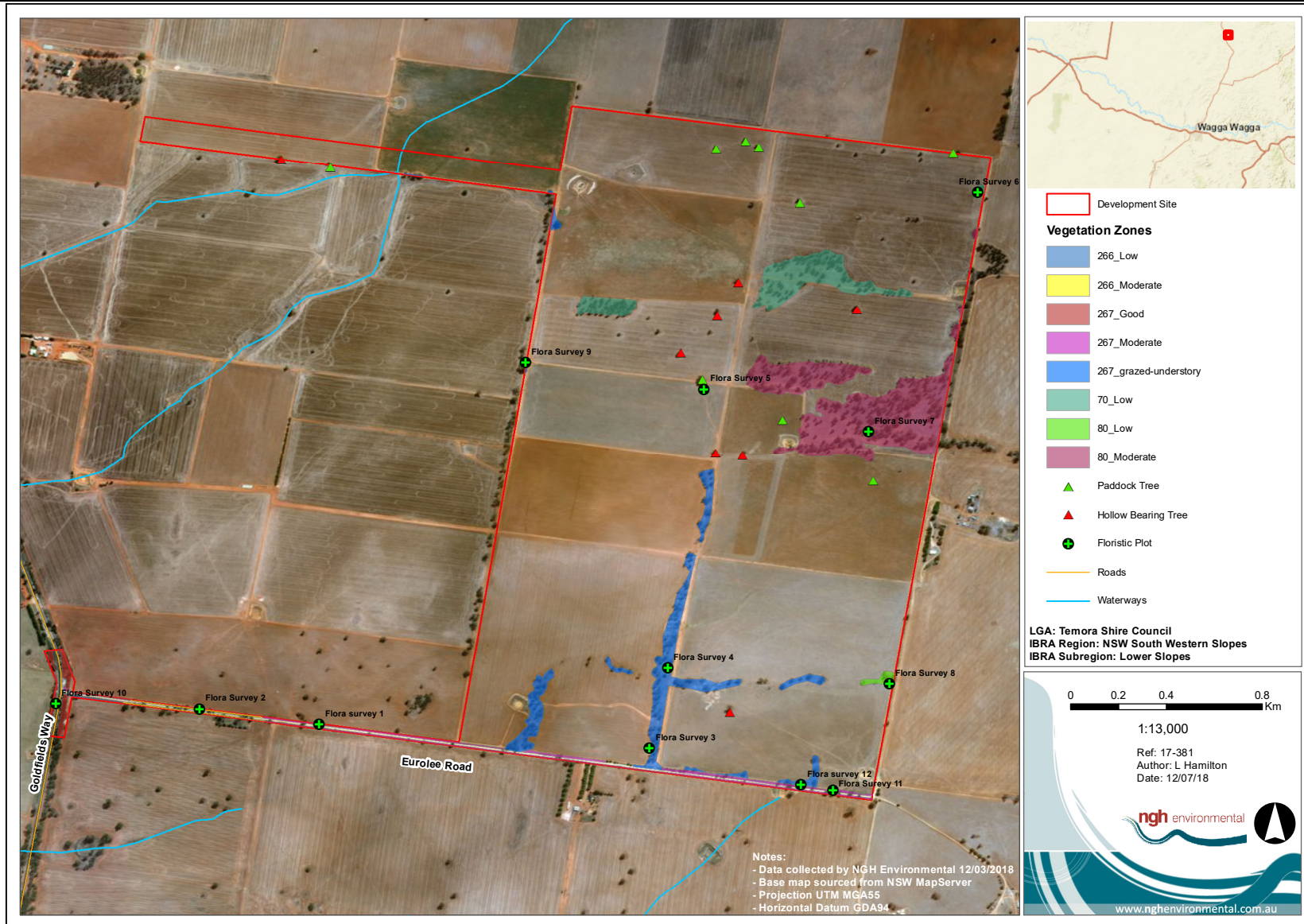


Figure 3-8 Vegetation zones within the development site

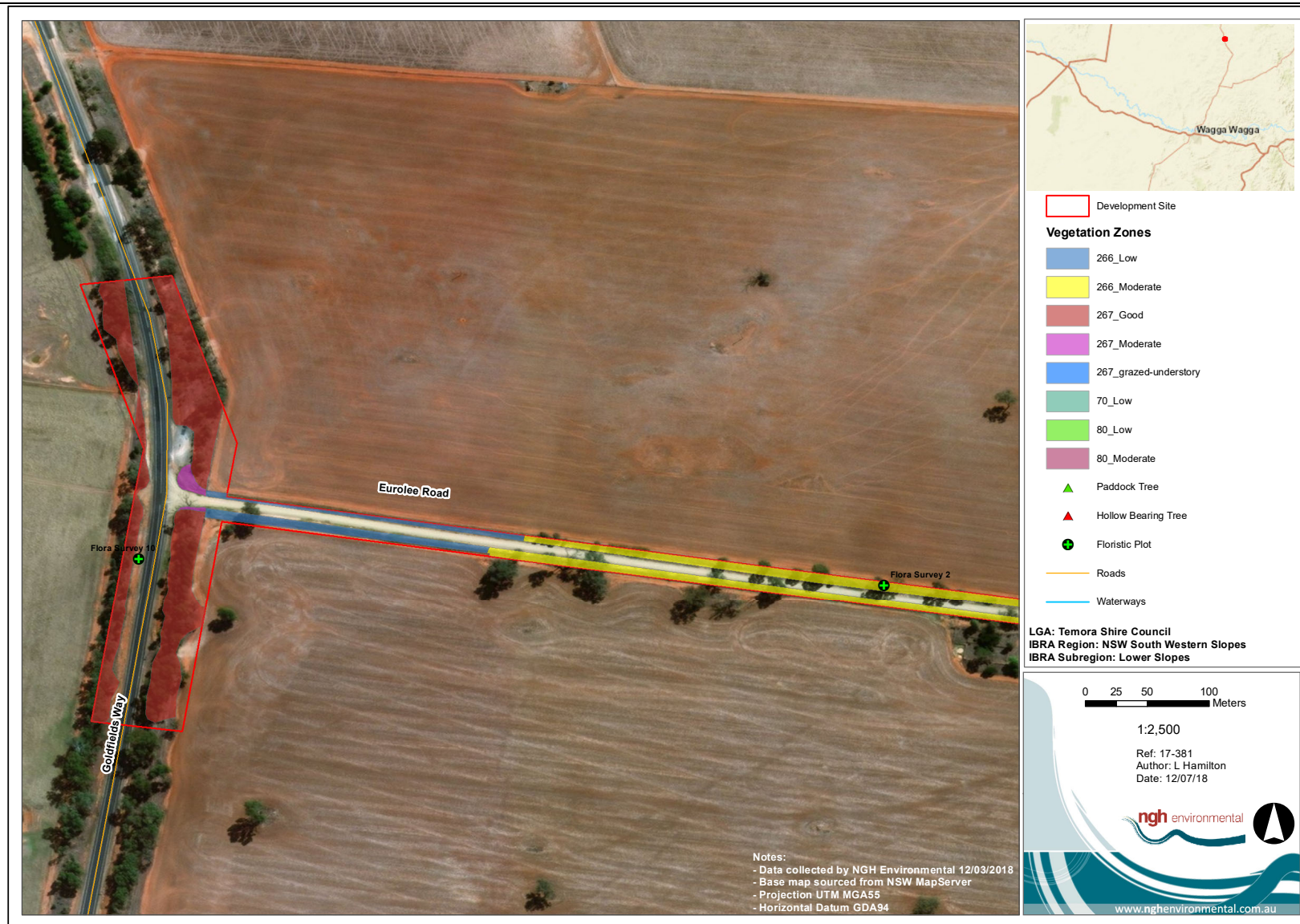


Figure 3-9 Vegetation Zones at the intersection of Eurolee Road and Goldfields Way.



Figure 3-10 Vegetation zones along Eurolee Road west of the Development site.

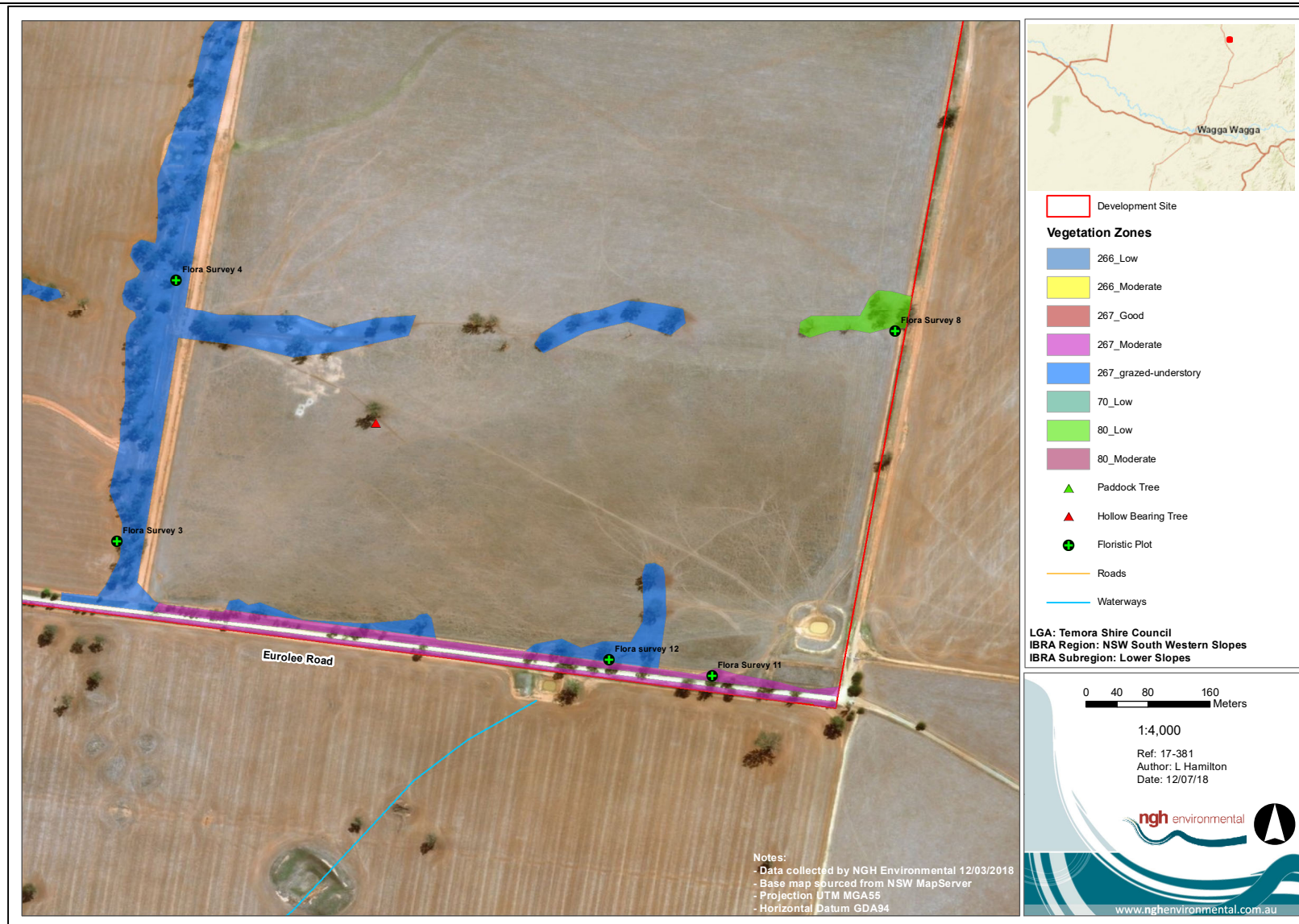


Figure 3-11 Vegetation zones along Eurolee Road south of the development site.

3.3.3 Vegetation integrity assessment results

62 plant species were identified within the 12 vegetation integrity survey plots comprising 31 native species and 31 exotic species. The results of the plot field data and photos of each plot can be found in Appendix B and Appendix C.

The plot data from the vegetation integrity survey plots were entered into the BAM calculator by accredited assessor (Julie Gooding- BAAS18074). The results of the vegetation integrity assessment are summarised in Table 3-6 for the vegetation zones that are impacted.

Table 3-6 Table of current vegetation integrity scores for each impacted vegetation zone within the development site.

Zone ID	Composition score	Structure score	Function score	Vegetation Integrity Score
1. 70_Low	2.9	47.4	44.7	18.2
2 267_grazedunderstory	9.1	32.5	68.1	27.2
3 266_Moderate	54	54.6	63.9	57.3
4 267_Good	19.5	58.7	85.7	46.1
5 266_Moderate	17.7	14.6	32.4	20.3

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

The following ecosystem credit species were returned by the calculator as being associated with the PCTs present on the development site (Table 4-1). These species are assumed to occur on site and contribute to ecosystem credits. The Superb Parrot and Brown Treecreeper were observed on site during the field surveys.

Table 4-1 Ecosystem credit species

Ecosystem credit species	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Anthochaera phrygia</i> Regent Honeyeater (Foraging)	PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Critically Endangered	Critically Endangered
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Calyptrorhynchus lathamii</i> Glossy Black-Cockatoo (Foraging)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Chthonicola sagittata</i> Speckled Warbler	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed

Ecosystem species	credit	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Dasyurus maculatus</i> Spotted-tailed Quoll		PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Endangered
<i>Falco hypoleucos</i> Grey Falcon		PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt	Endangered	Not listed
<i>Glossopsitta porphyrocephala</i> Purple-crowned Lorikeet		PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Glossopsitta pusilla</i> Little Lorikeet		PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion.	Vulnerable	Not listed
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Foraging)		PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Lathamus discolor</i> Swift Parrot (Foraging)		PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Endangered	Critically Endangered
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Foraging)		PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt	Vulnerable	Not listed
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)		PCT70 - White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed

Ecosystem credit species	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Petroica boodang</i> Scarlet Robin	PCT70 - White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Petroica phoenicea</i> Flame Robin	PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Phascolarctos cinereus</i> Koala (Foraging)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
<i>Polytelis swainsonii</i> Superb Parrot (Foraging)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
<i>Pomatostomus temporalis temporalis</i> Grey-crowned Babbler (eastern subspecies)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT-266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266_White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable

Ecosystem credit species	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Stagonopleura guttata</i> Diamond Firetail	PCT 70- White Cypress Pine woodland on sandy loams in central NSW wheatbelt PCT 266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion PCT 267- White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Vulnerable	Not listed

4.1.1 Species excluded from the assessment

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

4.2 SPECIES CREDIT SPECIES

4.2.1 Candidate species to be assessed

The BAM Calculator predicted the following species credit species to occur at the development site Table 4-2). Species excluded based on the absence of suitable habitat within the development site are highlighted in Table 4-2. The potential for indirect habitats on all species is considered in Section 7.2.

Table 4-2 Summary of species credit species

Species Credit Species	Habitat components and geographic restrictions. ¹	Sensitivity to gain class	NSW listing status	National listing status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
FAUNA							
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	Mapped Important areas (OEH)	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered	Outside mapped important areas (OEH)	Excluded	Not mapped as an important habitat area.
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	Rocky areas or within 50m of rocky area	High	Vulnerable	Vulnerable	Absent - No rocky areas within development site.	Excluded	No suitable habitat in development site
<i>Calyptrorhynchus lathamii</i> Glossy Black-Cockatoo (Breeding)	Outside Narrandera, Leeton and Griffith LGAs Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	High	Vulnerable	Not Listed	Suitable Hollow Bearing Trees (HBT) present within development site.	Excluded	No hollow bearing trees to be removed within native vegetation patches.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	Living or dead trees within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines. (Bionet).	High	Vulnerable	Not Listed	Absent – No waterbodies within 1km of development site.	Excluded	No suitable habitat in development site.
<i>Lathamus discolor</i> Swift Parrot	Mapped Important areas (OEH)	Moderate	Endangered	Critically Endangered	Outside mapped important areas (OEH)	Excluded	Outside mapped important area (OEH)
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Breeding)	Living or dead tree with hollows greater than 10cm diameter	High	Vulnerable	Not listed	Suitable HBTs present within development site.	Excluded	No hollow bearing trees to be removed within native vegetation patches.

Species Credit Species	Habitat components and geographic restrictions. ¹	Sensitivity to gain class	NSW listing status	National listing status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
<i>Petaurus norfolcensis</i> Squirrel Glider	Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart).	High	Vulnerable	Not listed	Suitable HBTs present within development site.	Excluded	No hollow bearing trees to be removed within native vegetation zones.
<i>Phascolarctos cinereus</i> Koala (Breeding)	Areas identified via survey as important habitat based on density of Koalas and quality of habitat.	High	Vulnerable	Vulnerable	Survey required to identify	Included	Survey required and undertaken
<i>Polytelis swainsonii</i> Superb Parrot (Breeding)	Living or dead <i>E. blakelyi</i> , <i>E. melliadora</i> , <i>E. albens</i> , <i>E. camaldulensis</i> , <i>E. microcarpa</i> & <i>E. polyanthemos</i> with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm.	High	Vulnerable	Vulnerable	Suitable HBTs present in development site	Excluded	No hollow bearing trees to be removed within native vegetation zones.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	Breeding camps. Breeding camps will need to be identified by survey	High	Vulnerable	Vulnerable	Survey required to identify	Included	Survey required and undertaken
FLORA							
<i>Acacia ausfeldii</i> Ausfeld's Wattle	None	High	Vulnerable	Not Listed	Survey required to identify	Included	Within Geographic Distribution
<i>Austrostipa metatoris</i> A spear-grass	None	Moderate	Vulnerable	Vulnerable	Suitable habitat of native understory within Zone 3, 4 & 5	Included	Within Geographic Distribution

Species Credit Species	Habitat components and geographic restrictions. ¹	Sensitivity to gain class	NSW listing status	National listing status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
<i>Austrostipa wakoolica</i> A spear-grass	South of Narrandera	Moderate	Endangered	Endangered	Development site north of Narrandera	Excluded	Outside Geographic distribution
<i>Diuris tricolor</i> Pine Donkey Orchid	None	Moderate	Vulnerable	Not Listed	Suitable habitat of native understory within Zone 3, 4 & 5	Included	Within Geographic Distribution
<i>Swainsona recta</i> Small Purple-pea	None	NA	Endangered	Endangered	Suitable habitat of native understory within Zone 3, 4 & 5	Included	Within Geographic Distribution
<i>Swainsona sericea</i> Silky Swainson-pea	None	High	Vulnerable	Not Listed	Suitable habitat of native understory within Zone 3, 4 & 5	Included	Within Geographic Distribution
<i>Tylophora linearis</i> Tylophora linearis	None	High	Vulnerable	Not listed	Suitable habitat of native understory within Zone 3, 4 & 5	Included	Within Geographic Distribution

4.2.2 Exclusions based on habitat features

Under Section 6.4.1.17 of the BAM, a species credit species can be considered unlikely to occur on a development site (or within specific vegetation zones) if following field assessment, it is determined that the habitat is substantially degraded such that the species is unlikely to utilise the development site (or specific vegetation zones). These species are identified in Table 4-3 along with justification regarding the habitats present.

Table 4-3 Species credit species excluded based on habitat

Species Credit Species	Zones excluded	Reason for exclusion
<i>Austrostipa metatoris</i> <i>Diuris tricolor</i> <i>Swainsona recta</i> <i>Swainsona sericea</i> <i>Tylophora linearis</i>	Zone 1: PCT 70_Low Zone 2: PCT267_Grazedunderstory	These zones have undergone significant understory disturbance through cropping and heavy grazing. The understory is dominated by bare ground and exotic species such as Brassica species and Rye Grass. The habitat is sufficiently degraded for native understory species and these species are unlikely to occur in these zones.
Major Mitchell Cockatoo (Breeding) Glossy Black Cockatoo (Breeding) Superb Parrot (Breeding)	Zone 1: PCT 70_Low Zone 2: PCT267_Grazedunderstory Zone 3: PCT266_Moderate Zone 4: PCT267_Good Zone 5: PCT267_Moderate	These zones are excluded, as there are no hollow bearing trees for nesting that occur within the impacted native vegetation zones. The species is unlikely to utilise these zones for breeding.

4.2.3 Candidate species requiring confirmation of presence or absence

The species listed in Table 4-4Table 4-3 are considered to have habitats present at the development site. One threatened species, the Superb Parrot (*Polytelis swainsonii*) was detected on site. A further five species, including one fauna species and four flora species, are assumed to be present on the site as surveys were unable to be undertaken during the appropriate survey period. Surveys have been conducted for the remaining species. Details of the survey methodologies and results are provided for each surveyed species below.

Targeted survey locations are mapped on Figure 4-1.

Species polygons have been defined for the species present on the site as mapped on Figure 4-1.

Table 4-4 Summary of species credit species surveyed at the development site

Species Credit Species	Biodiversity risk weighting	Survey Period	Assumed occur/survey/ report to expert	Present on site?	Species polygon area or count
FAUNA					
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo (Breeding)	2.00	Mar -Aug	Surveyed March 2018	No	0
<i>Lathamus discolor</i> Swift Parrot	3.00	May - Aug	Surveyed May 2018	No	0
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Breeding)	2.00	Sep - Dec	Not Surveyed Assumed Present	Yes	0 No breeding habitat to be impacted.
<i>Petaurus norfolcensis</i> Squirrel Glider	2.00	All	Surveyed March 2018	No	0
<i>Phascolarctos cinereus</i> Koala (Breeding)	2.00	All	Surveyed March 2018	No	0
<i>Polytelis swainsonii</i> Superb Parrot (Breeding)	2.00	Sep - Nov	Twelve detected on site in June 2018	Yes	0 No breeding habitat to be impacted.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	2.00	Oct -Dec	Surveyed November 2017	No	0
FLORA					
<i>Acacia ausfeldii</i> Ausfeld's Wattle	2.00	All	Surveyed Nov 2017, March and May 2018	No	0
<i>Austrostipa metatoris</i> A spear-grass	1.50	Oct -Nov	Not surveyed Assumed Present	Yes	0.13ha (Zone 3, 4 & 5)
<i>Diuris tricolor</i> Pine Donkey Orchid	1.50	Sep - Oct	Not surveyed Assumed Present	Yes	0.13ha (Zone 3, 4 & 5)
<i>Swainsona recta</i> Small Purple-pea	1.00	Sep - Nov	Not Surveyed Assumed Present	Yes	0.13ha (Zone 3, 4 & 5)
<i>Swainsona sericea</i> Silky Swainson-pea	2.00	Sep - Feb	Not surveyed Assumed Present	Yes	0.13ha (Zone 3, 4 & 5)
<i>Tylophora linearis</i> Tylophora linearis	2.00	Sep - May	Surveyed May 2018	No	0

4.3 THREATENED SPECIES SURVEY

Targeted surveys were undertaken over a number of days and months. A general biodiversity survey was undertaken on the 24th November 2017. Threatened Fauna Surveys and Nocturnal Surveys were undertaken on the 28th and 29th March, and 31st May and 4th July 2018. Threatened Flora surveys were undertaken on the 20th April 2018. Weather conditions recorded for these dates from the Bureau of Meteorology (BOM) at the Temora Weather Station are as follows:

Date	Maximum Temperature (°C)	Minimum Temperature (°C)	Rainfall (mm)	Max Wind (km/h)	Gust
24 th November 2017	15.3	34.1	0	41	
28 th March 2018	5.4	30.9	0	24	
29 th March 2018	9.5	34.3	0	39	
20 th April 2018	9.6	28.9	0	20	
31 st May 2018	4.4	11.6	0	39	
4 th July 2018	3.4	15.3	0	28	

Diurnal Birds (Glossy Black Cockatoo, Swift Parrot, Major Mitchell Cockatoo, and Superb Parrot)

SURVEY EFFORT

A woodland bird census was completed on the evening of the 28th March 2018. Three 20-minute point surveys for birds were carried out in the Woodland vegetation of the development site. Opportunistic surveys were undertaken throughout the site visit including traversing the site by car and on foot. Opportunistic sightings of birds were also recorded during the six days of field surveys.

Targeted Hollow Bearing Tree surveys were carried out on the 20th April 2018 to identify trees with suitable breeding habitat for the Superb Parrot or Major Mitchell Cockatoo. All paddock trees within the development footprint were surveyed for the presence of hollows. The number, size and height of hollows were recorded for each tree along with any evidence of use. Hollows were categorised as small (< 10 cm), medium (10 – 20 cm), and large (> 20 cm).

Targeted surveys were completed for the Glossy Black Cockatoo on the 28th March and 29th March. One 20 minute point survey was completed each evening over the two days. The surveys were undertaken in the Moderate Condition Grey Box White Cypress Woodland habitat in the centre of the development site.

Targeted surveys were also carried out for the Swift Parrot on the 31st May 2018. Two 20 minute point surveys were completed in the White Box (*Eucalyptus albens*) Woodland habitat in the centre of the development site and along Eurolee Road where suitable foraging habitat could occur.

Surveys for the Major Mitchell Cockatoo and Superb Parrot were unable to be undertaken during the recommended survey time.

SURVEY RESULTS

The Swift Parrot, Major Mitchell Cockatoo and Glossy Black Cockatoo were not recorded during any of the six days of field surveys.

The Superb Parrot was identified opportunistically during all six field surveys. The survey completed during July recorded a flock of up to 12 and 7 individuals flying across cleared paddocks on separate occasions.

Hollow bearing trees were identified within the development footprint. These were identified as potential breeding habitat for the Superb Parrot and the Major Mitchells Cockatoo. Suitable breeding habitat for these species include living or dead trees with hollows greater than 10cm diameter (Major Mitchells Cockatoo) and hollows 10-25cm in diameter and located 4-9m above the ground (Superb Parrot) (Bionet, 2018, Rayner et al, 2016).

The development would impact 6 paddock trees containing suitable hollows. In accordance with the BAM and Consultation with OEH, paddock trees assessed under the streamlined paddock tree assessment are not considered as species credit polygons.

0.27ha of native vegetation would be impacted by the development. However, no hollow bearing trees would be removed in these zones and therefore no breeding habitat for the Superb Parrot or Major Mitchells Cockatoo was entered into the BAM Calculator.

A full list of bird species observed during the surveys are shown in Appendix F.

Nocturnal mammals (Squirrel Glider and Koala and Grey-headed flying fox)

SURVEY EFFORT

Targeted spotlighting surveys were undertaken on the evenings of the 28th and 29th March 2018 and the 31st May and 4th July 2018 by two consultants for approximately two hours each night. A 100-watt spotlight was used in both vehicle-based and foot surveys within planted remnant vegetation and isolated paddock trees. Targeted searches for Koalas during the day were undertaken on the 20th April 2018 for approximately 5 hours. Mature feed trees were searched for signs of Koalas such as scats and scratches.

Targeted searches for Grey-headed Flying Foxes camps were completed during the day on the 24th of November. The canopy of trees within the development site were visually inspected for evidence of roosting bats.

SURVEY RESULTS

No Koalas (or signs of Koalas), Squirrel Gliders or Grey-headed Flying foxes were observed during the surveys. These species are not considered to occur within the development site.

Ausfelds Wattle (*Acacia ausfeldii*)

SURVEY EFFORT

Targeted surveys were completed for *Acacia ausfeldii* during the day on the 24th Nov 2017, 28th March and 31st May 2018. The understory of all vegetation zones within the development site and along Eurolee Road and the intersection of Goldfields Way were surveyed over the three field surveys.

SURVEY RESULTS

Acacia ausfeldii was not detected within the survey area. This species is not considered to occur within the development site.

Tylophora linearis

SURVEY EFFORT

This species known vegetation associations include White Cypress Pine woodland identified within the development site (Zone 1). Targeted surveys were completed for *Tylophora linearis* during the evening on

the 31st May 2018. The understory of this zone is predominantly exotic and disturbed from cropping and unlikely to be suitable habitat for this species.

SURVEY RESULTS

Tylophora linearis was not detected within the survey area. This species is not considered to occur within the development site.

A spear-grass (*Austrostipa metatoris*)

SURVEY EFFORT

Surveys for this threatened plant species was unable to be undertaken during the specified time period in Spring.

SURVEY RESULTS

Suitable habitat for this species occurs in the remnant woodland vegetation along Eurolee Road and Goldfields Way where native understory has not been entirely lost (Zone 3, 4 & 5). The remaining vegetation zones (Zones 1 and 2) are either exotic vegetation or lack an understory from cropping and grazing impacts and are not suitable habitat for these threatened flora species. As surveys were not undertaken during the specified time period these species are presumed to occur within Zones 3, 4 and 5.

Threatened Forbs (Pine Donkey Orchid, *Diuris tricolor*, Small Purple-pea *Swainsona recta*, Silky swainson-pea, *Swainsona sericea*, A Spear Grass, *Austrostipa metatoris*)

SURVEY EFFORT

Surveys for these threatened plant species were unable to be undertaken during the specified time period in Spring.

SURVEY RESULTS

Suitable habitat for these species occurs in the remnant woodland vegetation along Eurolee Road and Goldfields Way where native understory has not been entirely lost (Zone 3, 4 & 5). The remaining vegetation zones (Zones 1 and 2) are either exotic vegetation or lack an understory from cropping and grazing impacts and are not suitable habitat for these threatened flora species. As surveys were not undertaken during the specified time period these species are presumed to occur within Zones 3, 4 and 5.

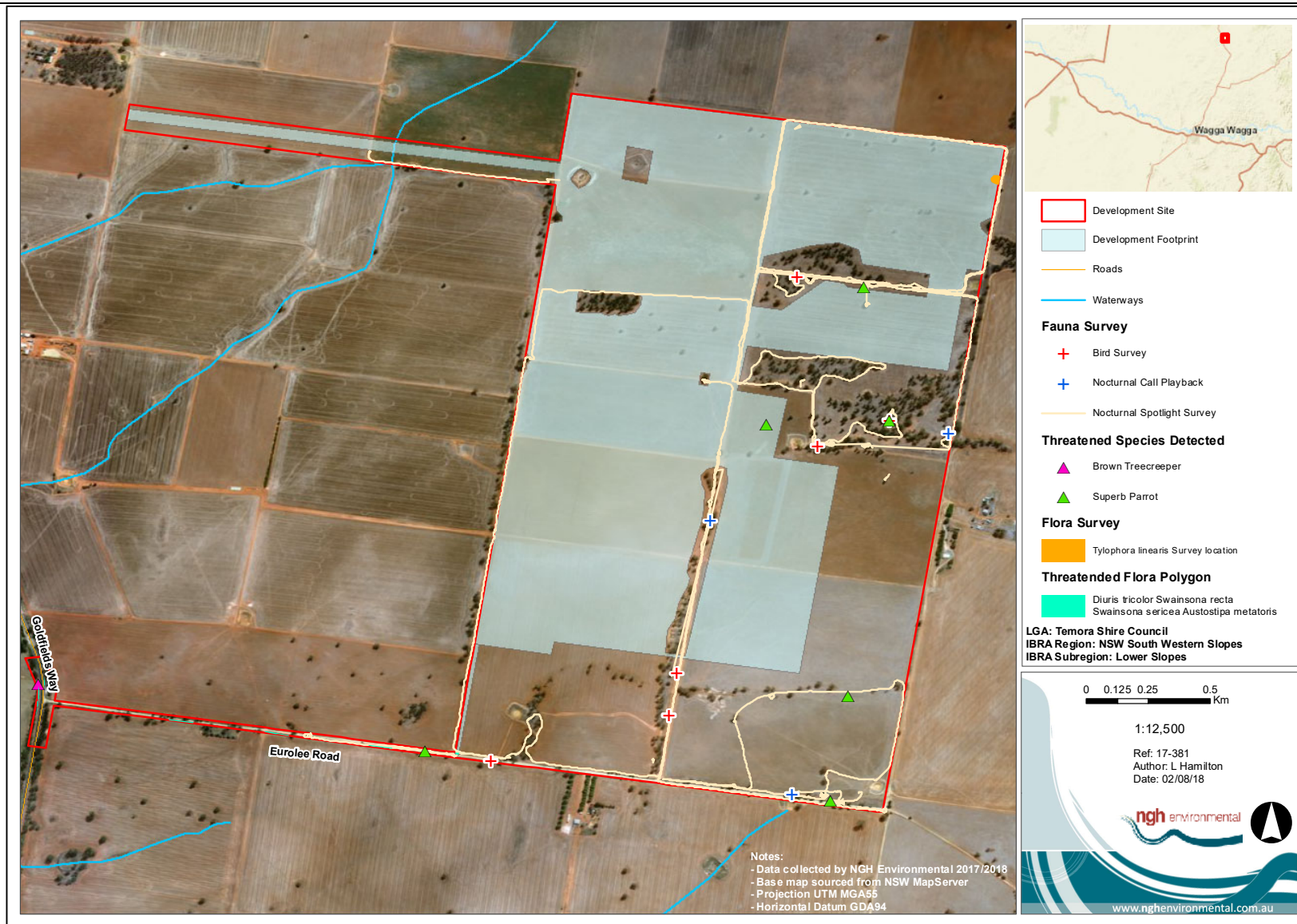


Figure 4-1 Targeted survey locations and threatened species polygons

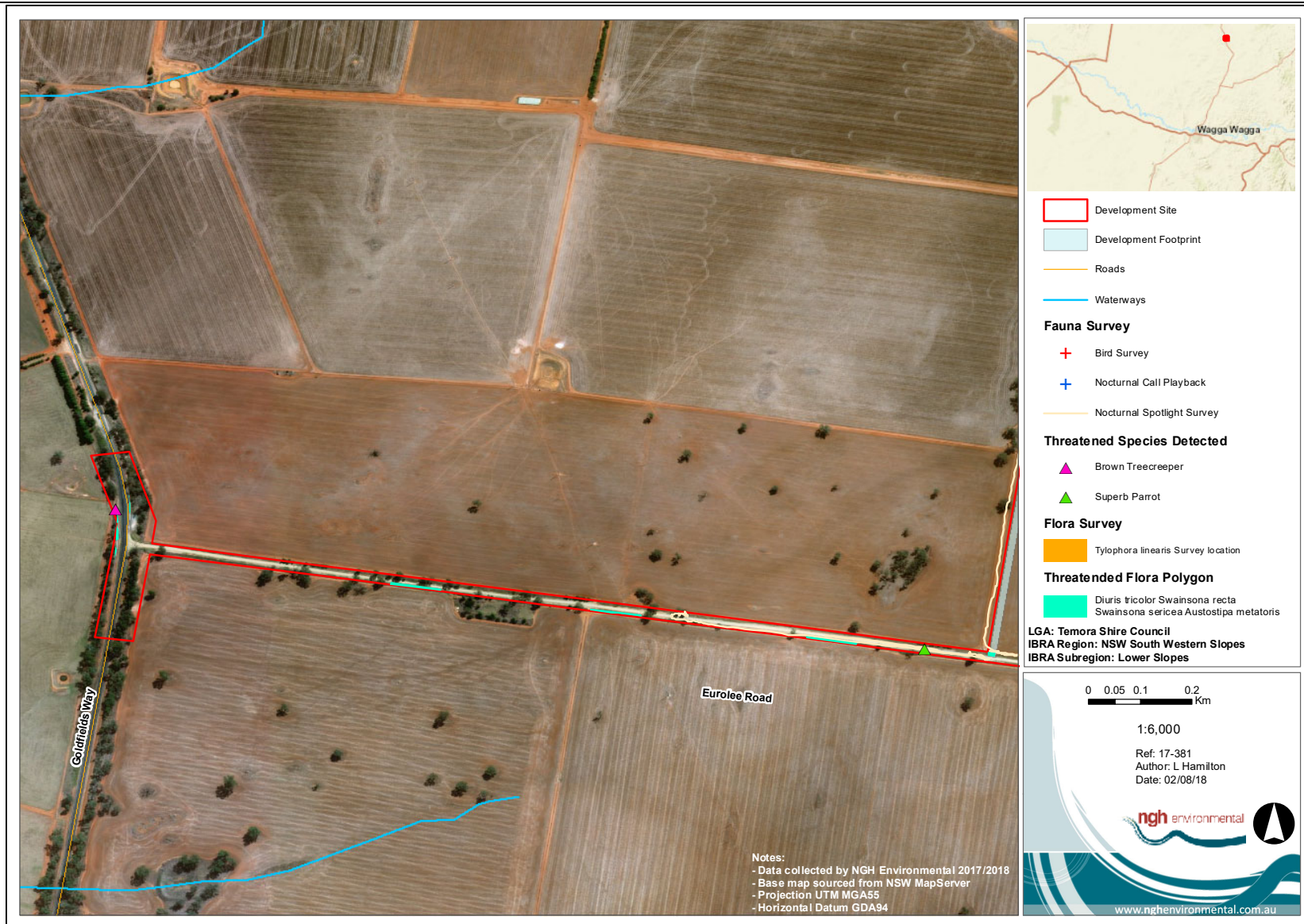


Figure 4-2 Threatened flora polygons along Eurolee Road and Goldfields Way

4.4 ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.4.1 *Occurrences of karst, caves, crevices and cliffs*

No Karsts, caves, crevices or cliffs occur within the development site

4.4.2 *Occurrences of rock*

No surface rocks or rocky outcrops occur within the development site

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

No human made structures that could be used by threatened species occur within the development site

Non-native vegetation within the development site is predominantly crops of Wheat and Canola. No threatened species are considered to rely on the non-native vegetation within the development site.

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

The development site is located on flat, low-lying land. No rivers, streams or wetlands occur within or adjacent to the development site. The closest watercourse is Wattle Fall Creek which occurs about 500m west of the development site. Wattle fall Creek meets Houlaghans Creek south of the development site which runs to its confluence with the Murrumbidgee River in Wagga Wagga NSW.

An unnamed drainage line occurs to the north of the development site and passes south through the proposed transmission line footprint. This drainage line has been extensively modified through the construction of dams, internal roads, and periodic cultivation. No evidence of riparian features or hydrology was observed in the transmission line footprint.

Six farm dams occur within the development site that provide catchment for drainage. These dams provide limited habitat quality as they are heavily grazed and dominated by exotic species.

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on 21 November 2017 (10 km buffer of the proposal footprint) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to Appendix D). Those relevant to biodiversity 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 identified. All four occur over 400 km from the development site and are not connected to the proposal site. The nearest of these (400 – 500 km upstream) is Hattah-Kulkyne Lakes. Hattah-Kulkyne Lakes are around 450 km west of the development site. It is fed by the Murray River. There is no apparent connectivity between the Sebastopol development site and the Murray River. All other wetlands returned from the search are over 500 km away.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Three threatened ecological communities were identified in the PMST report. Two of these TEC's could potentially occur in the development site based on the presence of Grey Box, Yellow Box and Blakely's Red Gum trees which are characteristic of the EEC's. These TEC's are

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern - Endangered
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived native grassland – Critically Endangered

An assessment of whether the vegetation communities within the development site met the condition threshold for each of the EPBC listed communities was undertaken.

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

17.9ha of remnant Grey Box White Cypress Woodland occurs within the development site. This vegetation was not considered to form part of the federally listed ecological community due to insufficient native perennial species cover in the ground layer.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived native grassland

13.7 ha of remnant Blakely's Red Gum and Yellow Box Woodland occurs within the development site. This vegetation was not considered to form part of the federally listed ecological community due to insufficient native species cover and richness in the ground layer.

5.3 THREATENED SPECIES

18 threatened species were returned from the protected matters report. Of these, four are considered to have the potential to utilise habitat within the development site:

- Birds
 - Swift Parrot (*Lathamus discolor*)- CE
 - Superb Parrot (*Polytelis swainsonii*) – V
- Bats
 - Corben's Long-eared Bat (*Nyctophilus corbei*) - V
- Flora
 - A Spear Grass (*Austrostipa wakoolica*) – E
 - A Spear grass (*Austrostipa metatoris*) – V

5.4 MIGRATORY SPECIES

10 listed migratory species were returned from the protected matters report. None of these species are considered likely to occur at the site on a regular basis or rely on the habitats present.

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

Ib vogt has reviewed the solar generation potential of many areas in NSW using a GIS (Geographic Information System) model. Other project locations are also being explored by Ib vogt in other areas of NSW.

The proposed site was selected because;

- The land has been heavily disturbed from past and current agricultural activities.
- Low ecological constraints (predominantly cleared cropping land with minimal vegetation removal).
- It is located within close proximity to existing electricity infrastructure reducing impacts to native vegetation associated with transmission line easements.
- The development site is not subject to land hazards such as flooding or bush fire and is not known to hold land contamination.
- The development site occurs on flat low-lying land with no major waterways.
- The proposal is not likely to generate land use conflicts with surrounding land uses.

The site is of a scale that allows for flexibility in the design, allowing ib vogt to avoid or effectively mitigate the ecological constraints that have been identified during the biodiversity assessment process. The development site is considered to be suitable for the proposal

6.1.2 Proposal components – consideration of alternate modes or technologies

The LRET and REAP outline the commitment by both Australia and NSW to reduce GHG emissions and set targets for increasing the supply of renewable energy. Other forms of largescale renewable energy accounted for in the LRET include wind, hydro, biomass, and tidal energy. The feasibility of wind, solar, biomass, hydro and tidal projects depend on the availability of energy resources and grid capacity.

Photovoltaic solar technology was chosen because it is cost-effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology which is readily available for broad scale deployment at the site. In terms of its impacts on biodiversity, PV solar has minimal construction footprint, mounts being either pile driven or on small footings. The largest footprint components are the perimeter tracks and inverter and switch station footings. The layout can be flexible to minimising impacts on site constraints.

6.1.3 Proposal planning phase – detailed design

A preliminary constraints analysis was conducted by NGH Environmental (2017) which informed the site layout design. This constraints analysis informed the site layout design by avoiding areas of high biodiversity value. Further refinement of the footprint was made during preparation of the BDAR which has involved avoiding clearing of the majority of native vegetation within the development site. This has been achieved by:

- Excluding the remnant moderate condition, Western Grey Box White Cypress Woodland (Zone 7 and 8) from the development footprint. This is the largest area of continuous vegetation (17.9ha).
- Excluding areas of remnant White Box White Cypress Woodland (Zone 2) which extend east west across the development site.
- Excluding the majority of old growth White Cypress Woodland (Zone 1). Only 4 trees would be removed.
- Minimising impacts to native vegetation along Eurolee Road by designing passing bays rather than widening the road. Passing bays would be selected in areas where there is no or limited overstorey cover (Zone 3 and 5). Passing bays mapped are indicative only and impact calculations are based on a worst-case scenario.
- Redesigning the footprint to avoid removal of as many paddock trees as possible.
- Designing the point of connection to an existing power line within a previously cleared and disturbed area.
- locating ancillary facilities in areas where there are no biodiversity values

The final site layout and location has not been able to completely avoid all areas of biodiversity value. In particular due to the size constraints of the individual solar panel arrays, scattered paddock trees were unable to be avoided.

The final design footprint is detailed in Figure 6-1. The design of the passing bays and intersection upgrades to Eurolee Road and Goldfields Way are detailed in Sebastopol EIS Traffic Access Assessment (TDG, 2018), Appendix G of the Sebastopol Solar Farm EIS.

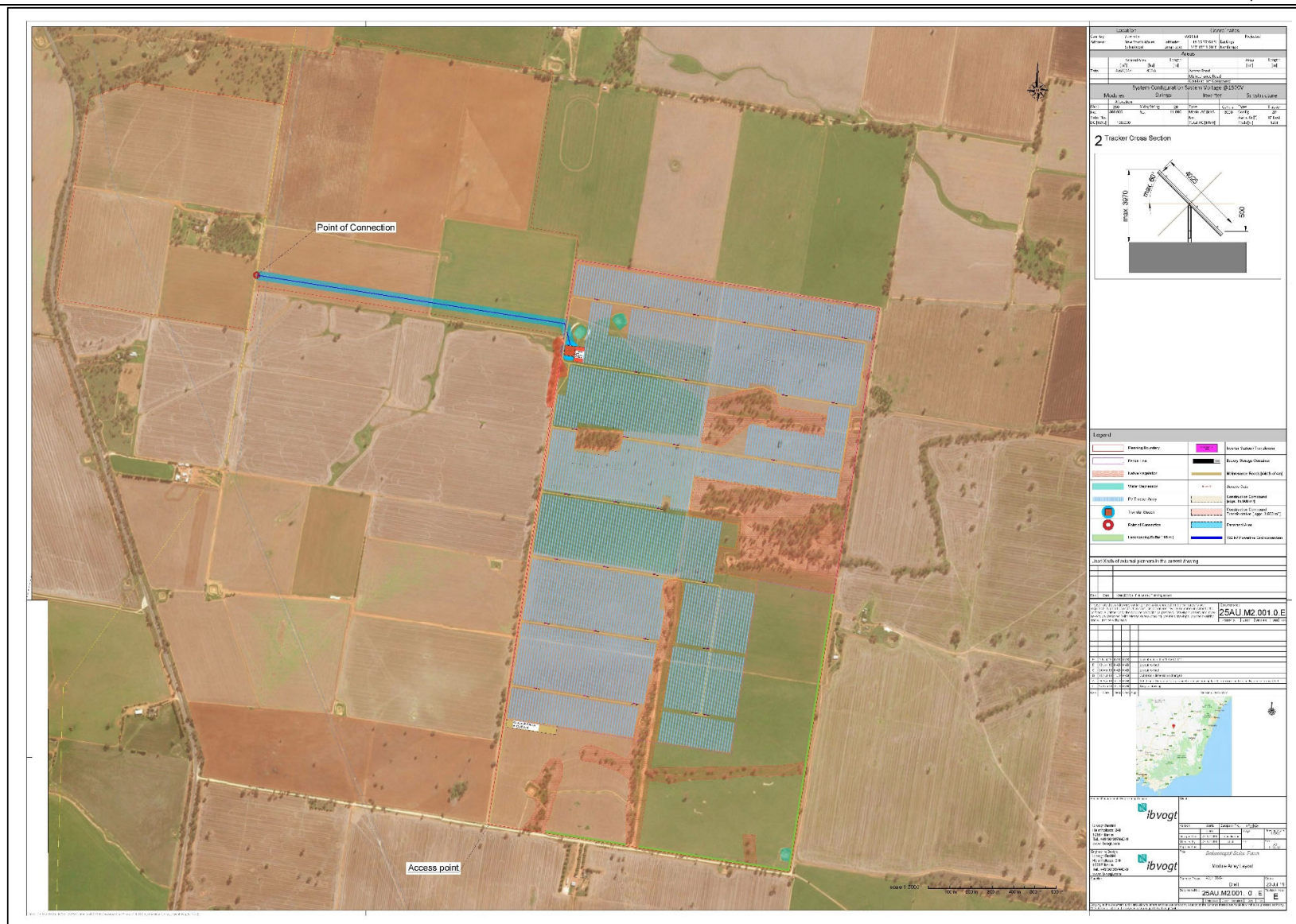


Figure 6-1 Final project footprint

6.2 AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS

The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme: The following prescribed impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation
- Impacts of development on the connectivity on 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 development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

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

6.2.1 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 development footprint was designed to avoid impacts to native vegetation. 47.6ha of native vegetation was avoided by the proposal, retaining existing connectivity within the development site. The construction of Perimeter fencing through zone 2 (PCT 267_Grazedunderstory) in the centre of the development site has the potential to reduce connectivity for fauna moving along the vegetation corridor. The perimeter fencing would be designed to ensure the infrastructure does not become a barrier to the movement of wildlife. The use of plain wire fencing in this area would reduce the risk of trapping arboreal mammals.

The Remnant vegetation along Goldfields Way provides connectivity across the landscape. No mature overstory species along Eurolee Road would be removed to ensure the movement corridor between the development site and Goldfields Way is not reduced.

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

As discussed in Section 6.2.1 above, the proposal has been designed to maintain connectivity where possible. This would include migratory species that rely on seasonal movements to maintain their lifecycle.

The development footprint was designed to avoid impacts on areas that may provide breeding habitat for threatened species. The large areas of remnant woodland throughout the development site have been avoided. These areas of vegetation include hollow bearing trees which support threatened species.

The location of the passing bays along Eurolee Road have been selected to reduce impacts to native vegetation and landscape connectivity. They would be constructed in areas where there is no mature overstory to avoid clearing of mature or hollow bearing trees.

6.2.3 Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

The development footprint was designed to avoid impacts to the six farms dams in the development site. No threatened species are likely to be reliant on this habitat given the poor quality.

Hydrological processes across the site would not be modified and current drainage across the site would be maintained. Sediment and erosion and pollution control measures will be put in place to maintain water quality moving outside of the development footprint. No indirect impacts to the onsite dams or the wetlands or rivers downstream are considered to be likely.

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

The location of the access roads were chosen, as they are already existing roads that are used by trucks and vehicles. As such, the risk of vehicle strike is already present. An increase in vehicle traffic may increase the risk of vehicle strike on threatened species occurring in or near the development site.

The road upgrade was designed to minimise clearing of native vegetation along Eurolee Road by creating three passing bays instead of widening the road. The narrow road (4-5m) and passing bays would reduce the speed of vehicles travelling along the access roads by ensuring the need for vehicles to spot oncoming traffic and allow additional time to pull over. Eurolee Road is unsealed which would further reduce travelling speeds. The road is straight and provides excellent sight vision ahead. Site management to enforce and reduce site speed limits would minimise impacts of vehicle strikes.

No barriers to movement would be created that could funnel any threatened species into these transport corridors.

7 IMPACTS UNABLE TO BE AVOIDED

7.1 DIRECT IMPACTS

The construction and operational phases of the proposal has the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and ongoing existence of infrastructure as detailed 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	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, transmission lines, compound sites, stockpile sites, access tracks)	0.4ha.	One-off	Construction phase: Short-term	<ul style="list-style-type: none"> • Direct loss of native flora and fauna habitat • Potential over-clearing of habitat outside proposed development footprint • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Displacement of resident fauna	Unknown	Regular	Construction & Operational Phase: Long-term	<ul style="list-style-type: none"> • Direct displacement of native fauna • Potential decline in local fauna populations
Injury or death of fauna	Unknown	Irregular	Construction Phase: Short-term	<ul style="list-style-type: none"> • Direct loss of native fauna • Decline in local fauna populations
Removal of habitat features e.g. HBTs	6 HBTs	One-off	Construction Phase: long-term	<ul style="list-style-type: none"> • Direct loss of native fauna habitat • Injury and mortality of fauna during clearing of habitat features
Shading by solar infrastructure	203.7ha	Constant	Operational Phase: Long-term	<ul style="list-style-type: none"> • Modification of native fauna habitat
Existence of permanent solar infrastructure	364ha	Constant	Operational Phase: long-term	<ul style="list-style-type: none"> • Modification of habitat beneath array (mostly non-native) • Reduced fauna movements across landscape due to fencing • Collision risks to birds and microbats (Fencing)

7.1.1 Loss in native vegetation

About 0.27ha of native vegetation would be removed by the proposal. The changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in Table 7-2 below.

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

Zone ID	PCT	EEC and/or threatened species habitat?	Area (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	70_Low	Threatened species habitat	0.08	18.2	0
2	267_grazed understory	White Box Yellow Box Blakely's Red Gum woodland EEC	0.06	27.2	0
3	266_moderate	White Box Yellow Box Blakely's Red Gum woodland EEC	0.03	57.3	0
4	267_good	White Box Yellow Box Blakely's Red Gum woodland EEC	0.03	46.1	0
5	267_moderate	White Box Yellow Box Blakely's Red Gum woodland EEC	0.07	20.3	0
		TOTAL:	0.27		

7.1.2 Loss of species credit species habitat or individuals

The loss of species credit species habitat or individuals as a result of clearing is documented in Table 7-3 below.

Table 7-3 Summary of species credit species loss at the development site

Species Credit Species	Biodiversity weighting	risk	Area of habitat or count of individuals lost
Pine Donkey Orchid (<i>Diuris tricolor</i>)	1.5		0.1
Small Purple Pea (<i>Swainsona recta</i>)	1		0.1
Silky Swainson-pea (<i>Swainsona sericea</i>)	2		0.1
A Spear Grass (<i>Austrostipa metatoris</i>)	1.5		0.1

7.1.3 Loss of Paddock Trees

Eighteen paddock trees occur throughout the development site comprised of a mix of White Cypress (*Callitris glaucophylla*), White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*) and Yellow Box (*Eucalyptus melliodora*). Eleven of these paddock trees would be impacted by the proposal. Details of each of the paddock trees are provided in E-IIAppendix E.

7.1.4 Loss of hollow-bearing trees

Nine hollow bearing trees (HBTs) were recorded in the development site. Six of these would be removed by the proposal (Table 7-4).

Table 7-4 Hollow bearing trees impacted by the proposal.

ZONE	HBTs within zone	HBTs impacted
Zone 1 PCT 70_Low	0	0
Zone2: PCT267_grazed_understory	5	0
Zone 3 PCT 266_moderate	0	0
Zone 4 PCT 267_good	0	0
Zone 5 PCT 267_moderate	1	0
Zone 6 PCT 266_Low	0	0
Zone 7 PCT 80_Low	0	0
Zone 8 PCT 80_moderate	0	0
Zone 9 non-native	0	0
Zone 10 Paddock trees	9	6

7.2 INDIRECT IMPACTS

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Section 9.1.4.2 of the BAM identifies the specific indirect impacts that must be considered. Table 7-5 below details the type, frequency, intensity, duration and consequence of the indirect impacts that may occur as a consequence of the proposal as identified by Section 9.1.4.2 of the BAM. Given the current land management practices and degraded nature of the development site, indirect impacts that are unlikely to occur or be exacerbated as a result of the proposal include:

- Inhibition of nitrogen fixation and increased soil salinity
- Fertiliser drift
- Wood collection
- Bush rock removal and disturbance
- Increase in predatory species populations
- Increase in pest animal populations
- Increased risk of fire
- Disturbance to specialist breeding and foraging habitat

Table 7-5 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	Unknown	Rare	Construction Phase: Short-term	<ul style="list-style-type: none"> Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Bely South Bioregion White Box Yellow Box Blakleys Red Gum Woodland Superb Parrot (<i>Polytelis swainsonii</i>) Major Mitchell Cockatoo (<i>Lophochroa leadbeateri</i>) 	<ul style="list-style-type: none"> Minor direct loss of native flora and fauna habitat Low potential for Injury and mortality of fauna during clearing of fauna habitat and habitat trees Minor disturbance to stags, fallen timber, and bush rock Increased edge effects <p>The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence</p>
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operational Phase: Long-term	<ul style="list-style-type: none"> Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Bely South Bioregion White Box Yellow Box Blakleys Red Gum Woodland Superb Parrot (<i>Polytelis swainsonii</i>) Major Mitchell Cockatoo (<i>Lophochroa leadbeateri</i>) 	<ul style="list-style-type: none"> Degradation of Inland Grey Box Woodland EEC. Degradation of White Box Yellow Box Woodland EEC Minor loss of native flora and fauna habitat <p>The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence</p>
Reduced viability of adjacent habitat due to noise, dust or light spill	Unknown	Rare	Operational Phase: Short-term	<ul style="list-style-type: none"> Superb Parrot (<i>Polytelis swainsonii</i>) Major Mitchell Cockatoo (<i>Lophochroa leadbeateri</i>) 	<ul style="list-style-type: none"> May alter fauna activities and/or movements Minor loss of foraging or breeding habitat

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
					The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	<ul style="list-style-type: none"> Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Bely South Bioregion White Box Yellow Box Blakleys Red Gum Woodland 	<ul style="list-style-type: none"> Degradation of Inland Grey Box Woodland EEC through weed encroachment Degradation of White Box Yellow Box Blakleys Red Gum Woodland EEC through weed encroachment Minor loss of native flora and fauna habitat. <p>The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence</p>
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction & Operational Phase: Long-term	<ul style="list-style-type: none"> Superb Parrot (<i>Polytelis swainsonii</i>) Major Mitchell Cockatoo (<i>Lophochroa leadbeateri</i>) 	<ul style="list-style-type: none"> Minor loss of foraging Habitat
Loss of breeding habitats	6 HBT	Constant	Construction Phase: Long-Term	<ul style="list-style-type: none"> Superb Parrot (<i>Polytelis swainsonii</i>) Major Mitchell Cockatoo (<i>Lophochroa leadbeateri</i>) 	<ul style="list-style-type: none"> Minor loss of potential breeding habitat through removal of paddock trees.
Trampling of threatened species	Unknown	Rare	Construction Phase: Short-term	<p>Threatened species assumed present;</p> <ul style="list-style-type: none"> Pine Donkey Orchid (<i>Diuris tricolor</i>) Small Purple Pea (<i>Swainsona recta</i>) Silky Swainson-pea (<i>Swainsona sericea</i>) 	<ul style="list-style-type: none"> Minor loss of threatened species and genetic diversity

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
				<ul style="list-style-type: none"> A Spear Grass (<i>Austrostipa metatoris</i>) 	
Earthworks mobilisation and of sediments	Unknown	Regular	Construction	<ul style="list-style-type: none"> Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Bely South Bioregion White Box Yellow Box Blakelys Red Gum Woodland 	<ul style="list-style-type: none"> Erosion and sedimentation and/or pollution of soils, dams and downstream habitats. Potential loss of ground cover resulting in unstable ground surfaces and sedimentation of adjacent waterways.
Rubbish dumping	Unknown	Regular	Construction & Operational	<ul style="list-style-type: none"> Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Bely South Bioregion White Box Yellow Box Blakelys Red Gum Woodland 	<ul style="list-style-type: none"> Degradation of Inland Grey Box Woodland EEC Degradation of White Box Yellow Box Woodland EEC

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 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 development site occurs within a highly cleared landscape. Goldfields Way west of the development site provides moderate landscape connectivity due to the presence of relatively uncleared vegetation. Connectivity from the development site to Goldfields Way occurs along Eurolee Road. However, connectivity is limited in many areas along Eurolee Road due to change in condition of woodland vegetation. Isolated patches of overstory vegetation and paddock trees provide stepping stones for highly mobile aerial species such as the Superb Parrot (*Polytelis swainsonii*), and Major Mitchell Cockatoo (*Lophochroa leadbeateri*). The development footprint intersects with this habitat through the construction of temporary passing lanes along Eurolee Road. These lanes have been selected in cleared areas to avoid clearing overstory vegetation and reducing connectivity along Eurolee road.

Superb Parrots are considered a highly mobile species (Manning *et al.* 2005) and may forage up to 10 km from nesting sites (OEH, 2018). The removal of a small area of habitat from within a corridor of habitat connectivity would therefore not have a substantive impact on the movement of these species across their range.

Perimeter fencing would create a barrier for movement to threatened species that traverse along the ground, such as the Koala. In Zone 2 (PCT 267_Grazedunderstory), the construction of perimeter fencing has the potential to reduce connectivity for arboreal mammals using canopy vegetation within the development site, including the Squirrel glider. The Squirrel glider and the Koala were not identified during field surveys. However, the perimeter fencing would be designed to reduce these potential impacts. The use of plain wire fencing in this area would reduce the risk of trapping arboreal mammals. Additionally, no impediments such as busy roads or barriers occur outside the development site and species travelling along the ground could move across the landscape in the similar cleared habitats surrounding the development site.

7.3.2 *Impacts of the development on movement of threatened species that maintains their life cycle*

No known migratory routes occur within the development site. The development site occurs within a highly cleared landscape and threatened species that may move within or through the development site would be tolerant of existing disturbances.

One migratory species, the Swift Parrot, was identified as a potential candidate species in the BAM Calculator. The Swift Parrot breeds in Tasmania during Summer and the entire population migrates north to the mainland in winter (TSSC, 2016). In NSW, the Swift Parrot migrates to the South Western Slopes and the Coast to forage. Swift Parrots forage on winter flowering Eucalyptus species and lerp infested Eucalypts. The Swift Parrot was not identified during the field survey and the development site does not fall within an area of mapped important habitat (OEH, 2018). Given the relatively small amount of habitat to be removed and low quality of potential habitat, the development is unlikely to have a substantive impact on the movement of the Swift Parrot across its range.

The Superb Parrot was identified during the field surveys on numerous survey efforts. The Superb Parrot and Major Mitchell Cockatoo are highly mobile species that use hollow bearing trees for nesting and breeding. The proposal involves the removal of 6 hollow bearing paddock trees. However, through reiterative design of the proposal, about 41ha of vegetation containing suitable breeding habitat would be retained. Mitigation measures to time works to avoid clearing during the breeding season would minimise impacts to the life cycle of this species. As these species are capable of flying over cleared areas, movement across the landscape to breeding hollows will still be maintained within the development site.

Corben's Long-eared Bat is a highly mobile species and can travel large distances up to 10km or more (Bionet, 2018). It can relocate between multiple roost locations over successive nights (TSSC, 2016). Suitable roosting habitat was identified in the development site in the form of hollow bearing trees within vegetation zones and as paddock trees. The proposal involves the removal of 6 hollow bearing paddock trees. However, 41ha of vegetation with suitable roosting habitat would be retained. Mitigation measures to time works to avoid clearing during the breeding season and hibernation season would minimise impacts to the life cycle of this species. Movement and foraging habitat would still be maintained within the development site.

No impacts to movement of other threatened species that maintain their life cycle are considered to occur. Aerial species would be able to continue to move across the development site. Boundary security fencing would create a barrier for movement to threatened species that travel along the ground, such as the Koala or Arboreal mammals. The use of plain wire fencing in high risk areas would reduce the risk of impacting fauna movement. Additionally, no impediments such as busy roads or barriers occur outside the development site and species travelling along the ground could move across the landscape in the similar cleared habitats surrounding the development site. Based on these factors, the proposal is unlikely to have a substantive impact on movement of threatened species that maintains their lifecycle.

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

The construction of the solar farm would temporarily increase traffic along Eurolee Rd. Superb Parrots were recorded along Eurolee Road during the field surveys. Superb Parrots are particularly vulnerable to vehicle strike when feeding on spilled grain along roadsides (Baker-Gabb, 2011). During harvest local traffic including grain trucks are likely to use Eurolee Road and Goldfields Way. Superb Parrots may be at risk of vehicle collision if construction of the proposal coincides with the grain carting season in November and December.

Major Mitchell Cockatoo (*Lophochroa leadbeateri*) were assumed to occur on site due to inadequate survey timing. Major Mitchell Cockatoos forage on the ground on seeds of Cypress Pines. Cypress Pines are abundant along Goldfields Way and scattered along Eurolee Road. The Major Mitchell Cockatoo could be found foraging along these roadsides and be at risk of vehicle collision.

All threatened species at risk of vehicle strike are highly mobile and agile species. Mitigation measures will be implemented to enforce a site speed limit. As Eurolee Road, will not be widened and only upgraded with passing bays, speed limits along Eurolee Road would be limited. With the recommended mitigation measures, it is not likely that there would be any notable increase in the risk of vehicle strike relevant to those that already exist.

7.4 IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

7.4.1 Threatened Ecological Communities

No federally listed ecological communities were identified in the development site.

7.4.2 Threatened Species

One EPBC listed species the Superb Parrot was recorded during the field surveys. An additional two fauna species were considered to have the potential to occur within the development site. Assessments of significance were undertaken for these species, comprising three fauna species and two flora species.

EPBC Assessments of significance were completed for the threatened Fauna: Swift Parrot, Superb Parrot and Corben's Long Eared Bat (Appendix I). These concluded that a significant impact was unlikely, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of these species
- Affect habitat or introduce disease such that these species would decline
- Introduce invasive species harmful to the species
- Interfere with the recovery of these species.

No referral is considered necessary to the Federal Department of Environment for these species.

EPBC Assessments of Significance were completed for threatened flora, A Spear Grass (*Austrostipa wakoolica*) and A Spear Grass (*Austrostipa metatoris*). Suitable habitat for these species exists along Eurolee Road and Goldfields Way. Survey timing was considered unsuitable for these species and it is not known if they occur within the development site. Impacts could occur to these species if they occur within the development footprint on Eurolee Road and Goldfields Way Rd.

It is recommended to survey for these species along Eurolee Road and Goldfields Way between September and October 2018, before development occurs to determine if they are present. Mitigation measures to survey for these species before construction begins will determine if a significant impact and referral to the Federal Department of Environment is required.

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 7-6 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala. The assessment in Table 7-6 resulted in a score of 3 and as such habitat within the study area is not considered to be critical to the survival of the Koala. An assessment of significant impact is not required.

Table 7-6: 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.	

Attribute	Score	Inland	Applicable to the proposal?
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	✓ No records within 2km within the last 10 years
	0 (low)	None of the above.	
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.	✓ Two food tree species present (Grey Box and White Box) co dominant with White Cypress (shelter tree).
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	✓ Not part of a large contiguous landscape
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	✓ No Koala occurrence and no dog or vehicle threat
	+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.	

Attribute	Score	Inland	Applicable to the proposal?
	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.	
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.	
	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	4	Decision: Habitat not critical to the survival of the Koala—assessment of significance not required	

7.4.3 Migratory species

Based on a habitat evaluation, no Migratory species were identified as potentially occurring within the development site (Appendix H). The proposal is unlikely to impact on any EPBC listed Migratory Species.

7.5 LIMITATIONS TO DATA, ASSUMPTIONS AND PREDICTIONS

It is possible that some species were not recorded during the survey due to the timing of the survey outside their recommended survey period. Where survey effort or timing is not consistent with the BAM or relevant guidelines, this is stated explicitly in the assessment and measures identified to address the limitation; i.e. assumption of occurrence for three species whose survey window could not be met.

The calculation of hollow-bearing trees, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows (Gibbons and Lindenmayer, 2000). However, it was noted where it was considered likely that hollows were present but not visible from ground level.

8 MITIGATING AND MANAGING IMPACTS

8.1 MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal 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

8.1.1 *Impacts from the clearing of vegetation and habitats*

1. Time works to avoid critical life cycle events
2. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or wildlife handler
3. Relocate habitat features (fallen timber, hollow logs) from within the development site to an adjacent area.
4. Spring Flora surveys to determine the presence of EPBC listed species *Austrostipa wakoolica* and *Austrostipa metatoris* (Candidate species). (Completed 9th October)

8.1.2 *Indirect impacts*

1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed
2. Adaptive dust monitoring programs to control air quality
3. Temporary fencing to protect significant environmental features such as riparian zones
4. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas
5. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented

8.1.3 *Prescribed impacts*

1. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment
2. Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.
3. Use wildlife friendly fencing in areas with the potential to become a barrier to wild life movement.

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	<ul style="list-style-type: none"> Hollow-bearing trees would not be removed during breeding and hibernation season (June to January) to mitigate impacts on Superb Parrots, Major Mitchell Cockatoo and Corben's Long-eared Bat. If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken by an ecologist or suitably qualified person to ensure no impacts to fauna would occur 	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted.
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	<ul style="list-style-type: none"> Pre-clearing checklist Tree clearing procedure 	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted.
relocation of habitat features (fallen timber, hollow logs) from within the development site.	<ul style="list-style-type: none"> Tree-clearing procedure including relocation of habitat features to adjacent area for habitat enhancement 	Construction	Regular	Contractor	Low	None
Spring Flora surveys for EPBC listed species	<ul style="list-style-type: none"> Spring flora surveys along Eurolee Rd and Goldfields Way for: <ul style="list-style-type: none"> <i>Austrostipa wakoolica</i> and <i>Austrostipa metatoris</i> (EPBC Species) 	Pre construction	Once	Contractor	Moderate	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
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	<ul style="list-style-type: none"> Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. No stockpiling or storage within dripline of any mature trees In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance 	Construction	Regular	Contractor	Low	None
noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	<ul style="list-style-type: none"> Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible. 	Construction	Regular	Contractor	Low	None
light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	<ul style="list-style-type: none"> Avoid Night Works Direct lights away from vegetation 	Construction/ Operation	Regular	Contractor	Low	None
adaptive dust monitoring programs to control air quality	<ul style="list-style-type: none"> Daily monitoring of dust generated by construction and operation activities Construction would cease if dust observed being blown from site until control measures were implemented 	Construction	Regularly	Contractor	Moderate	Sedimentation in dams.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	<ul style="list-style-type: none"> All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site 					
Hygiene protocols to prevent the spread of weeds or Pathogens between infected areas and uninfected areas	<ul style="list-style-type: none"> A Weed Management procedure would be developed for the proposal to prevent and minimise the spread of weeds. This would include: <ul style="list-style-type: none"> Management protocol for declared priority weeds under the <i>Biosecurity Act 2015</i> during and after construction Weed hygiene protocol in relation to plant, machinery, and fill The weed management procedure would be incorporated into the Biodiversity Management Plan. 	Construction, Operation	Regular	Contractor	Moderate	Weed encroachment
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	<ul style="list-style-type: none"> Site induction Toolbox talks 	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed
Preparation of a vegetation management plan to regulate activity in vegetation	<ul style="list-style-type: none"> Preparation of a Biodiversity management plan that would include protocols for: <ul style="list-style-type: none"> Protection of native vegetation to be retained Best practice removal and disposal of vegetation 	Construction	One-off	Contractor	Moderate	Impacts to native vegetation or threatened species for Biodiversity Management Plan not being followed.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	<ul style="list-style-type: none"> ○ Staged removal of hollow-bearing trees and other habitat features such as fallen logs with attendance by an ecologist ○ Weed management ○ Unexpected threatened species finds ● Rehabilitation of disturbed areas 					
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	<ul style="list-style-type: none"> ● An erosion and sediment control plan would be prepared in conjunction with the final design and implemented ● Spill management procedures would be implemented. 	Construction	Regular	Contractor	Moderate	Indirect impacts may occur to waterways if erosion and sedimentation control plan not implemented.
Staff training and site briefing to communicate impacts of traffic strikes on native fauna.	<ul style="list-style-type: none"> ● Awareness training during site inductions regarding enforcing site speed limits. ● Site speed limits to be enforced to minimise fauna strike. 	Construction and Operation	Regular	Contractor	Moderate	Fauna strikes from vehicles
fencing or other measures to control animal and vehicle interactions	<ul style="list-style-type: none"> ● Use plain wire fencing in area of Zone 2 (PCT 267_Grazedunderstory which intersects the woodland to avoid potential entrapment of fauna on fence. 	Construction	Once	Contractor	Moderate	Entrapment of fauna on fence and restriction of movement.

9 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

9.1 POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

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.

9.1.1 *Threatened ecological communities*

One threatened ecological community will be impacted on by the proposal that is listed as a potential SAI entity in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. This is the;

- White Box-Yellow Box- Blakely's Red Gum Woodland (Box-gum Woodland)

9.1.2 *Threatened species*

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

9.1.3 *Additional potential entities*

No further species were considered to be potential SAI entities.

9.2 ASSESSMENT OF SERIOUS AND IRREVERSIBLE IMPACTS

9.2.1 *White Box – Yellow Box – Blakely's Red Gum Woodland (Box-gum Woodland)*

An assessment of the impacts to the Box-gum woodland was undertaken. Figure 3-6 shows the location of the Box-gum Woodland within the development site.

a) the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI

13.65ha of Box Gum Woodland occurs within the development site. About 4ha occurs along Eurolee Road in Moderate condition with reduced overstory cover. 0.95ha occurs along Goldfields Way in good condition with overstory and understory present. The majority of Box Gum Woodland (8.91ha) occurs within the property as low condition woodland with grazed and exotic understory. 13.5ha of Box Gum Woodland has been avoided by the proposal.

- b) the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone**

Up to 0.19ha would be impacted through the construction of perimeter fencing, pathways along Eurolee Road, and Road widening along the intersection of Goldfields Way. Within the property impacts to Box Gum Woodland involve the removal of 0.06ha of Low Condition Woodland for a perimeter fence. The understory is exotic dominated and only the removal of groundcover is likely to be required for the fence line. 0.28ha of Good Condition Woodland would be impacted through the road intersection upgrade along Goldfields Way. 0.01ha of Moderate Condition Box Gum Woodland along Eurolee Road would also be impacted through the creation of passing bays and the site entrance.

- c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact**

No threshold has yet been defined by OEH for the extent of Box-gum Woodland to be removed that constitutes a serious and irreversible impact.

- d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint**

Using GIS and State Vegetation Mapping, it is estimated 23.65ha of Box-gum Woodland occurs within an area of 1000 ha surrounding the proposed development footprint and 724 ha of Box-gum Woodland occurs within an area of 10000 ha surrounding the proposed development footprint.

- e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration**

Threatened Species Scientific Committee (2006) estimates 55,798 ha of Box Gum Woodland remains in the NSW South Western Slopes IBRA Region. The removal of 0.19ha as a result of the proposal equates to 0.0003% of the estimated extent remaining.

- f) an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion**

In NSW Box-gum grassy Woodland is known to occur within at least 42 reserve systems. 8,000 ha of Box-gum woodland is estimated to occur in national parks and nature reserves within the NSW South Western Slopes IBRA Region (Benson 2008).

- g) the development, clearing or biodiversity certification proposal's impact on:**

- i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns**

Groundwater supplies and levels are unlikely to be affected by the proposal plant and no groundwater is anticipated to be intercepted or extracted. During construction, the proposal would have a short term gross impact upon soils and possibly surface water flow, within discreet areas. These impacts are manageable with the implementation of erosion and sediment controls and would be unlikely to impact on abiotic factors critical to the long-term survival of Box-gum woodland.

ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

No characteristic or functionally important species would be lost through the removal of the Box-gum woodland. The removal of understorey species is restricted to along Eurolee Road and Goldfields Way. No impacts are anticipated to the remaining Box-gum woodland. No introduced fire or flooding regimes would occur and no increase of natural occurrences of these events is anticipated from the development. No removal of understorey species or harvesting of plants would occur in the remaining Box-gum woodland.

iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts

0.19ha of Box-gum Woodland would be removed. It is likely the remaining 13.5ha of Box gum woodland avoided by the development would improve in condition through reduced impacts from cropping and grazing. The loss of cropping adjacent to the Box-gum woodlands will reduce fertiliser and herbicide impacts on this community.

h) direct or indirect fragmentation and isolation of an important area of the potential TEC

No direct or indirect fragmentation of an important area of Box Gum Woodland would occur as a result of the proposal. Connectivity of the Woodland would be maintained along Eurolee Road and Goldfields Way. The removal of an easement 10m wide for a fence line in the centre of the development is unlikely to fragment the community as canopy connectivity would remain.

i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

The 0.19ha of Box-gum woodland to be removed will be offset by 4 ecosystem credits ensuring no net loss of the Box Gum Woodland in the IBRA region.

10 REQUIREMENT TO OFFSET

10.1 IMPACTS REQUIRING AN OFFSET

10.1.1 Ecosystem credits

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

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

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

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	Zone	Impact area (ha)	Vegetation integrity score	Ecosystem credits required
PCT 70: White Cypress Pine woodland on sandy loams in Central NSW wheatbelt					
1	70	Low	0.08	18.2	1
				Subtotal:	1
PCT 267: White Box -White Cypress – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion					
2	267	Grazed understory	0.06	17.0	1
4	267	Good	0.03	46.1	1
5	267	Moderate	0.07	20.3	1
				Subtotal:	3
PCT 266: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion					
3	266	Moderate	0.03	57.3	1
				Subtotal:	1
				TOTAL:	5

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

10.1.2 Paddock Tree Credits

Offsets are required for the clearing of Class 2 and Class 3 Paddock trees. 11 Class 3 paddock trees would be removed by the proposal. The paddock trees are considered to form part of PCT 267: *White Box -White Cypress – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion*.

Ecosystem credits are calculated as per the streamlined assessment defined in the BAM (Appendix 1). The ecosystem credits are documented in Table 10-2. 10.75 ecosystem credits are required for the clearing of paddock trees.

Table 10-2 Paddock Tree offsets

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Credits Required	Ecosystem credits required
PCT267 White Box - White Cypress – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion				
Class 2 (>20cm DBH and < 50cm DBH)	No	0	0.5	0
Class 2 (>20cm DBH and < 50cm DBH)	Yes	0	0	0
Class 3 >50cm DBH	No	5	0.75	3.75
Class 3 >50cm DBH	Yes	6	1	6
TOTAL:				9.75

10.1.3 Species credits

An offset is required for the threatened species impacted by the development that require species credits. These species and the species credits required are documented in Table 10-3.

Table 10-3 Species credit species that require offsets

Species Credit Species	Biodiversity risk weighting	Area of habitat or count of individuals lost	Species credits required
FLORA			
Austrostipa metatoris	1.5	0.1	3
Pine Donkey Orchid <i>Diuris tricolor</i>	1.5	0.1	3
Small Purple Pea <i>Swainsona recta</i>	1	0.1	3
Silky Swainson-pea <i>Swainsona sericea</i>	2	0.1	3
TOTAL			12

*Awaiting response from OEH regarding the resulting credit value of nil for *Swainsona recta*

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

10.1.4 Offsets required under the EPBC Act

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

10.2 AREAS NOT REQUIRING ASSESSMENT

363ha of land comprised of agricultural crops would be impacted by the proposal. This area is not considered native vegetation, does not contain threatened species habitat and does not require offsetting or further assessment.

These areas are mapped on Figure 10-1.

10.3 SUMMARY OF OFFSET CREDITS REQUIRED

The following credit requirement is generated for the project.

Table 10-4 Credit requirement for the project

Ecosystem Credits	Offset credits required
PCT 70: White Cypress Pine Woodland on Sandy loams in Central NSW Wheatbelt	1
PCT 267: White Box – White Cypress – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	3
PCT267: Paddock Trees White Box – White Cypress – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	9.75
PCT 266: White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	1
TOTAL	14.75
Species Credits	Offset Credits Required
A Spear Grass (<i>Austrostipa metatoris</i>)	3
Pine Donkey Orchid (<i>Diuris tricolor</i>)	3
Small Purple Pea (<i>Swainsona recta</i>)	3
Silky Swainson-pea (<i>Swainsona sericea</i>)	3
TOTAL	12

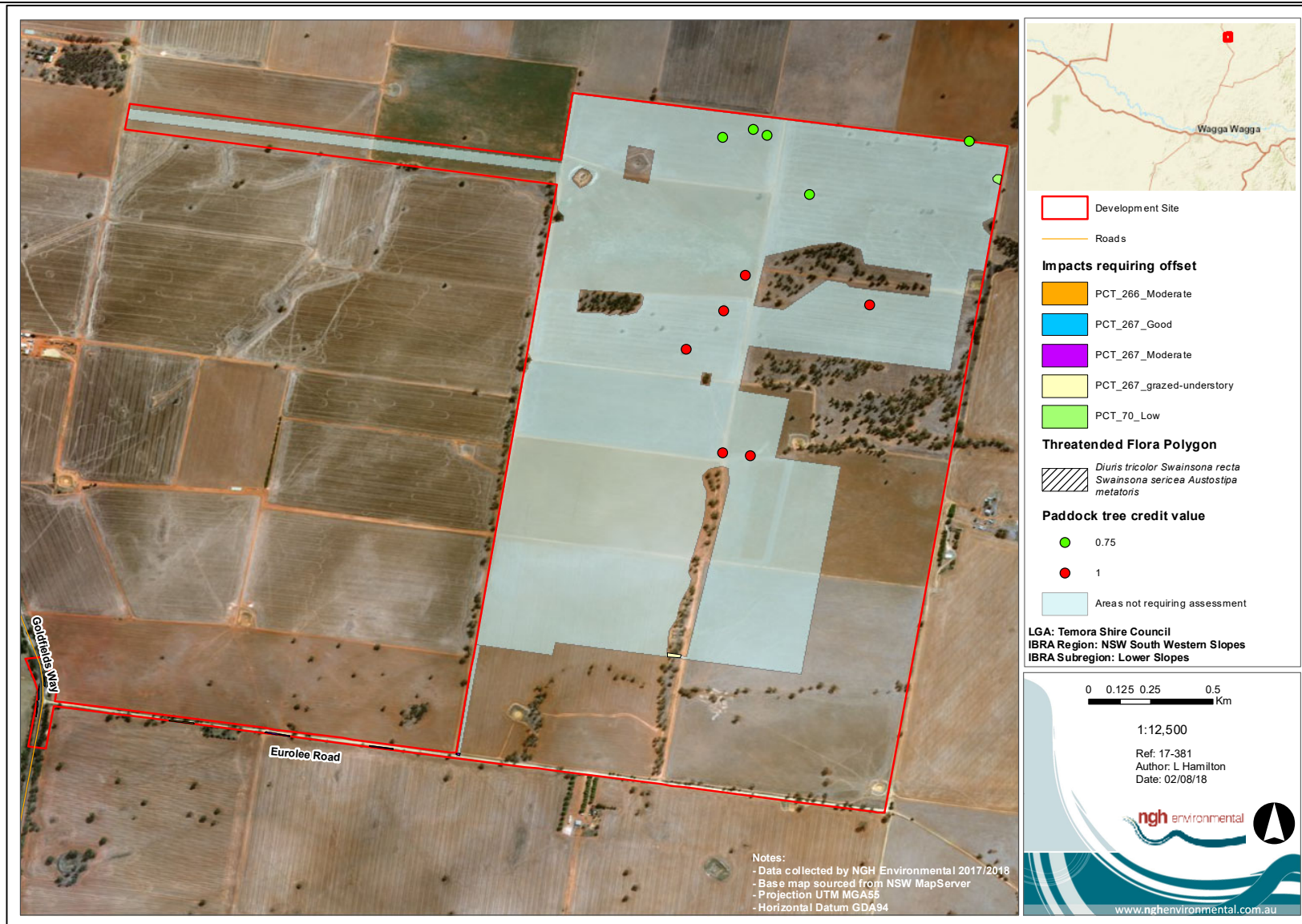


Figure 10-1 Impacts requiring offset, not requiring offset and not requiring assessment



Figure 10-2 Impacts requiring offset along Eurolee Road and Goldfields Way



Figure 10-3 Impacts requiring offset along Eurolee Road and Goldfields Way

11 CONCLUSIONS

NGH Environmental has prepared this BDAR on behalf of ib Vogt for the Sebastopol Solar Farm in Sebastopol, NSW. The purpose of this BDAR was to address the requirements of the BAM and to address the biodiversity matters raised in the SEARs.

In this BDAR:

- Biodiversity impacts have been assessed through comprehensive mapping and assessment completed in accordance with the BAM
- Mitigation measures which have been outlined to reduce the impacts to biodiversity
- The credit requirement has been defined as:
 - 3 Ecosystem Credits for impacts to White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (PCT267)
 - 1 Ecosystem Credits for impacts White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266).
 - 1 Ecosystem credits for White Cypress Pine woodland on sandy loams in central NSW wheatbelt (PCT 70)
 - 12 species credits for assumed impacts to A Spear Grass (*Auroloma metatoris*), Pine Donkey Orchid (*Diuris tricolor*), Small Purple Pea (*Swainsona recta*) and Silky Swainson-pea (*Swainsona sericea*) that were unable to be surveyed for during the recommended survey period. (*Swainsona recta* produced an error value of 0 of which has been corrected to 3.)

Spring flora surveys have been recommended to determine the presence of EPBC threatened flora along Eurolee Rd and Goldfields way. These surveys were completed on the 9th of October 2018 and did not detect any threatened flora species.

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

- (a) acquiring or retiring credits under the Biodiversity Offsets Scheme
- (b) making payments into the Biodiversity Conservation Fund using the offsets payment calculator, or
- (c) funding a biodiversity action that benefits the threatened entity(ies) impacted by the development.

The total number of credits produced for the proposal will be retired through direct payment into the Biodiversity Conversation Fund managed by the Biodiversity Conservation Trust.




12 REFERENCES


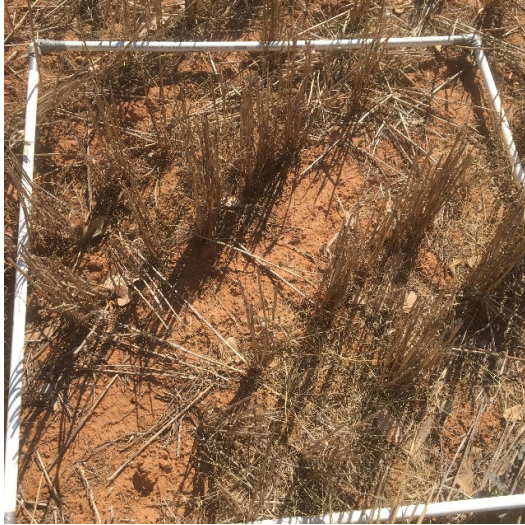


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- Threatened Species Scientific Committee (TSSC) (2015) – Conservation Advice: *Nyctophilus corbeni* South-eastern long-eared bat

APPENDIX A PERSONNEL






Name	Title	Qualifications	Roles
Dave Maynard	Principal Ecologist	<ul style="list-style-type: none"> BAM Accredited Assessor B Science (Ecology, First Class Honours) 	Review of BDAR
Mitch Palmer	Senior Ecologist (Technical Lead)	<ul style="list-style-type: none"> BAM Accredited Assessor #BAAS17051 B.Science (Geology and Geography) 	Review and approval of BDAR
Julie Gooding	Environmental Consultant - Ecologist	<ul style="list-style-type: none"> BAM Accredited Assessor #BAAS18074 B. Science (Biology) 	<p>Direction in BAM assessment and BDAR</p> <p>Field Work including PCT identification, vegetation mapping, vegetation integrity plots</p>
Lisa Hamilton	Environmental Consultant - Ecologist	<ul style="list-style-type: none"> B. Environmental Science 	<p>Main author of BDAR</p> <p>Field Work including PCT identification, vegetation mapping, vegetation integrity plots and threatened flora surveys.</p> <p>GIS Mapping</p>
Jess Murphy	Environmental Consultant - Ecologist	<ul style="list-style-type: none"> B. Science Master Environmental Science and Management 	Field Work including targeted fauna surveys, HBT surveys and assistance with Vegetation Integrity Plots
Nicola Smith	Environmental Consultant - Graduate	<ul style="list-style-type: none"> B. Science Master of Philosophy – Physical Geography 	Assistance with Field Work
Sarah Hillis	Environmental Consultant	<ul style="list-style-type: none"> B. Environmental Science 	Assistance with Field Work




APPENDIX B FLORA SURVEY PHOTOS


Flora Survey 1	Zone 3: PCT267_Moderate
	
Flora Survey 2	Zone 5: PCT266_Moderate
	
Flora Survey 3	Zone 2: PCT267_grazedunderstory

	
Flora Survey 4	Zone 2: PCT267_grazedunderstory
	
Flora Survey 5	Zone 9: Exotic

	
<p>Flora Survey 6</p>	<p>Zone 1: PCT70_Low</p>
	
<p>Flora Survey 7</p>	<p>Zone 8: PCT80_Moderate</p>
<p>Plot photo Not available (example photo below)</p>	<p>Not available (groundcover example below)</p>

	
Flora Survey 8	Zone 7: PCT80_Low
	
Flora Survey 9	Zone 2: PCT267_grazedunderstory
	Not available

Flora survey 10	Zone 4: 267_Good
	
Flora survey 11	Zone 3: PCT267_Moderate
	<p>Not available</p>
Flora Survey 12	Zone 2: PCT267_grazedunderstory

	N/A
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APPENDIX C FLORA SPECIES LIST

KEY

(%) - Foliage Cover in 20m x 20m plot

(#) - Number of individuals in 20m x 20m plot

* - Introduced species

Δ - High Threat Exotic

	Scientific Name	Common Name	Plot 1 PCT 276 Zone 3		Plot 2 PCT 266 Zone 5		Plot 3 Exotic Zone 9		Plot 4 PCT 267 Zone 2		Plot 5 Exotic Zone 9		Plot 6 PCT 70 Zone 1		Plot 7 PCT 80 Zone 8	
			%	#	%	#	%	#	%	#	%	#	%	#	%	#
TREES																
	<i>Brachychiton populneus</i>	Kurrajong														
	<i>Callitris glaucophylla</i>	White Cypress Pine											30	5		
	<i>Eucalyptus albens</i>	White Box	0.1	1	10	8			15	1						
	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum			5	1										
	<i>Eucalyptus melliodora</i>	Yellow Box														
	<i>Eucalyptus microcarpa</i>	Western Grey Box													5	4
SHRUBS																
	<i>Acacia decora</i>	Western Silver Wattle	0.5	2	6	30										
	<i>Acacia paradoxa</i>	Hedge wattle														
FORBS																
*	<i>Brassica rapa</i>	Wild turnip					0.1	5	0.1	30					0.1	3
*	<i>Brassica napus</i>	Canola											0.1	30		
	<i>calotis cuneifolia</i>	Purple Burr Daisey														
*	<i>Chondrilla juncea</i>	Skeleton Weed			0.1	10					10	50				
	<i>Convolvulus angustissimus</i>	Bind weed			2	3										
*	<i>Conyza spp.</i>	A Fleabane	0.1	20			0.1	5								
*	<i>Cucumis myriocarpus</i>	Paddy melon											0.2	10		
	<i>Dianella revoluta</i>	Dianella			0.1	1										
	<i>Dysphania pumilio</i>	Small Crumbweed														
*	<i>Echium plantagineum</i>	Patterson's Curse			0.1	30										
	<i>Euphorbia drummondii</i>	Caustic Weed			0.1	10										
*	<i>Heliotropium europaeum</i>	Potato Weed					0.1	1	0.1	1	5	50				
*	<i>Hypochaeris radicata</i>	Catsear													1	20
*	<i>Lactuca serriola</i>	Prickly Lettuce	1	50	0.1	30	0.1	1								

	Scientific Name	Common Name	Plot 1 PCT 276 Zone 3		Plot 2 PCT 266 Zone 5		Plot 3 Exotic Zone 9		Plot 4 PCT 267 Zone 2		Plot 5 Exotic Zone 9		Plot 6 PCT 70 Zone 1		Plot 7 PCT 80 Zone 8	
			%	#	%	#	%	#	%	#	%	#	%	#	%	#
*	<i>Malva parviflora</i>	Small-flowered Mallow											0.1	10		
Δ	<i>Marrubium vulgare</i>	White Horehound	1	5												
*	<i>Modiola caroliniana</i>	Red-flowered Mallow	0.1	1												
	<i>Oxalis perennans</i>	Oxalis			0.1	5									1	20
*	<i>Reseda lutea</i>	Cut leaf Mingonette														
*	<i>Salvia verbenaca</i>	Vervain			0.1	1										
	<i>Sida corrugata</i>	Corrugated Sida	0.1	1	3	30										
	<i>Sida cunninghamii</i>	Ridge Sida													2	100
*	<i>Solanum nigrum</i>	Black-berry Nightshade	1	10	0.2	30										
*	<i>Sonchus oleraceus</i>	Common Sowthistle					1	20							0.1	8
	<i>Tricoryne elatior</i>	Yellow Autumn-lily													5	80
	<i>Unidentified forb</i>	Unidentified forb			0.1	2										
	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy													0.1	1
	<i>Wahlenbergia spp.</i>	Blue bell													0.1	2
Δ	<i>Xanthium spinosum</i>	Bathurst Burr														
GRASSES																
*	<i>Eragrostis minor</i>	Minor stink grass							0.1	1	1	50				
	<i>Aristida behriana</i>	Bunch Wiregrass													0.1	10
	<i>Austrostipa scabra</i>	Speargrass													2	50
	<i>Austrostipa sp.</i>	Austrostipa sp.	2	10	5	100										
*	<i>Avena fatua</i>	Wild Oats	2	20	1	30										
	<i>Bothriochloa macra</i>	Red Grass	2	10	2	50										
*	<i>Bromus catharticus</i>	Prairie Grass			5	100										
*	<i>Bromus diandrus</i>	Great Brome			1	30									20	1000
	<i>Carex sp.</i>	Sedge			0.1	1										

	Scientific Name	Common Name	Plot 1 PCT 276 Zone 3		Plot 2 PCT 266 Zone 5		Plot 3 Exotic Zone 9		Plot 4 PCT 267 Zone 2		Plot 5 Exotic Zone 9		Plot 6 PCT 70 Zone 1		Plot 7 PCT 80 Zone 8	
			%	#	%	#	%	#	%	#	%	#	%	#	%	#
Δ	<i>Chloris gayana</i>	Rhodes Grass	10	100												
	<i>Cynodon dactylon</i>	Common Couch	10	100	0.5	30										
	<i>Elymus scaber</i>	Common Wheatgrass													0.1	5
*	<i>Hordeum leporinum</i>	Barley Grass									10	100				
*	<i>Lolium spp.</i>	A Ryegrass			0.5	100			50	1000					30	1000
	<i>Lomandra spp.</i>	Mat-rush	0.1	1	2	100									5	500
*	<i>Panicum capillare</i>	Witch Grass	20	50	5	100					20	500	0.1	30		
Δ	<i>Paspalum dilatatum</i>	Paspalum	20	50	30	500										
	<i>Rhytidosporum spp.</i>	Wallaby Grasses													2	100
*	<i>Romulea spp.</i>	Onion grass													1	100
*	<i>Setaria sp.</i>	Pigeon Grass			5	500										
*	<i>Setaria spp.</i>	Pigeon Grass	10	50												
*	<i>Triticum aestivum</i>	Wheat					30	500								
*	<i>Vulpia spp.</i>	Rat's-tail Fescue													2	500
VINES AND CLIMBERS (other)																
	<i>Cheilanthes austrotenuifolia</i>	Rock Fern													0.1	10
	<i>Glycine clandestina</i>	Glycine	0.1	1	1	30									0.1	2

	Scientific Name	Common Name	Plot 8 PCT 80 Zone 7		Plot 9 PCT 267 Zone 2		Plot 10 PCT 267 Zone 4		Plot 11 PCT 267 Zone 3		Plot 12 PCT 267 Zone 2		Incidental
			%	#	%	#	%	#	%	#	%	#	
TREES													
	<i>Brachychiton populneus</i>	Kurrajong			1	1							
	<i>Callitris glaucophylla</i>	White Cypress Pine					20	30					
	<i>Eucalyptus albens</i>	White Box			20	1			5	3	8	1	
	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum											
	<i>Eucalyptus melliodora</i>	Yellow Box							2	1	2	1	
	<i>Eucalyptus microcarpa</i>	Western Grey Box	10	2	5	1	5	5					
SHRUBS													
	<i>Acacia decora</i>	Western Silver Wattle											
	<i>Acacia paradoxa</i>	Hedge wattle											X
FORBS													
*	<i>Brassica rapa</i>	Wild turnip											
*	<i>Brassica napus</i>	Canola											
	<i>calotis cuneifolia</i>	Purple Burr daisey					1	20					
*	<i>Chondrilla juncea</i>	Skeleton Weed											
	<i>Convolvulus angustissimus</i>	Bind weed											
*	<i>Conyza spp.</i>	A Fleabane											
*	<i>Cucumis myriocarpus</i>	Paddy melon	1	50									
	<i>Dianella revoluta</i>	Dianella					20	100					
	<i>Dysphania pumilio</i>	Small Crumbweed	2	50									
*	<i>Echium plantagineum</i>	Patterson's Curse							10	500			
	<i>Euphorbia drummondii</i>	Caustic Weed							0.1	10			
*	<i>Heliotropium europaeum</i>	Potato Weed											
*	<i>Hypochaeris radicata</i>	Catsear											
*	<i>Lactuca serriola</i>	Prickly Lettuce											

	Scientific Name	Common Name	Plot 8 PCT 80 Zone 7		Plot 9 PCT 267 Zone 2		Plot 10 PCT 267 Zone 4		Plot 11 PCT 267 Zone 3		Plot 12 PCT 267 Zone 2		Incidental
			%	#	%	#	%	#	%	#	%	#	
*	<i>Malva parviflora</i>	Small-flowered Mallow	1	50									
Δ	<i>Marrubium vulgare</i>	White Horehound											
*	<i>Modiola caroliniana</i>	Red-flowered Mallow											
	<i>Oxalis perennans</i>	Oxalis											
*	<i>Reseda lutea</i>	Cut leaf Mingonette							0.1	2			
*	<i>Salvia verbenaca</i>	Vervain											
	<i>Sida corrugata</i>	Corrugated Sida							1	50	0.1	10	
	<i>Sida cunninghamii</i>	Ridge Sida											
*	<i>Solanum nigrum</i>	Black-berry Nightshade											
*	<i>Sonchus oleraceus</i>	Common Sowthistle											
	<i>Tricoryne elatior</i>	Yellow Autumn-lily											
	<i>Unidentified forb</i>	Unidentified forb											
	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy					0.1	2					
	<i>Wahlenbergia spp.</i>	Blue bell											
Δ	<i>Xanthium spinosum</i>	Bathurst Burr	0.1	1									
GRASSES													
*	<i>Eragrostis minor</i>	Minor stink grass							0.5	20			
	<i>Aristida behriana</i>	Bunch Wiregrass											
	<i>Austrostipa scabra</i>	Speargrass											
	<i>Austrostipa sp.</i>	Austrostipa sp					10	5	5	20			
*	<i>Avena fatua</i>	Wild Oats											
	<i>Bothriochloa macra</i>	Red Grass											
*	<i>Bromus catharticus</i>	Praire Grass											
*	<i>Bromus diandrus</i>	Great Brome											
	<i>Carex sp.</i>	Sedge											

	Scientific Name	Common Name	Plot 8 PCT 80 Zone 7		Plot 9 PCT 267 Zone 2		Plot 10 PCT 267 Zone 4		Plot 11 PCT 267 Zone 3		Plot 12 PCT 267 Zone 2		Incidental
			%	#	%	#	%	#	%	#	%	#	
Δ	<i>Chloris gayana</i>	Rhodes Grass											
	<i>Cynodon dactylon</i>	Common Couch											
	<i>Elymus scaber</i>	Common Wheatgrass											
*	<i>Hordeum leporinum</i>	Barley Grass											
*	<i>Lolium spp.</i>	A Ryegrass	5	300									
	<i>Lomandra spp.</i>	Mat-rush											
*	<i>Panicum capillare</i>	Witch Grass											
Δ	<i>Paspalum dilatatum</i>	Paspalum	5	200									
	<i>Rhytidosporum spp.</i>	Wallaby Grasses							30	500			
*	<i>Romulea spp.</i>	Onion grass											
*	<i>Setaria sp.</i>	Pigeon Grass											
*	<i>Setaria spp.</i>	Pigeon Grass											
*	<i>Triticum aestivum</i>	Wheat											
*	<i>Vulpia spp.</i>	Rat's-tail Fescue											
	<i>Cheilanthes austrotenuifolia</i>	Rock Fern											
	<i>Glycine clandestina</i>	Glycine											

APPENDIX D FIELD DATA SHEETS

APPENDIX E Paddock Trees

ID	Latitude	Longitude	Species	DBH (cm)	Hollows Present	DBH above Benchmark (50cm)	Paddock Tree Class	Impacted By proposal	Credits Required
1	-34.62223	147.558969	<i>Eucalyptus albens</i>	100	Yes	Yes	3	NO	0
2	-34.60996	147.557966	<i>Eucalyptus melliodora</i>	150	Yes	Yes	3	NO	0
3	-34.609732	147.557937	<i>Eucalyptus melliodora</i>	70	No	Yes	3	NO	0
4	-34.60734	147.55849	<i>Eucalyptus microcarpa</i>	100	Yes	Yes	3	YES	1
5	-34.608727	147.557127	<i>Eucalyptus melliodora</i>	100	Yes	Yes	3	YES	1
6	-34.612492	147.558429	<i>Eucalyptus microcarpa</i>	90	Yes	Yes	3	YES	1
7	-34.606071	147.559278	<i>Allocasuarina luehmannii</i>	80	Yes	Yes	3	YES	1
8	-34.603119	147.561599	<i>Callitris glaucophylla</i>	90	No	Yes	3	YES	0.75
9	-34.600991	147.560058	<i>Callitris glaucophylla</i>	80	No	Yes	3	YES	0.75
10	-34.600772	147.559558	<i>Callitris glaucophylla</i>	70	No	Yes	3	YES	0.75
11	-34.60105	147.558455	<i>Callitris glaucophylla</i>	63	No	Yes	3	YES	0.75
12	-34.601218	147.567369	<i>Callitris glaucophylla</i>	92	No	Yes	3	YES	0.75
13	-34.601758	147.54396	<i>Callitris glaucophylla</i>	75	No	Yes	3	NO	0
14	-34.601465	147.542129	<i>Eucalyptus microcarpa</i>	80	Yes	Yes	3	NO	0
15	-34.607114	147.563749	<i>Eucalyptus albens</i>	76	Yes	Yes	3	YES	1
16	-34.613549	147.564358	<i>Callitris glaucophylla</i>	80	No	Yes	3	NO	0
17	-34.611237	147.560955	<i>Callitris glaucophylla</i>	70	No	Yes	3	NO	0
18	-34.612574	147.559454	<i>Eucalyptus albens</i>	110	Yes	Yes	3	YES	1

*The PCT entered into the Calculator for each paddock tree was PCT 267.

APPENDIX F FAUNA SURVEY RESULTS

Scientific Name	Common Name	Opportunistic	Survey 1 E147.5645 54 N-34.6113 GDA94 Z55	Survey 2 E147.56194 3N- 34.612243 GDA94 Z55	Survey 3 E147.5568 25 N- 34.620488 GDA94 Z55	Survey 4 E147.5611 89 N- 34.606091 GDA94 Z55	Survey 5 E147.5565 48 N- 34.622025 GDA94 Z55	Survey 6 E147.5509 1 N- 34.62367 GDA94 Z55	Nocturnal
Birds									
<i>Falco cenchroides</i>	Nankeen Kestrel	X						X	
<i>Ocyphaps lophotes</i>	Crested Pigeon	X	X	X		X	X		
<i>Eolophus roseicapilla</i>	Galah	X	X		X		X	X	
<i>Platycercus eximius</i>	Eastern Rosella	X		X		X			
<i>Psephotus haematonotus</i>	Red-rumped Parrot	X	X			X			
<i>Tyto alba</i>	Barn Owl								X
<i>Ninox novaeseelandiae</i>	Southern Boobook								X
<i>Cincloramphus cruralis</i>	Brown Songlark	X						X	
<i>Rhipidura leucophris</i>	Willy Wagtail	X					X		

<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		X	X				X
<i>Manorina melanocephala</i>	Noisy Miner	X	X	X	X			
<i>Northiella haematogaster</i>	Blue Bonnet		X	X		X		X
<i>Polytelis swainsonii</i>	Superb Parrot	X	X	X	X	X		
<i>Climacteris picumnus victoriae</i>	Brown Tree creeper	X						
<i>Sternus vulgaris</i>	Starling					X	X	
<i>Grallina cyanoleuca</i>	Peewee	X			X	X		
<i>Struthidea cinerea</i>	Apostlebird	X				X		
<i>Cracticus nigrogularis</i>	Pied Butcherbird	X						
<i>Cracticus tibicen</i>	Australian Magpie	X			X	X		
<i>Corvus mellori</i>	Little Raven	X						
Mammals								
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	X						
<i>Pteropus scapulatus</i>	Little Red Flying-fox							X
<i>Trichosurus vulpecula</i>	Brush-tail Possum							X

APPENDIX G EPBC PROTECTED MATTERS SEARCH



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: 21/11/17 14:43:55

[Summary](#)

[Details](#)

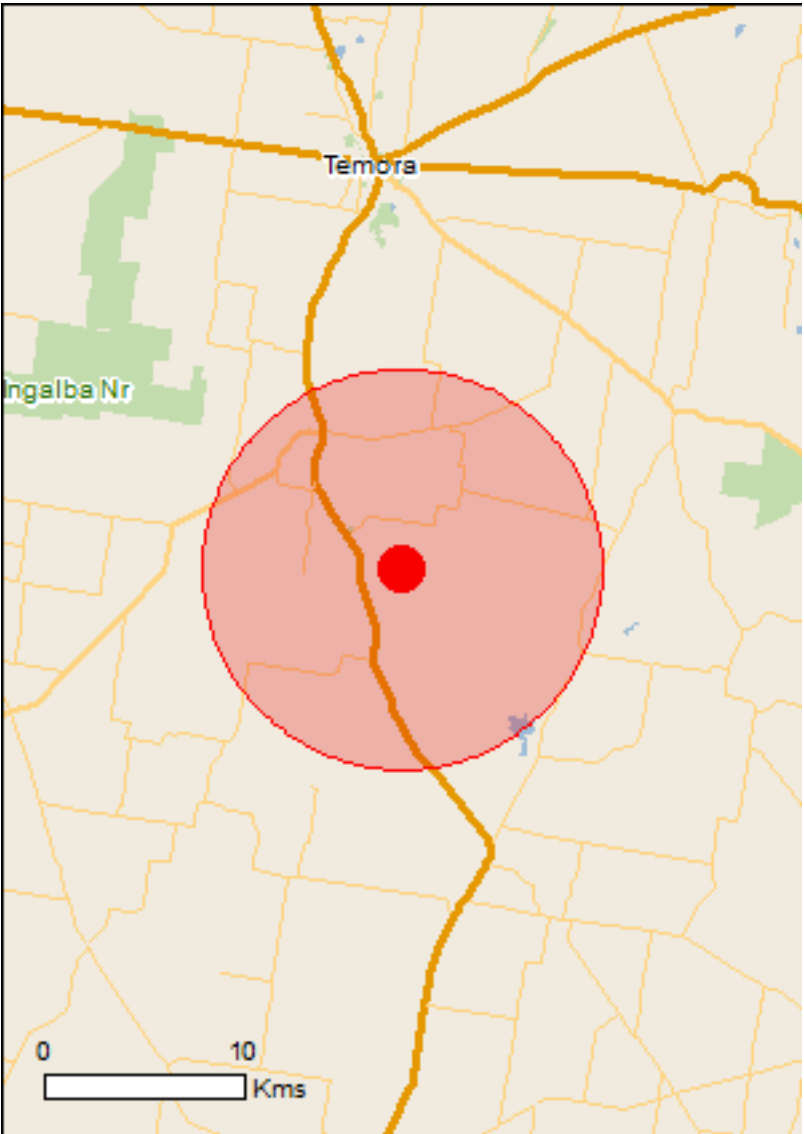
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

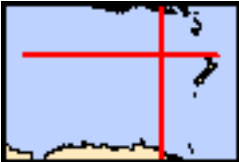
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	18
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

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

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	22
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	600 - 700km upstream	
Hattah-kulkyne lakes	400 - 500km upstream	
Riverland	500 - 600km upstream	
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream	

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

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

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

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

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Mammals		
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 known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Austrostipa metatoris [66704]	Vulnerable	Species or species habitat may occur within area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area
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

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]	Critically Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]		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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]	Critically Endangered	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]		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
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[[Resource Information](#)]

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

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		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
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		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

-34.59795 147.54676

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](#)
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- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

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

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX H EPBC HABITAT ASSESSMENT

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
FAUNA				
<i>Anthochaera phrygia</i> Regent Honeyeater	inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Occurs in woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Absent –suitable habitat not present. No mistletoes present.	Unlikely	No – Unlikely to occur on site
Australian Bittern <i>Botaurus poiciloptilus</i>	Permanent freshwater wetlands with tall, dense vegetation.	Absent – no freshwater wetlands with dense vegetation	Unlikely	No – Unlikely to occur on site
Curlew Sandpiper <i>Calidris ferruginea</i>	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 – no intertidal mudflats	Unlikely	No – Unlikely to occur on site
Painted Honeyeater <i>Grantiella picta</i>	Boree/Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes.	Scattered paddock trees of box-gum woodland. No mistletoes present.	Unlikely – not detected during site surveys. No suitable food sources. (mistletoes)	No – Unlikely to occur on site
Swift Parrot <i>Lathamus discolor</i>	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 and Lerp infested trees such as Grey Box and Black Butt.	Present	Unlikely – outside mapped important areas (OEH). Not detected during surveys	Possible, Assessment of significance
Mallee Fowl <i>Leipoa ocellata</i>	Semi-arid to arid shrublands and low woodlands, especially those dominated by Mallee and/or	Absent	Unlikely	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
FAUNA				
	Acacia which are tall, dense, and floristically rich. A sandy to sandy-loam substrate and abundance of leaf litter are required for breeding.			
Eastern Curlew <i>Numenius madagascariensis</i>	Large intertidal mudflats often with seagrass beds along sheltered coasts including in estuaries, bays, harbours, inlets, lagoons, and among saltmarshes and mangroves.	Absent	Unlikely	No – Unlikely to occur on site
Plains Wanderer <i>Pedionomus torquatus</i>	Semi-arid, lowland native grasslands that typically occur on hard red-brown soils. Habitat structure typically comprises 50% bare ground, 10% fallen litter and 40% herbs, forbs and grasses. Grassland habitat less than 5cm high.	Absent – no native grasslands with preferred habitat structure.	Unlikely	No – Unlikely to occur on site.
Superb Parrot <i>Polytelis swainsonii</i>	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	Likely – Known to occur in the area	Yes – Assessment of Significance
Australian Painted Snipe <i>Rostratula australis</i>	Shallow terrestrial freshwater or occasionally brackish wetlands, including temporary and permanent lakes, swamps, and claypans, as well as inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms, and bore drains. Fringes of swamps, dams, and nearby marshy areas with cover of grasses, lignum, low scrub, or open timber. Shallow wetlands with areas of bare wet mud.	Absent	Unlikely	No – Unlikely to occur on site
Murray Cod <i>Maccullochella peelii</i>	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	Absent – No waterbodies	Unlikely	No – No suitable habitat

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
FAUNA				
	large rocks, woody debris, and overhanging vegetation.			
Macquarie Perch <i>Macquaria australasica</i>	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 – No waterbodies	Unlikely	No – No suitable habitat
Corben's Long-eared Bat <i>Nyctophilus corbei</i>	Variety of vegetation types, most commonly Mallee, Bulloke, and Box-dominated communities, but most common in vegetation with distinct canopy and dense understorey. Roost in tree hollows, crevices, and under loose bark.	Present	Possible – Yes known to occur in locality.	Yes – Assessment of Significance undertaken
Koala <i>Phascolarctos cinereus</i>	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 – Unlikely to occur on site
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines.	Absent	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Pink-tailed Worm-lizard <i>Aprasia parapulchella</i>	Inhabits sloping open woodland areas with predominantly native grassy ground layers. Commonly found beneath small, partially-embedded rock.	Absent – no rocky outcrops or partially buried rocks.	Unlikely – No suitable habitat	No – Unlikely to occur on site
Striped legless lizard <i>Delma impar</i>	Inhabits grassland dominated by perennial, tussock-forming grasses such as Kangaroo Grass <i>Themeda australis</i> , spear-grasses <i>Austrostipa spp.</i> and poa tussocks <i>Poa spp.</i> , and occasionally wallaby grasses <i>Rhytidosperra spp</i> and exotic components.	Present- Grassland with exotic components present along Eurolee road	Unlikely– development site outside known distribution	No

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
FAUNA				
FLORA				
A spear-grass <i>Austrostipa wakoolica</i>	Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils.	Present - Grey Box-White Cypress Woodland an associated vegetation type	Possible—development site within known distribution	Yes – Assessment of Significance completed
A Spear Grass <i>Austrostipa metatoris</i>	habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	Present- Grey Box-White Cypress Woodland an associated vegetation type	Possible – development site within known distribution	Yes – Assessment of Significance completed

APPENDIX I EPBC ASSESSMENTS OF SIGNIFICANCE

The Environment Protection and Biodiversity Conservation Act 1999 specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The Matters of Environmental Significance – Significant Impact Guidelines (DoE 2013) identify the factors the need to be considered.

The following assessment assesses the significance of the likely impacts associated with the proposed works on these species and ecological communities listed under the EPBC Act:

- Birds
 - Swift Parrot (*Lathamus discolor*)- CE
 - Superb Parrot (*Polytelis swainsonii*) – V
- Bats
 - Corben’s Long-eared Bat (*Nyctophilus corbei*) - V
- Flora
 - A Spear Grass (*Austrostipa wakoolica*) – E
 - A Spear grass (*Austrostipa metatoris*) – V

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

The following assessment assesses the significance of the likely impacts associated with the proposed works on these endangered and critically endangered species:

- Fauna
 - Swift Parrot – CE
- Flora
 - A Spear Grass (*Austrostipa wakooolica*) – E

According to the guidelines (DoE 2013), the criteria for assessing endangered and critically endangered species are the same and as such, each group has been assessed accordingly below.

a) Will the action lead to a long-term decrease in the size of a population of a species?
<p><i>Austrostipa wakooolica</i></p> <p><i>Austrostipa wakooolica</i> was not detected within the development site however survey timing was not considered suitable for proper identification of this species. <i>Austrostipa</i> species were present along Eurolee Road, however were unable to be identified due to the lack of suitable plant material. No records of this species occur within 10km of the development site.</p> <p>Suitable habitat for <i>A. wakooolica</i> occurs along Eurolee Rd and Goldfields Way. 0.13ha of this roadside habitat would be impacted by the proposal.</p> <p>As it is not known if the species occurs within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for <i>A. wakooolica</i> before construction occurs along Eurolee Road and Goldfields Way.</p> <p>A field survey was completed on the 9th October 2018 in accordance with the BAM. <i>Austrostipa wakooolica</i> was not identified in the development site. No impacts are expected for this species.</p>
<p>Swift Parrot</p> <p>The swift parrot breeds in Tasmania during the Summer and the entire population migrates north to the Mainland in Winter (TSSC, 2016). In NSW, swift parrots forage on winter flowering Eucalyptus species and lerp infested Eucalypts. Potential foraging habitat for Swift Parrot occurs within the development site and would be removed by the proposal. Surveys did not detect these species and so the development site is not considered known habitat but provides potential foraging habitat.</p> <p>The proposal would involve the removal of around 0.4 ha of Box-gum woodland vegetation suitable as a foraging source and 11 scattered paddock trees of Various Eucalyptus sp. and White Cypress. There would also be some disturbance associated with construction, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.</p> <p>The quality of potential habitat for these species is low, being largely cleared, and highly disturbed by agriculture. Given the relatively small amount of habitat to be removed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of a population of these species is minimal.</p>
b) Will the action reduce the area of occupancy of the species?
<p><i>Austrostipa wakooolica</i></p> <p>If these species occur within the development footprint, the proposal could reduce the area of occupancy of these species. 0.7 ha of suitable habitat would be impacted along Muntz Rd and Sandigo-Boree Creek Rd. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs along Muntz Rd and Sandigo-Boree Creek Rd. If these species are detected a further assessment would be undertaken before work commenced.</p> <p>A field survey was completed on the 9th October 2018 in accordance with the BAM. <i>Austrostipa wakooolica</i> was not identified in the development site. No impacts are expected for this species.</p>
<p>Swift Parrot</p>

The proposal would involve the removal of around 0.19ha of Box-gum woodland vegetation and 11 scattered paddock trees over a crop. There would also be some disturbance associated with construction. The development site is not considered known important habitat.

The quality of potential habitat for these species is low, and the area of habitat to be removed is relatively small. The removal of the vegetation would not impact on the ability of the species to move across the landscape and as such would have a minimal impact on the area of occupancy of the species.

c) Will the action fragment an existing population into two or more populations?

Austrostipa wakoolica

If this species occurs within the development footprint, the proposal could fragment an existing population into two or more populations. 0.1 ha of suitable habitat would be impacted along Eurolee Rd and Goldfields Way. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs along Eurolee Rd and Goldfields Way. If these species are detected a further assessment would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa wakoolica* was not identified in the development site. No impacts are expected for this species.

Swift Parrot

The proposal would involve the removal of around 0.4ha of Box-gum Woodland and 11 scattered paddock trees. There would also be some disturbance associated with construction. The development site is not considered known habitat and the likelihood of occurrence of these species is low.

The quality of potential habitat is low, and the area of habitat to be removed is relatively small and would not disrupt habitat connectivity for canopy species. The proposal would not fragment an existing population of these species into two or more populations.

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

Austrostipa wakoolica

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

Swift Parrot

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for this species.

e) Will the action disrupt the breeding cycle of a population?

Austrostipa wakoolica

If these species occur within the development footprint, the proposal could disrupt the breeding cycle of the population. 0.1 ha of suitable habitat would be impacted along Eurolee Road and Goldfields Way. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs Eurolee Road and Goldfields Way. If these species are detected a further assessment would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa wakoolica* was not identified in the development site. No impacts are expected for this species.

Swift Parrot

Swift Parrots breed only in Tasmania, migrating to the mainland in autumn and winter. There would be no notable impacts on connectivity for this highly mobile species. The proposal would not disrupt the breeding cycle of the Swift Parrot.

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

Austrostipa wakoolica

If this species occurs within the development footprint, the proposal could decrease the availability or quality of habitat so that the species is likely to decline. 0.1 ha of suitable habitat would be impacted along Eurolee Road and Goldfields Way. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs along Eurolee Road and Goldfields Way. If these species are detected a further assessment would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa wakoolica* was not identified in the development site. No impacts are expected for this species.

Swift Parrot

The proposal would involve the removal of around 0.4ha of Box-gum Woodland and 11 scattered paddock trees. There would also be some disturbance associated with construction, which could decrease the quality of some habitat. The development site is not considered known habitat and is considered potential habitat only.

The quality of potential habitat is low, and the area of habitat to be removed is relatively small and would not disrupt habitat connectivity for canopy species. With the implementation of the recommended mitigation measures, the likelihood of the action modifying, destroying, removing, isolating, or decreasing the availability or quality of habitat to the extent that these species would be likely to decline is minimal.

g) Will the action result in invasive species that are harmful to a critically endangered or endangered/vulnerable species becoming established in the endangered / critically endangered /vulnerable species habitat?

Swift Parrot and *Austrostipa wakoolica*

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal is therefore unlikely to result in invasive species that are harmful to these threatened species becoming established in potential habitat.

h) Will the action introduce disease that may cause the species to decline?

Swift Parrot and *Austrostipa wakoolica*

There is a risk that diseases could be introduced to the development site via machinery, vehicles, and materials during construction and operation. With the implementation of the recommended mitigation measures, the proposal is unlikely to result in the introduction of any disease that may cause these species to decline.

i) Will the action interfere with the recovery of the species?

Austrostipa wakoolica

Due to the low number of known populations of these species, if these species occur within the development footprint, they would likely represent a separate population and the proposal could interfere with the recovery of these species. 0.1 ha of suitable habitat would be impacted along Eurolee Road and Goldfields Way. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs along Eurolee Road and Goldfields Way. If these species are detected a further assessment and any further requirements would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa wakoolica* was not identified in the development site. No impacts are expected for this species.

Swift Parrot

The National Recovery Plan for the Swift Parrot lists the following objectives:

1. To identify and prioritise habitats and sites used by the species across its range, on all land tenures.
2. To implement management strategies to protect and improve habitats and sites on all land tenures.

3. To monitor and manage the incidence of collisions, competition and Beak and Feather Disease (BFD).
4. To monitor population trends and distribution throughout the range.

The proposal would not interfere with any of these objectives.

Conclusion

Austrostita wakoolica

Suitable habitat for these species exists along Eurolee Road and Goldfields Way. Survey timing was considered unsuitable for these species and it is not known if they occur within the development site. A significant impact could occur to these species if they occur within the development footprint on Eurolee Road and Goldfields Way.

It is recommended to survey for these species along Eurolee Road and Goldfields Way between September and October 2018, before development occurs to determine if they are present. Mitigation measures to survey for these species before construction begins will determine if a significant impact and referral to the Federal Department of Environment is required.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostita wakoolica* was not identified in the development site. No impacts are expected for this species.

Swift Parrot

A significant impact to this species is considered unlikely, on the basis that the proposal would not;

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of these species
- Affect habitat or introduce disease such that these species would decline
- Introduce invasive species harmful to the species
- Interfere with the recovery of these species.

No referral is considered necessary to the Federal Department of Environment for this species.

VULNERABLE SPECIES

The following assessment assesses the significance of the likely impacts associated with the proposed works on these vulnerable species:

- Birds
 - Superb Parrot – V
- Bats
 - Corben's Long-eared Bat – V
- Flora
 - *Austrostipa metatoris* – V

An 'important population' is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

a) Will the action lead to a long-term decrease in the size of an important population of a species?

Superb Parrot

The Superb Parrot was detected in the development site during the all four field surveys. Additionally, a number of sightings of the Superb Parrot have been recorded within 10km of the development site, mainly along Goldfields Way (Bionet, 2018). The population of superb parrot within Southern NSW is considered one population of about 6500 individuals (Baker-Gabb, 2011)

The national recovery plan (Baker- Gabb, 2011) indicates core breeding areas as:

1. Area bounded by Molong, Rye Park, Yass, Coolac, Cootamundra and Young,
2. Along the Murrumbidgee River between Wagga Wagga and Bringagee,
3. Along the Murray and Edward Rivers

The development site is not located within any of these core breeding areas. The Murrumbidgee River is located over 55 km from the development site. However, Houghlans Creek, a tributary of the Murrumbidgee is located 5 km west of the development site. Houghlans Creek is fringed with Woodland habitat and may provide connectivity to suitable breeding habitat further south. Nesting occurs in hollows near water usually within 10km of Box-Gum Woodland (Baker – Gabb, 2011).

An important population is not considered to occur within the development site as the species has a large home range and the development site is not near the limit of the species range. The action is unlikely to lead to a long term decrease in the size of an important population.

Corben's Long-eared Bat

Surveys were not undertaken for the Corben's Long-eared Bat and it is not known whether it occurs on site. Suitable habitat for the Corben's Long-eared Bat exists in the development site in the form of Grey Box and White Cypress Woodland areas and scattered Paddock Trees. There are no known records of the species within the both Temora and Junee local government areas. Studies shown that Corben's long eared bat is more commonly found in habitats that have a distinct tree canopy and dense understory and extensive stands of vegetation rather than smaller woodland patches (TSSC, 2015). These preferred habitat features are not present within the development footprint.

The Corben's distribution occurs from Queensland and into northern Victoria. It is considered 50% of the species known distribution occurs in inland NSW (TSSC, 2015). It is considered to have large home range.

An important population is not considered to occur within the development site, as no known population occurs within the development site, the species has a large home range and the development site is not near the limit of the species range. The action is unlikely to lead to a long term decrease in the size of an important population.

Austrostipa metatoris

Austrostipa metatoris was not detected within the development site however survey timing was not considered suitable for proper identification of this species. *Austrostipa* species were present along Eurolee Road, however were unable to be identified due to the lack of suitable plant material. No records of this species occur within 10km of the development site.

Suitable habitat for *A. metatoris* occurs along Eurolee Rd and Goldfields Way. 0.13ha of this roadside habitat would be impacted by the proposal.

As it is not known if the species occurs within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for *A. metatoris* before construction occurs along Eurolee Road and Goldfields Way.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa metatoris* was not identified in the development site. No impacts are expected for this species.

b) Will the action reduce the area of occupancy of an important population of a species?

Superb Parrot

As an important population is not considered to occur within the development site, the proposal is not considered to reduce the area of occupancy of an important population. The broader development site and surrounding area will continue to contain suitable areas of breeding and foraging habitat to maintain individuals of the species with the proposal area and wider locality.

Corben's Long-eared Bat

As an important population is not considered to occur within the development site, the proposal is not considered to reduce the area of occupancy of an important population. The broader development site and surrounding area will continue to contain suitable areas of breeding and foraging habitat to maintain individuals of the species with the proposal area and wider locality.

Austrostipa metatoris

As an important population is not considered to occur within the development site, the proposal is not considered to reduce the area of occupancy of an important population. The broader development site and surrounding area will continue to contain suitable areas of breeding and foraging habitat to maintain individuals of the species with the proposal area and wider locality.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa metatoris* was not identified in the development site. No impacts are expected for this species.

c) Will the action fragment an existing important population into two or more populations?

Superb Parrot

An important population is not considered to occur within the development site. As the species is highly mobile, the proposal will not impact on its movement within or across the development site.

Corben's Long-eared Bat

An important population is not considered to occur within the development site. As the species is highly mobile, the proposal will not impact on its movement within or across the development site.

Austrostipa metatoris

If this species occurs within the development footprint, the proposal could fragment an existing population into two or more populations. 0.1 ha of suitable habitat would be impacted along Eurolee Rd and Goldfields Way. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for these species before construction occurs along Eurolee Rd and Goldfields Way. If these species are detected a further assessment would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa metatoris* was not identified in the development site. No impacts are expected for this species.

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

Superb Parrot

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

Corben's Long-eared Bat

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

Austrostipa metatoris

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

e) Will the action disrupt the breeding cycle of an important population?

Superb Parrot

An important population is not considered to occur within the development site. However, Superb Parrots were observed during all field surveys. A flock of up to 12 individuals was observed flying through the development site suggesting that the species may use habitat within the development site for breeding. 6 hollow bearing trees would be impacted by the proposal which could be suitable breeding habitat for the Superb Parrot.

Mitigation measures will be put in place for hollow bearing tree removal to avoid impacts to the breeding cycle of the species. Pre-clearing surveys would be undertaken during the breeding season for the Superb Parrot (September to November) prior to commencement of construction.

Corben's Long-eared Bat

No known important population occurs within the proposal area. However, specific mitigation measures will be put in place for hollow-bearing tree removal to avoid impacts to the breeding cycle of the species if they are present within the development site. Higher quality areas of suitable habitat will be retained in the development site, ensuring that individuals could continue to utilise the development site, and the breeding cycle of the broader population is not disrupted.

Austrostipa metatoris

If this species occurs within the development footprint, the proposal could disrupt the breeding cycle of the population through removal of plants prior to seed set. As it is not known if these species occur within the development footprint, mitigation measures will be implemented to conduct pre-clearance surveys for

these species before construction occurs along Eurolee Rd and Goldfields Way. If these species are detected a further assessment would be undertaken before work commenced.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa metatoris* was not identified in the development site. No impacts are expected for this species.

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

Superb Parrot

The proposal would involve the removal of around 0.4ha of Woodland habitat, and 11 paddock trees. The quality of potential habitat is low, and the area of habitat to be removed is relatively small and would not disrupt habitat connectivity for this mobile canopy species. With the implementation of the recommended mitigation measures, the proposal would not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species would be likely to decline.

Corben's Long-eared Bat

The proposal will remove approximately 0.4ha of woodland vegetation containing native canopy and 11 paddock trees, 6 containing hollows. The vegetation to be removed as a result of the proposal is considered to constitute low quality foraging habitat and small amounts of potential roosting and breeding habitat. Higher quality areas of suitable habitat have been avoided and will be retained within the development site, ensuring that areas of suitable habitat remain. As such, the impacts to habitat are not considered likely to be such that the species is likely to decline, were it present within the development site.

Austrostipa metatoris

The proposal would involve the removal of around 0.4ha of Woodland habitat of which would be permanently removed. The potential habitat is of low quality and unlikely to be suitable for this species given current and past disturbances. With the implementation of the recommended mitigation measures, including targeted surveys for this species, the proposal would not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species would be likely to decline. Further assessment would be completed if *Austrostipa metatoris* species is identified on site.

A field survey was completed on the 9th October 2018 in accordance with the BAM. *Austrostipa metatoris* was not identified in the development site. No impacts are expected for this species.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Superb Parrot Corben's Long-eared Bat & *Austrostipa metatoris*

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread or introduction of invasive species on site. The proposal is therefore unlikely to result in invasive species that are harmful to these vulnerable species becoming established in potential habitat.

h) Will the action introduce disease that may cause the species to decline?

Superb Parrot Corben's Long-eared Bat & *Austrostipa metatoris*

There is a risk that diseases could be introduced to the development site via machinery, vehicles, and materials during construction and operation. With the implementation of the recommended mitigation

measures, the proposal is unlikely to result in the introduction of any disease that may cause these species to decline.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot.
2. Increase the level of knowledge of the Superb Parrot's ecological requirements.
3. Develop and implement threat abatement strategies.
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The proposal would not interfere with any of these objectives.

Corben's Long-eared bat

No national recovery plan has been made for the Corben's Long-eared Bat.

Considering the small areas of potential foraging and roosting habitat to be removed, the mitigation measures in place to avoid impacts to individuals and that substantial habitat will remain within the broader proposal area and locality, the proposal is unlikely to interfere with the recovery of Corben's Long-eared Bat.

Austrotopa metatoris

No national recovery plan has been made for *Austrotopa metatoris*.

Conclusion

A significant impact to these species is considered unlikely, on the basis that the proposal would not;

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of these species
- Affect habitat or introduce disease such that these species would decline
- Introduce invasive species harmful to the species
- Interfere with the recovery of these species.

No referral is considered necessary to the Federal Department of Environment for these species.

APPENDIX J BAM CALCULATOR CREDIT REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011323/BAAS18074/18/00011324	Sebastapol Solar Farm	07/11/2018
Assessor Name	Report Created	BAM Data version *
Julie Gooding	16/11/2018	4
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS18074		

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAI	Ecosystem credits
White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion								
2	267_Grazedunder story	27.2	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
4	267_Good	46.1	0.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
5	267_Moderate	20.3	0.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1

BAM Credit Summary Report

						Subtotal	3
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion							
3	266_Moderate	57.3	0.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE 1
						Subtotal	1
White Cypress Pine woodland on sandy loams in central NSW wheatbelt							
1	70_Low	18.2	0.1	0.25	High Sensitivity to Potential Gain	1.75	1
						Subtotal	1
						Total	5

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAI	Species credits
<i>Austrostipa metatoris</i> / A spear-grass (Flora)						
266_Moderate	57.3	0.03	0.25	1.5	False	1
267_Good	46.1	0.03	0.25	1.5	False	1
267_Moderate	20.3	0.07	0.25	1.5	False	1
					Subtotal	3
<i>Diuris tricolor</i> / Pine Donkey Orchid (Flora)						
266_Moderate	57.3	0.03	0.25	1.5	False	1

BAM Credit Summary Report

267_Good	46.1	0.03	0.25	1.5	False	1
267_Moderate	20.3	0.07	0.25	1.5	False	1
					Subtotal	3
<i>Swainsona recta / Small Purple-pea (Flora)</i>						
266_Moderate	57.3	0.03	0.25	2	False	1
267_Good	46.1	0.03	0.25	2	False	1
267_Moderate	20.3	0.07	0.25	2	False	1
					Subtotal	3
<i>Swainsona sericea / Silky Swainson-pea (Flora)</i>						
266_Moderate	57.3	0.03	0.25	2	False	1
267_Good	46.1	0.03	0.25	2	False	1
267_Moderate	20.3	0.07	0.25	2	False	1
					Subtotal	3

APPENDIX K Paddock Tree Report



Paddock Tree Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00011323/BAAS18074/18/00012329	Sebastopol Solar Farm	24/02/2018
Assessor Name	Report Created	BAM Data version *
Julie Gooding	12/09/2018	3
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS18074		

Paddock Trees

PCT code	PCT name	No. of trees	Species	DBHOB Category	Contain hollows	Class	Assessment required
267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	5	Callitris glaucophylla	> 50cm	False	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	2	Eucalyptus albens	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species



Paddock Tree Report

267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	2	Eucalyptus microcarpa	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	1	Allocasuarina luehmannii	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	1	Eucalyptus melliodora	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species