

Biodiversity Assessment Report

COLEAMBALLY SOLAR FARM BIODIVERSITY ASSESSMENT REPORT



APRIL 2017



Document Verification



Proposal
Title:

Coleambally Solar Farm Biodiversity Assessment
Report

Project Number:

Proposal File Name: Coleambally Solar Farm Biodiversity Assessment Report

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
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ACRONYMS AND ABBREVIATIONS

BBAM	BioBanking Assessment Methodology
BCC	BioBanking Credit Calculator
BOS	Biodiversity Offset Strategy
Cwth	Commonwealth
EEC	Endangered Ecological Community
EIS	Environmental impact statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
FBA	Framework Biodiversity Assessment
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
ha	hectares
KFH	Key Fish Habitat
km	kilometres
m	metres
Noxious Weeds Act	<i>Noxious Weeds Act 1993 (NSW)</i>
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage (formerly DECCW)
PCTs	Plant Community Types
RMS	Roads and Maritime Services, Roads and Maritime
SEARs	Secretary Environmental Assessment Requirements
SCIVI	Southeast NSW Native Vegetation Classification and Mapping
SEPP	State Environmental Planning Policy (NSW)
sp/spp	Species/multiple species
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>

EXECUTIVE SUMMARY

Neoen is planning for the construction and operation of a 150 megavolt ampere (MVA) solar photovoltaic (PV) plant and associated infrastructure within the Murrumbidgee Shire Council area, approximately 5 km northeast of Coleambally.

This Biodiversity Assessment Report (BAR) has been prepared by NGH Environmental on behalf of Neoen.

The aim of this BAR is to address the Secretary's Environmental Assessment Requirements (SEARs) (Appendix B) and the Framework for Biodiversity Assessment (FBA), developed for Major Projects as part of the Biodiversity Offsets Policy for Major Projects. This BAR will be used to inform an Environmental Impact Assessment as part of an application for a Major Project under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The FBA underpins the Biodiversity Offsets Policy for Major Projects. It contains the assessment methodology that is adopted by the policy to quantify and describe the impact assessment requirements and offset guidance that applies to Major Projects. This report follows the BAR format required by the FBA.

Field surveys of the proposal area identified two plant community types (PCT): Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26) and Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion (PCT 16). Weeping Myall Open Woodland is listed as an EEC under the *Threatened Species Act* and *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Careful design of the project has required only minimal removal (0.08ha) of Weeping Myall Open Woodland. The project would result in the removal of 0.66ha the Black Box Grassy Open Woodland.

Eight threatened species (TSC Act) were predicted to occur within the proposal area by the BioBanking Credit Calculator (BCC). Of these, four species were presumed to occur due to lack of adequate survey timing.

Mitigation and management measures will be put in place to adequately address impacts associated with the project, both direct and indirect.

According to the requirements of the FBA, offset requirements have been identified and calculated for residual impacts on:

- Black Box Grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
(23 credits required)
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion **(2 credits required)**

Unless impacts to this PCT are avoided, the credits will be retired, in accordance with the FBA, either through physical offsets, supplementary measures or payment into a biodiversity offset fund.

1 INTRODUCTION

Neoen is planning for the construction and operation of a 150 megavolt ampere (MVA) solar photovoltaic (PV) plant and associated infrastructure within the Murrumbidgee Shire Council area, approximately 5km northeast of the village of Coleambally (Figure 1-1). The proposal area is located at Lots 78, 81,82,83, 101, and 100 of DP750896. It is proposed to access the site from the north of the proposal area by Ercildoune Road. The proposed solar farm would connect to the existing 132 kilovolt (kV) TransGrid substation located directly across Ercildoune Road, about 150 metres north of the proposal area. A minor extension to the substation would also be needed to accommodate infrastructure for the solar farm connection.

Key infrastructure components would include:

- Solar arrays, PV boxes or skids
- Potential battery storage
- Delivery station and solar substation
- Associated above or underground cabling.
- Underground connection to TransGrid substation and extension to substation.
- Ancillary facilities.
- New proposal area access point from Ercildoune Road and associated road upgrades.
- Construction of bridges across Tubbo irrigation channel and central drainage channels.
- Construction of internal gravel access tracks.
- Possible irrigation drainage channel relocation, subject to final design.
- Subdivision of land.
- Perimeter security fencing
- A vegetation buffer.

A 7m wide access road to the site would be developed from Ercildoune Road into the proposal site for a distance of 30m.

The construction phase of the proposal is expected to take approximately nine months. The Coleambally Solar Farm is expected to operate for approximately 30 years.

1.1 STUDY AIMS

This Biodiversity Assessment Report (BAR) has been prepared by NGH Environmental, on behalf of Neoen.

The aim of this BAR is to address the requirements of the Framework for Biodiversity Assessment (FBA), newly developed for Major Proposals, and to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) (Appendix D).

1.2 REPORT STRUCTURE

This BAR follows the reporting requirements of section 1 of the FBA and includes the following:

- Identification of biodiversity values subject to the proposed major development (the proposal) – Chapter 2 (Landscape Features), Chapter 3 (Native Vegetation), Chapter 4 (Threatened Species).
- Impacts of the proposal on biodiversity as part of an application for approval to undertake the Major Proposal under NSW planning legislation - Chapter 5 (Avoid and Minimise Impacts), Chapter 6 (Impact Summary).

1.3 DEFINITIONS

Proposal Area

The proposal area is defined as the whole area inside the property boundary including the substation, the proposed above ground transmission line and the proposed access road (Figure 1-1).

Development Envelope

The proposed development envelope is defined as the area of land that is directly impacted by the construction and operation of the solar PV plant (Figure 1-1) including the transmission line, substation extension and access road. The proposed site boundary has been defined in a precautionary manner, in that it is a 'worst case' area; some areas within it may not be required to be impacted during construction.

1.4 SOURCES OF INFORMATION USED

The following information sources were used in the preparation of this report:

- Aerial maps, proposal layers and environmental layers provided by Neoen and OEH.
- Australian Government's Species Profiles and Threats database (SPRAT) <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) EPBC Act Species Profiles and Threats Database (SPRAT).
- NSW OEH's BioBanking credit calculator (<http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>)
- NSW OEH's threatened species database <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>
- OEH Threatened Species Profiles

- Office of Environment and Heritage (OEH) (2007). Mitchell Landscapes with per cent cleared estimates.
- Office of Environment and Heritage (OEH) (2014). Framework for Biodiversity Assessment: NSW Biodiversity Offsets Policy for Major Proposals. Published by Office of Environment and Heritage for the NSW Government.
- State of NSW and Office of Environment and Heritage (2014). NSW Biodiversity Offsets Policy for Major Proposals. Published by Office of Environment and Heritage for the NSW Government.



Figure 1-1 Location map

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 plant and animal communities. The proposal is located within the Riverina Bioregion and the Murrumbidgee Subregion (IBRA v.7 2012). The Riverina bioregion is characterised by a dry semi-arid climate with hot summers and cool winters. The geology of the region is Late Mesozoic to Quaternary in age, with landforms of sand plains, dune fields, salt lakes and alluvial plains. The dominant pre-European vegetation type is Eucalypt Low Woodland, dominated by Black Box (*Eucalyptus largiflorens*) and saltbush understory (*Atriplex* and *Chenopodium* spp.) (ASRIS accessed 27/2/17).

The dominant IBRA subregion affected by the proposal is the Murrumbidgee Subregion. This was entered in the BioBanking Credit Calculator (BCC) for the proposal.

2.2 NSW LANDSCAPE REGIONS (MITCHELL LANDSCAPES)

The proposal area is in the Murrumbidgee Scalded Plains Mitchell Landscape. Murrumbidgee Scalded Plains occurs throughout the proposal area. The per cent cleared estimate for this landscape is currently 67% (OEH 2007). This was entered as the dominant Mitchell Landscape into the BCC for the proposal.

Table 2-1 Description of the Mitchell Landscape relevant to the proposal (DECC 2002)

Mitchell Landscape
Murrumbidgee Scalded Plains
Quaternary alluvial plains with extensive scalding interpreted as relic floodplains or terraces. Grey, brown and red cracking clays, red brown texture-contrast soils with scalds. Levees traces evident, relief generally <1m, up to 5m on associated pans, swamps and lunettes.
Low shrublands and grasslands of bladder saltbush (<i>Atriplex vesicaria</i>), other annual saltbushes (<i>Atriplex</i> sp.), numerous burrs (<i>Sclerolaena</i> sp.), cottonbush (<i>Maireana aphylla</i>), bush minuria (<i>Minuria cunninghamii</i>), white-top grass (<i>Austrodanthonia caespitosa</i>), windmill grass (<i>Chloris truncata</i>), and hill wallaby grass (<i>Austrodanthonia eriantha</i>).

2.3 NATIVE VEGETATION EXTENT

Using GIS an inner and outer assessment circle with the ratio of 1:10 was established. A 3,000 ha outer assessment circle and 300 ha inner assessment was established over the proposal site and centred over the area of native vegetation that is impacted most by the proposal (Figure 2-2).

The total area of native vegetation mapped within the outer assessment circle is 855 ha (Figure 1-1).

Native vegetation mapping used over-storey as a surrogate for native vegetation cover, and is considered conservative as this would include non-native vegetation that may still provide some habitat value.

2.4 CLEARED AREAS

Cleared areas in the study area are primarily irrigated cropping land and provide very little in terms of fauna habitat. These areas provide suitable foraging habitat for raptors, parrots, cockatoos and introduced species such as cats, foxes & rabbits. Approximately 550ha (95%) within the site boundary is cleared (non-native vegetation) land.

2.5 RIVERS AND STREAMS

No natural water courses occur within or adjacent to the development site. A network of irrigation channels is spread throughout the site, fed from a main channel (Tubbo Channel) which runs along the north-west boundary. An irrigation drain runs through the south of the site surrounded by Black Box Woodland (Figure 2-1). The nearest natural water course is Cooinbil Creek, approximately 16 kilometres to the north west.



Figure 2-1a Irrigation channel running through centre of site 2.1b. Irrigation drain through Black Box Woodland

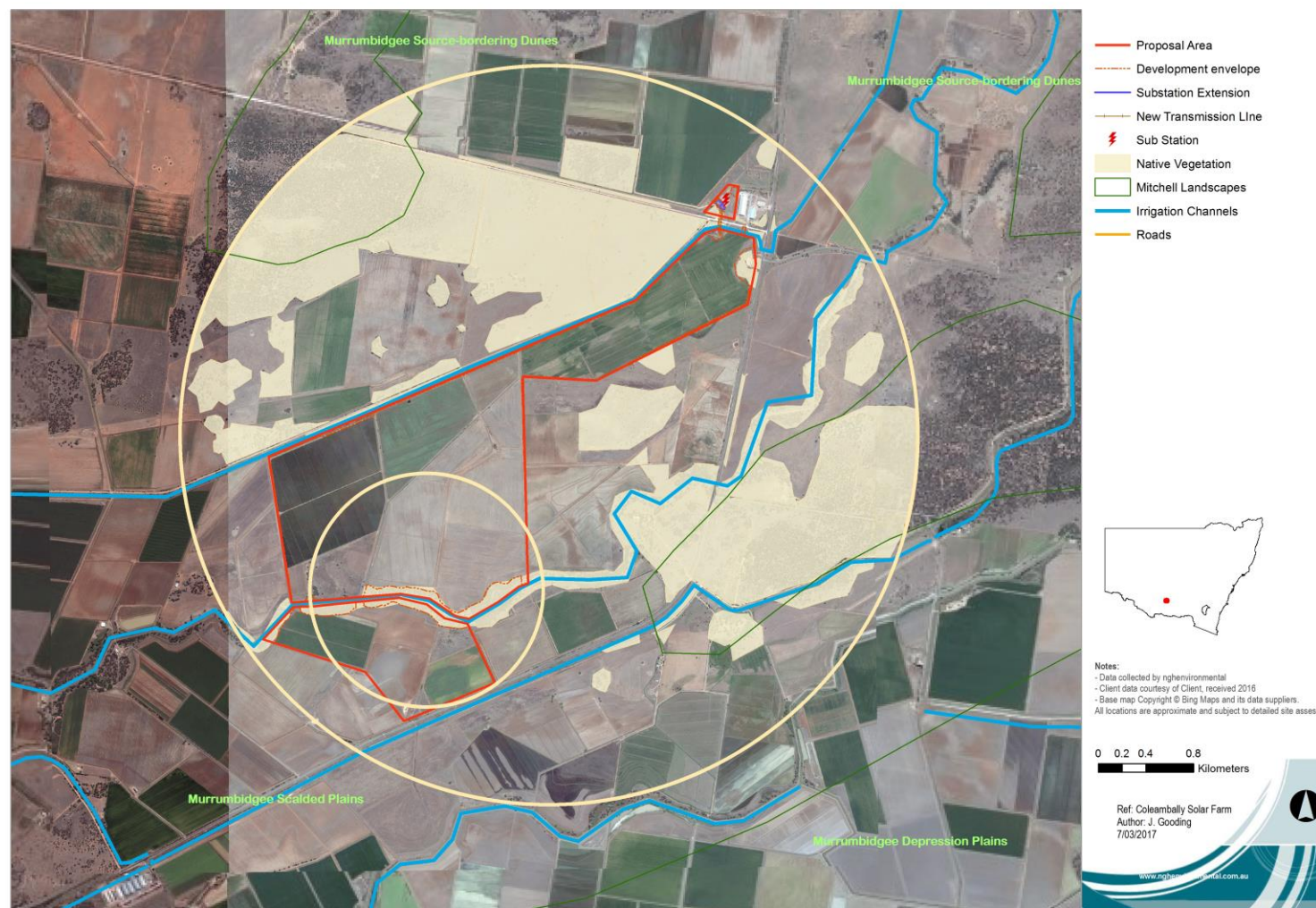


Figure 2-2 Landscape Map of site showing existing vegetation

2.6 WETLANDS

No wetlands occur within or adjacent to the development site.

2.7 STATE OR REGIONALLY SIGNIFICANT BIODIVERSITY LINKS

State Significant Biodiversity Links and Regionally Significant Biodiversity Links are defined in the FBA. To date, no biodiversity corridor plans have been approved by the Chief Executive of the OEH.

Under the FBA, no Regionally Significant Biodiversity Links or State Significant Biodiversity Links occur within the proposal area, nor within the inner and outer assessment circles.

2.8 LANDSCAPE VALUE SCORE COMPONENTS

A BioBanking credit assessment was completed for this proposal. The proposal ID for the assessment was 144/2017/4276D and the assessment type was selected as 'Major Proposal'. This section summarises the values entered into the Landscape values section of the BCC assessment.

2.8.1 Method applied

The proposal conforms to the definition of a *site-based development* according to the FBA; a development other than a linear shaped development, or a multiple fragmentation impact development. As a result, the site based landscape assessment methodology, in accordance with Appendix 4 of the FBA for major proposals, has been used in the assessment. Key information entered into the BCC is detailed below.

2.8.2 Percent native vegetation cover in the landscape

The following steps were completed in accordance with Appendix 4 of the FBA. They were completed based on the proposed layout of the solar farm and associated infrastructure and transmission line as of March 2017.

Assessing percent current extent of native vegetation cover

Using GIS an inner and outer assessment circle with the ratio of 1:10, was established and centred on the area of native vegetation that is most impacted by the proposal.

- The total area of the inner assessment circle is 300 ha.
- The total area of the outer assessment circle, including the proposal area, is 3000 ha
- Current native vegetation cover within the inner assessment circle is 8.6%
- Current native vegetation cover within the outer assessment circle is 28.5%

Assessing percent future extent of native vegetation cover

Using the same inner and outer assessment circles centred on the area of native vegetation that is most impacted by the proposal:

- Future native vegetation cover in the inner assessment circle is 8.4%
- Future native vegetation cover in the outer assessment circle is 28.4%

2.8.3 Connectivity value

A connecting link is when native vegetation on the site adjoins native vegetation surrounding the site and the native vegetation:

- is in moderate to good condition, and
- has a patch size >1 ha, and
- is separated by a distance of <100 m (or <30 m for non-woody ecosystems), and
- is not separated by a large water body, dual carriageway, wider highway or similar hostile link.

The proposal does not impact on any state or regional biodiversity links as defined in the defining criteria from FBA Table 10 below.

Extract from the FBA Table 10: Connectivity value scores for site based development

Category of connecting link	Defining criteria
State significant biodiversity link	An area identified as being part of a state significant biodiversity link in a plan approved by the Chief Executive, OEH OR A riparian buffer 50 m either side of a 6th order stream or greater OR A riparian buffer 50 m around an important wetland or an estuarine area
Regionally significant biodiversity link	An area identified as being part of a regionally significant biodiversity link and in a plan approved by the Chief Executive, OEH OR A riparian buffer 20 m either side of a 4th or 5th order stream

Connectivity value

The development would not impact on any connecting links or state or regional biodiversity links. Vegetation connectivity is maintained across the site however the limiting link most relevant to the site occurs along the irrigation drainage channel and is 40m wide. A connectivity value class width of 30-100m was entered into the BCC for both before and after development. Native overstory foliage cover was calculated as >25% of lower benchmark for this community before and after development. Midstory/Groundstory Foliage cover is calculated as >50% of lower benchmark.

2.8.4 Area to perimeter ratio

As the proposal is a site-based development and not a linear-shaped development or a multiple fragmentation development, the area to perimeter ratio for the proposal is not required to be assessed.

2.8.5 Patch size

Vegetation is connected along the irrigation drain and adjacent woodlands giving a patch size of over 1000m².

2.8.6 Landscape value score

Entering the data documented above into the BCC returned a landscape value score of zero. This demonstrates there will be no significant impact to the native vegetation extent and connectivity across the local landscape.

3 NATIVE VEGETATION

3.1 PLANT COMMUNITY TYPES

3.1.1 Vegetation communities

Two distinct Plant Community Types (PCTs) were observed in the proposal area (Figure 3-7). These are:

1. Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26).
2. Black Box Grassy open woodland wetland of rarely flooded depressions in south western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT 16).

Weeping Myall Open Woodland forms part of the listed EEC - *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregion* (Figure 3-8).

Black Box Grassy open woodland wetland does not form part of any listed EEC.

Cleared areas that were dominated by non-indigenous vegetation were not considered to provide habitat for threatened species or communities and thus have not been included in the BCC calculations.

Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)

This vegetation community occurred in small patches within the proposal area.

- A patch (2.6ha) of moderate to good woodland vegetation in the north of the site along the Kidman Way.
- An adjacent patch (0.57ha) of low condition woodland.
- A patch (1.21ha) of moderate to good woodland vegetation in the north of the site on the corner of the Kidman Way and Ercildoune Road.
- A patch (1.37ha) of woodland in the NorthWest of the site along an irrigation channel.
- A patch (3.8ha) occurs along the roadside of Kook Road.

This vegetation community is listed as an Endangered Ecological Community (EEC) under the TSC Act: Weeping Myall Open Woodland of the Riverina and NSW South-western slopes Bioregions. This vegetation community is also listed as an EEC under the EPBC Act – Weeping Myall Woodlands.

In the moderate to good condition woodland, the overstory is characteristically dominated by Weeping Myall (*Acacia pendula*). A 2nd generation of *A. pendula* is present in the midstory along with Grey Mistletoe (*Amyema quandang*). The groundcover consists of Plains Grass (*Austrostipa aristiglumis*), Wallaby Grass (*Rytidosperma* sp.) Creeping Saltbush (*Atriplex semibaccata*), Ruby Saltbush (*Enchylaena tomentosa*), Climbing Saltbush (*Einadia nutans ssp nutans*), Ridged Sida (*Sida corrugata*) and juvenile *A. pendula*.

A patch of scattered trees of *A. pendula* was considered in low condition. This patch has a canopy cover of <25% of the lowest benchmark for this community and an exotic dominated groundcover. Groundcover species were predominately Wild Oats (**Avena* sp.), Prickly Lettuce (**Lactuca serriola*) and prickly Ox-tongue (**Helminthotheca echioides*). Some native plants were present but covered less than 50% of the groundcover. The groundcover was also scattered with abandoned hay bales.

A further patch of Weeping Myall open Woodland was present in the southern corner during the initial site survey in December 2016. This has since been cleared by the landholder for routine farming operations through the Native Vegetation Act process and is not discussed further in this report.

Table 3-1 Summary of the **Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)** in the proposal area.

Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)		
Vegetation formation	Semi-arid Woodlands (Grassy sub-formation)	
Vegetation class	Riverine Plain Woodlands	
Vegetation type	Plant Community Type (PCT) ID	26
	Biometric Vegetation Type ID	CW205, LA212, MR639, MU604
	Common Community Name	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.
Approximate extent within proposal area (ha)	2.6ha of this vegetation community occurs in the north of the site along The Kidman Way in moderate-good condition. A further 0.57ha in Low condition occurs alongside comprising of scattered paddock trees with an exotic understory (Figure 3-7). 1.21 ha occurs on the corner of The Kidman Way and Ercildoune Road. Detailed design of the proposal will result in minimal impact of only 0.08ha to this vegetation community.	
Condition	3.7ha in Moderate to Good condition. 0.57ha occurs in Low condition.	
Survey Effort	Three biometric Plots and Random Meander Survey over the entire patch.	
Conservation Status	This vegetation community is listed as an endangered ecological community (EEC) under the TSC ACT known as Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions. It is also listed as Endangered under the EPBC ACT. The patch of moderate to good vegetation meets the definition of Weeping Myall Woodland under the EPBC Act.	
Estimate of percent cleared	90%.	
Threatened plant species habitat	Within the relatively undisturbed remnant patches, this community can provide habitat for threatened flora species, including spear-grass (<i>Austrostipa wakoolica</i>), Slender Darling Pea (<i>Swainsona murrayana</i>), Bindweed (<i>Convolvulus tedmoorei</i>), Lanky Buttons (<i>Leptorhynchos orientalis</i>) and Chariot Wheels (<i>Maireana cheelii</i>).	
Fauna Habitat	This vegetation community provides numerous habitat types for fauna. Canopy trees of Weeping Myall (<i>Acacia pendula</i>) provide foraging and nesting/resting for birds and arboreal fauna. The mid-storey, (<i>A. pendula</i> and Grey Mistletoe (<i>Amyena quandang</i>)) provides foraging and nesting for smaller birds. Ground plants, logs and fallen leaves provide shelter and foraging for terrestrial fauna as well. A family of Black Shouldered Kites (<i>Elanus axillaris</i>) were observed foraging in this patch.	

Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26)

Example



Figure 3-1 Example of moderate to good condition Weeping Myall Open Woodland of the Riverina and NSW South Western Slopes Bioregions in the study area.



Figure 3-2 Example of low condition Weeping Myall Open Woodland of the Riverina and NSW South Western Slopes Bioregions in the study proposal area.

Black Box grassy open woodland wetland of rarely flooded depressions in south Western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT 16)

Within the proposal area, PCT 16 occurs at the northern end of the proposal area on the corner of Ercildoune and Kook Rd and alongside the transgrid substation. The proposed transmission line connecting to this substation will require some clearing of this community. A further larger patch of this Black Box Woodland occurs alongside the irrigation drain at the south of the study area.

This vegetation community is not listed as an endangered ecological community under the TSC or EPBC act.

The dominant trees in the community consisted of an overstory of Black Box (*Eucalyptus largiflorens*). A few scattered Hickory Wattle (*Acacia implexa*) are present in the midstory. The groundcover layer consisted of a diverse assemblage of native species including Climbing Saltbush (*Einadia nutans* subsp. *nutans*), Creeping Saltbush (*Atriplex semibaccata*), Ruby saltbush (*Enchylaena tomentosa*), Black Rolypoly (*Sclerolaena muricata*), Ridged Sida (*Sida cunninghamia*), Quena (*Solanum esuriale*) and Nardoo (*Marsilea drummondii*). Exotic species consists of Wild Oats (*Avena sp.*), Prickly Lettuce (*Lactuca serriola*), Variegated Thistle (*Silybum marianum*) and White Horehound (*Marrubium vulgare*).

A further patch of Black Box grassy open Woodland with an exotic dominated understory was present in the south-western corner during the initial site survey in December. This has since been cleared by the landholder for routine farming operations through the Native Vegetation Act process. A set aside area for this clearing is provided for in the Black Box Woodland alongside the irrigation drain and shown in Figure 3-7

Table 3-2 Summary of Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW.

Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT16)		
Vegetation formation	Semi-arid Woodlands (Grassy sub-formation)	
Vegetation class	Inland Floodplain Woodlands	
Vegetation type	Plant Community Type (PCT) ID	16
	Biometric Vegetation Type ID	LA109; LM104; MR518; MU514; WE126
	Common Community Name	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
Approximate extent within proposal area	2.64ha of this vegetation community occurs in the north of the proposal area of which 0.16ha is proposed to be impacted (Figure 3-7). 19.93ha of this vegetation community occurs alongside the irrigation drain in the south of the study area of which 0.5ha is proposed to be impacted.	
Condition	Moderate – Good.	
Survey Effort	2 biometric plots (3 hours) and random meander through the rest of the site.	
Conservation Status	Not Threatened	

Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT16)

Estimate of percent cleared

50%

Threatened plant species habitat

Within the relatively undisturbed remnant patches, this community can provides habitat for threatened flora species, including Spear-grass (*Austrostipa wakoolica*), Mossgiel Daisy (*Brachyscome papillosa*), a burr-daisy (*Calotis moorei*) and Slender Darling Pea (*Swainsona murrayana*).

Fauna Habitat

This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting for birds and arboreal fauna. The mid-storey (if present) provides foraging and nesting for smaller birds, as well as refuge for small-medium sized mammals and reptiles. Ground plants, logs and fallen leaves provide shelter and foraging for terrestrial fauna as well. Many small hollows are present in *Eucalyptus largiflorens*, providing daytime resting habitat for bats and mammals, and roosting habitat for birds.

Example



Figure 3-3 Example of Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW in Zone 2 on corner of Ercildoune Rd and Kook Rd.

Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (PCT16)



Figure 3-4 Example of Black-Box Grassy Open Woodland Wetland of rarely flooded depressions in South Western NSW in Zone 1 along irrigation drain.

Non-indigenous vegetation

This highly disturbed and modified vegetation community occupies approximately 95% of the development site and is confined to cropping and pastoral areas (Figure 3-5). In these areas, there is a prevalence of exotic or planted non-local groundcover species. These include crop species such as soybean (*Glycine max*), Chickpeas (*Cicer arietinum*) and Wheat (*Triticum sp.*) or bare ground recently cultivated. In pastoral areas, the groundlayer is almost entirely exotic with species including Oats (*Avena sp.*), Barley Grass (*Hordeum leporinum*), Prickly Lettuce (*Lactuca serriola*), Variegated Thistle (*Silybum marianum*), Spear thistle (*Cirsium vulgare*) and Horehound (*Marubium vulgare*).

As this vegetation has virtually no native component in any strata, then in accordance with the FBA, this vegetation does not need to be assessed further.

Disturbed Vegetation

A further area was included in the development envelope for a borrow pit. This area is located on an existing borrow pit that has regenerated with scattered native grasses. Ground cover however, consists of less than 50% plant cover with bare soil comprising the majority of the site. Evidence of disturbance from illegal dumping, fires and vehicles is present. Due to the high disturbance of this site it is not assigned a PCT and does not provide threatened species habitat.

As this vegetation has virtually no native component in any strata, then in accordance with the FBA, this vegetation does not need to be assessed further.



Figure 3-5 An example of exotic-dominated cropping vegetation within the proposal area.



Figure 3-6 An example of exotic dominated pastoral vegetation within the proposal area

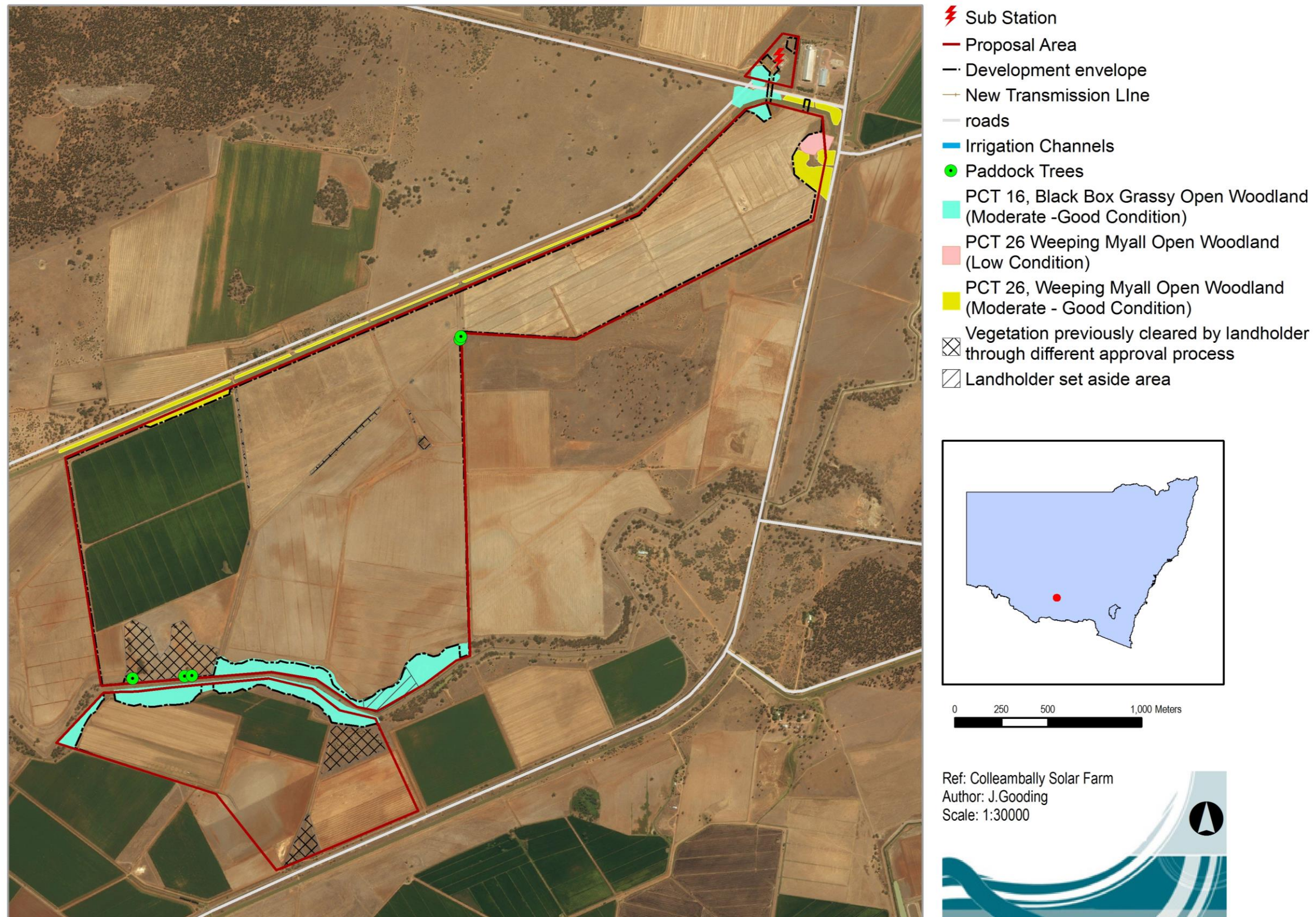


Figure 3-7 PCTs (including condition) within the proposal area.

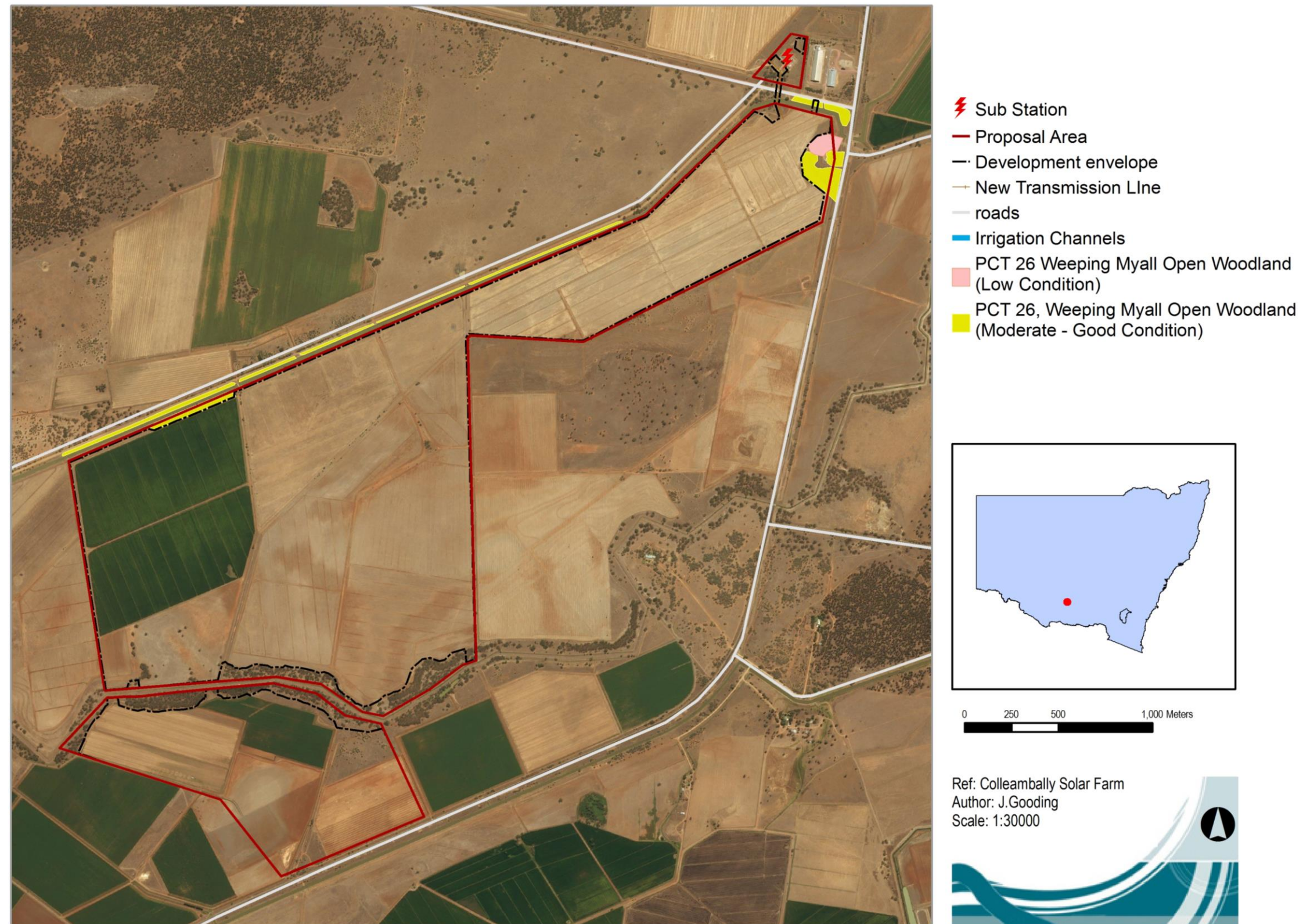


Figure 3-8 EECs within the proposal area

3.1.2 Vegetation zones in the BioBanking Credit Calculator

Four vegetation zones would be impacted by the development (Figure 3-9 - Figure 3-11 and Table 3-3):

Zone 1: Black Box Grassy Open Woodland Wetland of rarely flooded depressions alongside irrigation drain. This will be impacted on to build access across the irrigation drain.

Zone 2: Black Box Grassy Open Woodland Wetland of rarely flooded depressions along side the transgrid substation. This will be impacted on to build an underground transmission line connecting between the solar farm and transgrid substation.

Zone 3: Black Box Grassy Open Woodland Wetland of rarely flooded depressions alongside irrigation drain. This will be impacted on by realigning an irrigation channel to the eastern boundary.

Zone 4: Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion alongside Ercildoune Road and Kook Road. These areas will be impacted on by the new access roads to the site. 0.08ha would be impacted on the Ercildoune Rd access road and 0.004ha on the Kook Road access.

The vegetation zones that would be impacted by the proposal, as they have been entered into the BCC, their condition class, number of biometric plots undertaken within them and their current site value score, as determined by the BCC, are as follows:

Table 3-3 BCC vegetation zones within the proposal

Zone ID	Vegetation zones	Condition class	Area (ha) within development zone.	Survey effort (number of plots)	Site value score (current)
1	PCT #16 BVT #MR518 Black Box Grassy Open Woodland wetland of rarely flooded depressions in South Western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate to good	0.20	1	42.00
2	PCT #16 BVT #MR518 Black Box Grassy Open Woodland wetland of rarely flooded depressions in South Western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate to good	0.16	1	37.33
3	PCT #16 BVT #MR518 Black Box Grassy Open Woodland wetland of rarely flooded depressions in South Western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate to good	0.30	1	70.67

Zone ID	Vegetation zones	Condition class	Area (ha) within development zone.	Survey effort (number of plots)	Site value score (current)
4	PCT #26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.	Moderate to good	0.084	1	31.33

No vegetation zones had site value scores of <17.

3.1.3 Site values (plot data entered into BCC)

The following plot data were collected in March 2017 for vegetation zone 1 to 4 (Table 3-4).

Another two additional plots were conducted within the Weeping Myall woodland along the Kidman Way which would have comprised a separate vegetation zone. However, subsequent revision of the proposal design has removed any impact to this zone and it is no longer included in this assessment.

Table 3-4 Plot data

Zone 1: PCT #16 - BVTMR514 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW

Plot name	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Overstorey regeneration	Total length of fallen logs	Easting	Northing	Zone
Black Box 1	10	5.9	0.6	9	0	4	82	0	1	14	401167.5	6151826	55

Zone 2: PCT #16 - BVTMR514 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW

Plot name	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Overstorey regeneration	Total length of fallen logs	Easting	Northing	Zone
Black Box 2	13	4.7	0	17	3	17	36	1	0	10	404204.8	6155058	55

Zone 3: PCT #16 - BVTMR514 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW

Plot name	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Overstorey regeneration	Total length of fallen logs	Easting	Northing	Zone
Black Box 3	11	13	0	4	40	0	32	4	1	55	402556.6	6152005	55

Zone 4: PCT #26 - BVTMR639 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

Plot name	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Overstorey regeneration	Total length of fallen logs	Easting	Northing	Zone
Myall 3	9	0	0	40	20	0	40	0	1	0	404351.7	6154949	55

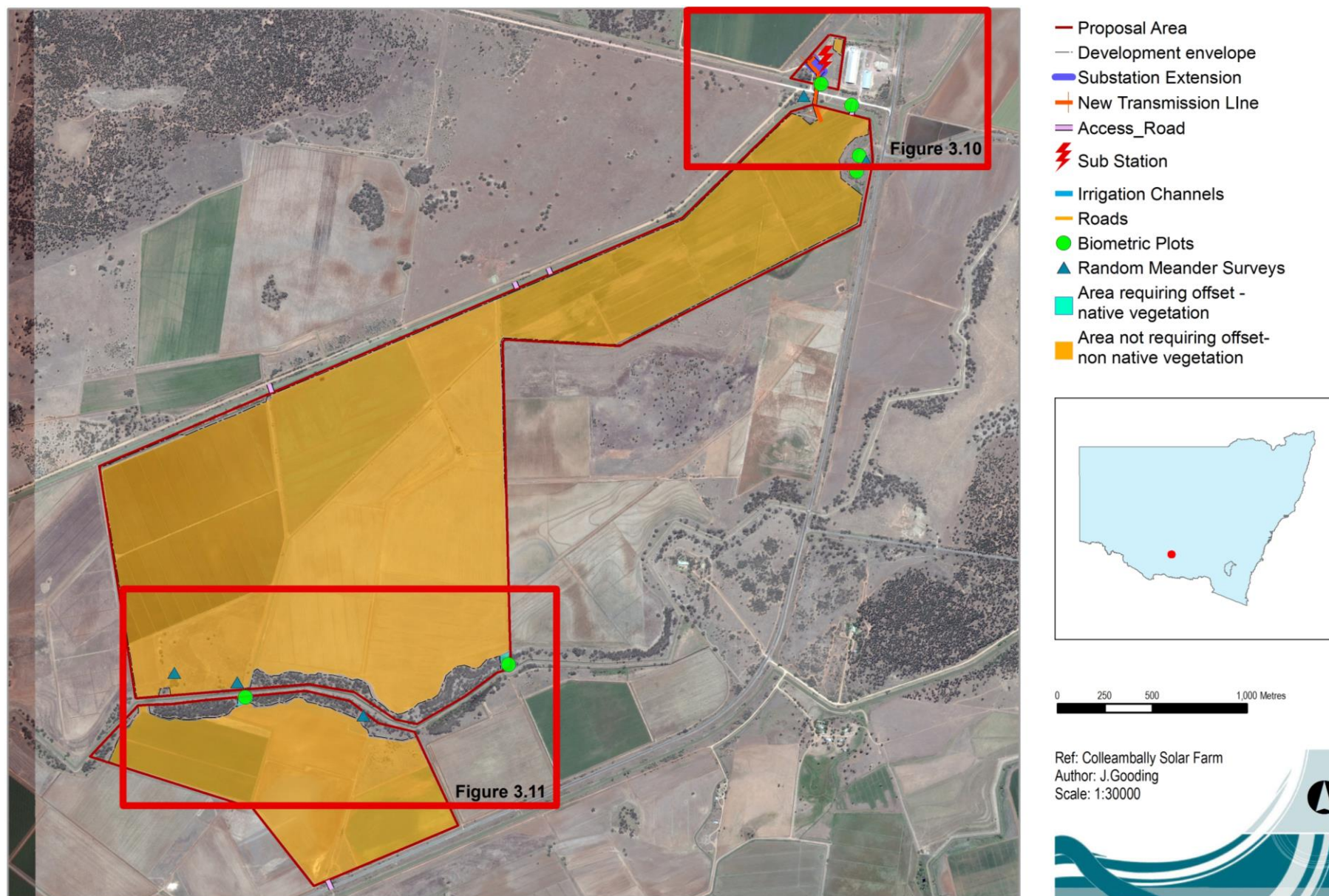


Figure 3-9 Areas requiring offset

Final

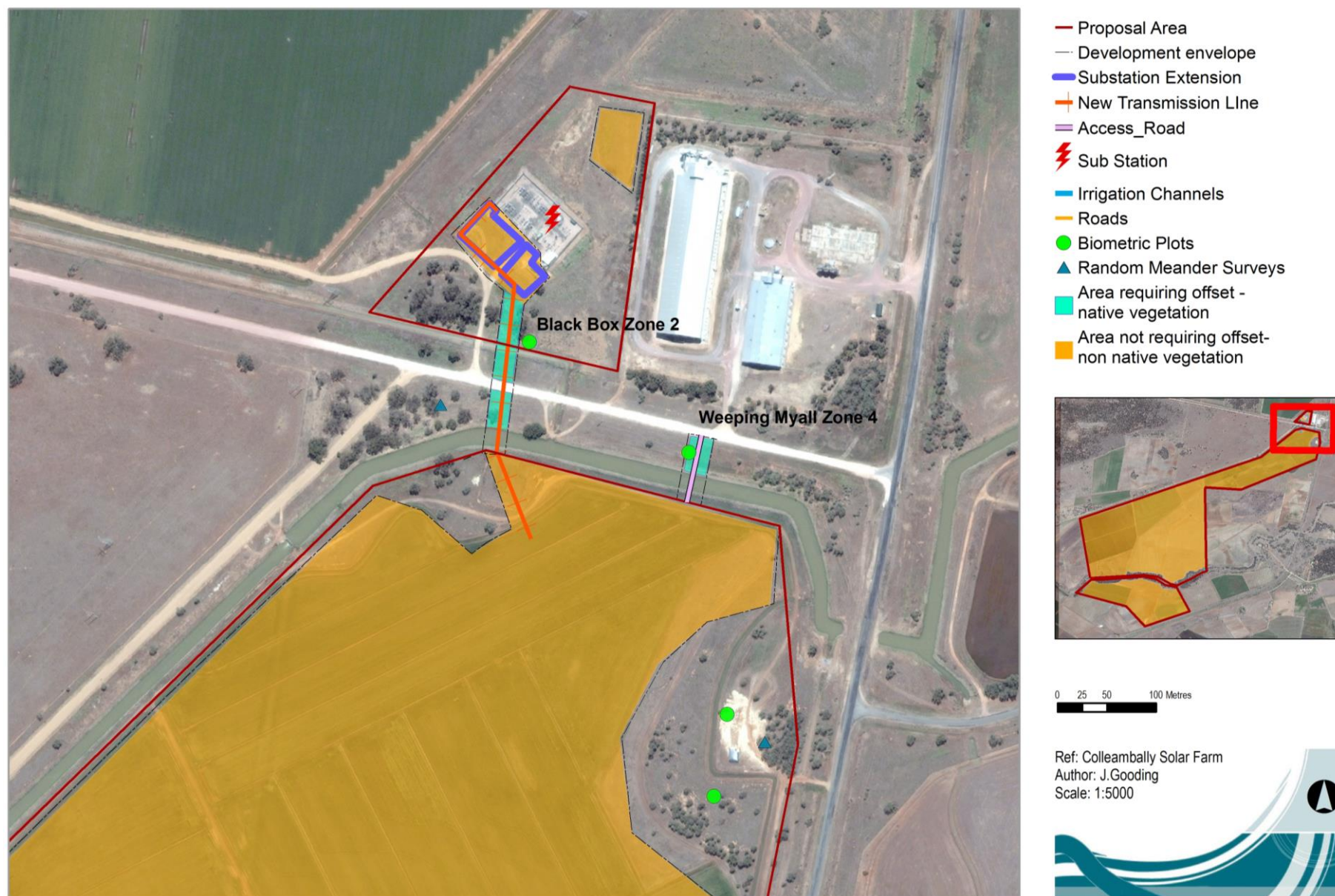


Figure 3-10. Areas requiring offset

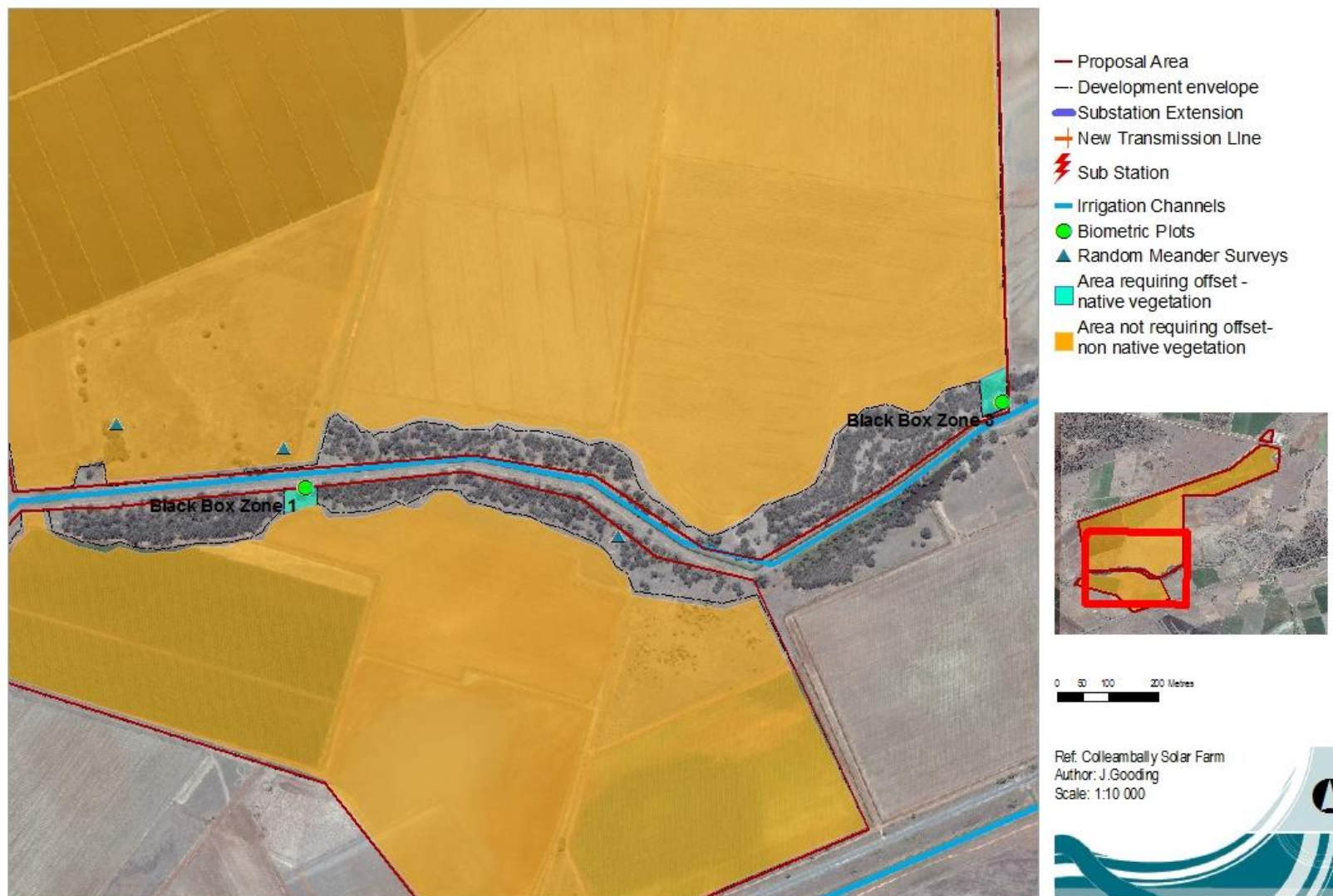


Figure 3-11 Areas requiring offset.

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

The following habitat features were returned in the Geographic / habitat feature tab of the BCC.

Table 4-1 Geographic / habitat features

Impact?	Common name	Scientific name	Feature
No	Grey Falcon	<i>Falco hypoleucos</i>	Land containing and within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated paddock trees overhanging water or dry watercourses.
No	Winged Peppergrass	<i>Lepidium monoplocoides</i>	Land containing seasonally damp or waterlogged sites
No	Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts
No	Menindee Nightshade	<i>Solanum karsense</i>	Periodically flooded depressions with heavy soils
No	Austral Pillwort	<i>Pilularia novae-hollandiae</i>	Periodically waterlogged sites (including table drains and farm dams)
Yes	Chariot Wheels	<i>Maireana cheelii</i>	Heavy grey clay soils and claypans or shallow depressions

Only one is relevant to the site and would be impacted:

- Heavy grey clay soils and claypans or shallow depressions.

The following species are all species predicted by the BCC to occur, based on the data entered for the landscape assessment and the geographic and habitat features in the assessment. These constitute all species which will generate ecosystem credits in the credit calculations.

Table 4-2 Ecosystem credit species predicted to occur.

Common name	Scientific name	TS offset multiplier
Australian Bustard	<i>Ardeotis australis</i>	2.6
Barking Owl	<i>Ninox connivens</i>	3.0
Brolga	<i>Grus rubicunda</i>	1.3
Bush Stone-curlew	<i>Burhinus grallarius</i>	2.6
Diamond Firetail	<i>Stagonopleura guttata</i>	1.3
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis subsp. temporalis</i>	1.3

Common name	Scientific name	TS offset multiplier
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata subsp. cucullata</i>	1.7
Little Eagle	<i>Hieraaetus morphnoides</i>	1.4
Little Pied Bat	<i>Chalinolobus picatus</i>	2.1
Magpie Goose	<i>Anseranas semipalmata</i>	1.3
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	1.9
Masked Owl	<i>Tyto novaehollandiae</i>	3.0
Painted Honeyeater	<i>Grantiella picta</i>	1.3
Pied Honeyeater	<i>Certhionyx variegatus</i>	1.3
Regent Parrot (eastern subspecies)	<i>Polytelis anthopeplus subsp. monarchoides</i>	1.8
Spotted Harrier	<i>Circus assimilis</i>	1.4
Square-tailed Kite	<i>Lophoictinia isura</i>	1.4
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1.3

4.2 SPECIES CREDIT SPECIES PRESENT

4.2.1 Candidate species

The following species were returned by the BCC as requiring survey. The table below identifies if species were detected during surveys and identifies if they are likely to be impacted by the proposal and therefore may generate offset requirements.

Table 4-3 Threatened species requiring survey

Common name	Scientific name	Surveys	Present/presumed present	Affected by the proposal
Mossgiel Daisy	<i>Brachyscome papillosa</i>	Not detected. No evidence of any <i>Brachyscome</i> species.	No	Unlikely
A Burr Daisy	<i>Calotis moorei</i>	Not detected however timing not suitable for this species.	Presumed Present	Possible. Will require surveying during Spring.
A Spear Grass	<i>Austrostipa wakoolica</i>	Not detected. Timing suitable	No	Unlikely

Common name	Scientific name	Surveys	Present/presumed present	Affected by the proposal
Bindweed	<i>Convolvulus tedmoorei</i>	Not detected however timing not suitable	Presumed Present	Possible. Will require surveying during Spring.
Chariot Wheels	<i>Maireana cheelii</i>	Not detected Timing suitable	No	Unlikely
Lanky Buttons	<i>Leptorhynchos orientalis</i>	Not detected however timing not suitable	Presumed Present	Possible. Will require surveying during Spring.
Slender Darling Pea	<i>Swainsona murrayana</i>	Not detected. Timing Suitable	No	Unlikely.
Squirrel Glider	<i>Petaurus norfolcensis</i>	Not surveyed for	Presumed Present	Possible. Six hollow Bearing trees to be removed in Zone 3.

4.2.2 Survey Effort

Flora and fauna field surveys were undertaken in January & March 2017. This information is used in the BCC assessment to support the decisions regarding candidate species that would be affected by the proposal.

Site surveys

The aims of the site surveys were as follows:

1. Determine vegetation communities present within the proposal area, their condition and extent.
2. Identify potential EECs within the proposal area and determine their condition and extent.
3. Conduct searches for threatened flora and fauna species predicted to occur in the proposal area.
4. Assess the availability and extent of flora and fauna habitat, particularly threatened species habitat, such as hollow-bearing trees.

Random meander and targeted searches for threatened flora species

Targeted surveys were used for threatened flora species predicted to occur in the study area as determined by habitat evaluations, previous recordings in the local area and the BCC. These species included:

- A Spear Grass (*Austrostipa wakoolica*),
- Slender Darling Pea (*Swainsona murrayana*),
- Mossgiel Daisy (*Brachyscome papillosa*)
- Chariot Wheels (*Maireana cheeli*).
- Lanky Buttons (*Leptorhynchos orientalis*)
- A Burr-daisy (*Calotis moorei*)
- Bindweed (*Convolvulus tedmoorei*)

Formal random meanders (after Cropper 1993) were undertaken on foot throughout the study area in suitable habitat, searching for threatened flora species. This method provides a comprehensive approach in terms of detecting the species and variation within vegetation types, and improves opportunities for

detecting significant or sparsely distributed plant species. In areas of habitat considered most suitable for the above listed threatened species, targeted searches were carried out by conducting informal transects (random meanders) covering as much of the vegetation patch as was accessible.

Approximately six hours was spent surveying the study area in order to search for threatened plant species and assess the condition and extent of vegetation communities present in the study area to determine areas for further surveys using BioMetric Vegetation Plots. Additional time was also taken to confirm species and community identifications.

Biometric vegetation plots

BioMetric Vegetation Plots were established in each area/zone of homogenous vegetation type and condition, as defined by the 2014 OEH BioBanking Assessment Methodology (BBAM 2014). The plots were placed using a stratified approach to ensure that all native vegetation types were adequately surveyed. In total, six plots were surveyed within the study area. These vegetation plots were undertaken utilising the methodology presented in BBAM 2014. Each vegetation plot was assigned to a suitable Plant Community Type (PCT), as per the OEH database.

Vegetation plots included:

- 3 vegetation plots were surveyed in areas of Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes.
- 3 vegetation plots were surveyed in areas of Black Box Grassy open woodland wetland of rarely flooded depressions in South Western NSW.

No plots were undertaken in areas of vegetation that were dominated by exotic species. Locations of all vegetation plots have been mapped (Figure 3-9).

Fauna habitat assessment

An assessment of habitat types available and their quality and suitability as threatened species habitat was conducted across the study area. Factors such as arboreal resources, ground-layer resources, vegetation structure, connectivity and disturbance were noted.

All trees within the study area were inspected for hollows. The number, size and occupancy of the hollows, as well as the species, diameter at breast height (dbh) and height of the hollow-bearing trees were all recorded.

Incidental sightings of fauna and their traces (e.g. scats, tracks, scratches) made while present on the site were also recorded.

Approximately six hours were spent assessing fauna habitat within the study area.

Fauna

Approximately six hours were spent surveying for opportunistic sightings of fauna species during the site visits.

4.2.3 Previous surveys conducted in the local area

There were a number of other threatened species of note that were identified in background searches of previous recordings within a 10km radius. These species, their survey results, evidence of suitable habitat in the study area and likely impacts due to the proposal are summarised in Table 4-4.

Table 4-4 Other threatened species of note that were identified in background searches with previous recordings within a 10km radius of the proposal area:

Common name / Status (TSC Act, EPBC Act)	Scientific name	Number of records (OEH)	Suitable habitat within the proposal area	Surveys	Present/presumed present	Affected by the proposal
Superb Parrot/V,V	<i>Polytelis swainsonii</i>	30	Yes	Not detected	Presumed to occur on occasion. Habitat elements that occur onsite are common in the local area.	Unlikely.
Painted Honey Eater / V,V	<i>Grantiella picta</i>	1	Yes	Not detected	Presumed to occur on occasion. Habitat elements that occur onsite are common in the local area.	Unlikely
Grey-crowned Babbler / V, -	<i>Pomatostomus temporalis</i>	7	Yes	Not detected	Presumed to occur on occasion. Habitat elements that occur onsite are common in the local area.	Unlikely
Varied Sitella / V, -	<i>Daphoenositta chrysoptera</i>	1	Yes	Not detected	Presumed to occur on occasion. Habitat elements that occur onsite are common in the local area.	Unlikely
Southern Bell Frog/ V, -	<i>Litoria raniformis</i>	1	Yes	Not detected	Nearest OEH record 2km away in Cypress Pine Woodland.	Unlikely. Irrigation channels will not be impacted.

Weather conditions during the field surveys

Table 4-5 Weather conditions during the field surveys, recorded at Coleambally.

Date	Temperature min (°C)	Temperature max (°C)	Rain (mm)	Max wind speed (km/h)
16/12/16	17.8	31.1	31.4	16
3/3/17	19.0	34.0	0	43
20/3/17	21.7	32.9	0	30

4.2.4 Survey results

Sixty-nine flora species and sixteen fauna species were detected during the surveys. These are provided in Appendix A.

Sixty-nine flora species and sixteen fauna species were detected during the surveys. These are provided in Appendix A.

Of all the species recorded, no flora or fauna species are listed as threatened species, either under NSW or Commonwealth legislation.

Thirty-seven hollow bearing trees were recorded in the proposal area. Of these, five hollow bearing trees will be impacted on in Zone 3. (Figure 4-1). Hollow potentially provide roosting habitat for some species of parrots, owls, microbats and arboreal mammals.

Mossgiel Daisy

The Mossgiel Daisy (*Brachyscome papilosa*) is listed as vulnerable under the TSC and EPBC act. It is recorded primarily on clay soils in Bladder saltbush and leafless bluebush plains but can also occur in grasslands of box woodlands. It flowers June to December however it is a perennial and would be present all year round. Survey times were inadequate for detecting flowers of this species however no evidence of any *Brachyscome* species or similar forbs were present within the BlackBox Woodland. Due to the small area to be impacted it is considered unlikely that this species would have been overlooked if present and **it is presumed highly unlikely that the proposal will cause an adverse impact to this species.**

Grey Falcon

The Grey Falcon (*Falco hypoleucos*), listed as endangered under the TSC Act and EPBC Act, is sparsely distributed in NSW and occurs over a variety of habitats, although wooded water courses, shrubland and grasslands are preferred. Breeding is restricted to arid regions. This species was not recorded in the study area, nor were any potential nests. No records of this species have been recorded within 10km of the study area.

The site is dominated by cropped and pastoral agricultural land that does not provide habitat for this species. Due to there being only marginal potential habitat consisting of small woodland patches (0.66ha to be cleared and 18.6ha of Black Box Woodland remaining in the proposal area), **it is highly unlikely that the proposal will cause an adverse impact to this species**, should it occur.

Black Breasted Buzzard

The Black Breasted Buzzard (*Hamirostra melanosternon*) is listed as vulnerable under the TSC act, is sparsely distributed in NSW and occurs over a variety of habitats although wooded watercourses is the preferred habitat. This species was not recorded in the study area, nor were any potential nests. No records of this species has been recorded within 10km of the study area.

The site is dominated by cropped and pastoral agricultural land that does not provide habitat for this species. Due to there only being a minimal amount of potential habitat (0.66ha to be cleared and 18.6ha of Black Box Woodland remaining) in the proposal area, **it is highly unlikely that the proposal will cause an adverse impact to this species**, should it occur.

Squirrel Glider

The Squirrel Glider (*Petaurus norfolcensis*) is listed as vulnerable under the TSC act. It can inhabit mature box woodlands with an understory of Acacia shrubs and requires abundant tree hollows for nesting and refuge. OEH's distribution map shows it is unlikely to occur in this area and no records of this species have been recorded within 10km of the study area.

The site is dominated by cropped and pastoral agricultural land that does not provide quality habitat for this species. Only a minimal amount of potential habitat (0.66ha) is to be removed. Six hollow bearing trees would be impacted in the Blackbox Woodland with one providing medium to large hollows that could be used by this species. The extent of clearing will be no more than 30metres in width within the corridor of remnant Black Box woodland which will still allow movement for these species along the remaining woodland, should they occur. Targeted surveys were not conducted for this species and so for the BCC it is presumed present.

Slender Darling Pea

The Slender-Darling Pea (*Swainsona murrayana*) was not detected during the surveys. No other *Swainsona* species were recorded during the survey. It is considered unlikely that the species would have been overlooked if present and as such **it is not considered to occur at the development site.**

A Spear Grass

A spear Grass (*Austrostipa wakoolica*) was not detected during the surveys. Plains Grass (*Austrostipa aristiglumis*) is abundant throughout the area and no other species of *Austrostipa* was detected. Due to the small area of impact it is considered unlikely that this species would have been overlooked if present and as such **it is not considered to occur at the development site.**

Chariot Wheels

Chariot Wheels (*Maieana cheelii*) was not detected during the surveys. One common *Maieana* species (*Maieana decalvens*) was detected in flower during the surveys. Due to the small area of impact it is considered unlikely that this species would have been overlooked if present and as such **it is not considered to occur at the development site.**

Lanky Buttons

Lanky Buttons (*Leptorhynchus orientalis*) grows in woodland or grassland often in association with *Acacia pendula* woodland. It was not detected during the surveys, however surveys were not conducted within the optimal survey times as recommended by the BCC. The Biobanking Credit Calculator requires that further targeted surveys are necessary to determine if any offsets are required for this species. **Targeted surveys are recommended to occur within the next flowering season which will be between September and November 2017.**

Bindweed

Bindweed (*Convolvulus tedmoorei*) is a perennial herb that grows in self-mulching grey clay soils on floodplains of the Darling and Murrumbidgee Rivers. It was not detected during the surveys however surveys were not conducted within the optimal survey times as recommended by the BCC. The Biobanking Credit Calculator requires that further targeted surveys are necessary to determine if any offsets are required for this species. **Targeted surveys are recommended to occur within the next flowering season which will be between September and November 2017.**

A Burr Daisy

A Burr Daisy (*Calotis moorei*) is a perennial herb that grows in woodland associated with *Acacia* woodland. It was not detected during the surveys, however surveys were not conducted within the optimal survey times as recommended by the BCC. The Biobanking Credit Calculator requires that further targeted surveys

are necessary to determine if any offsets are required for this species. **Targeted surveys are recommended to occur within the next flowering season which will be between September and November 2017.**

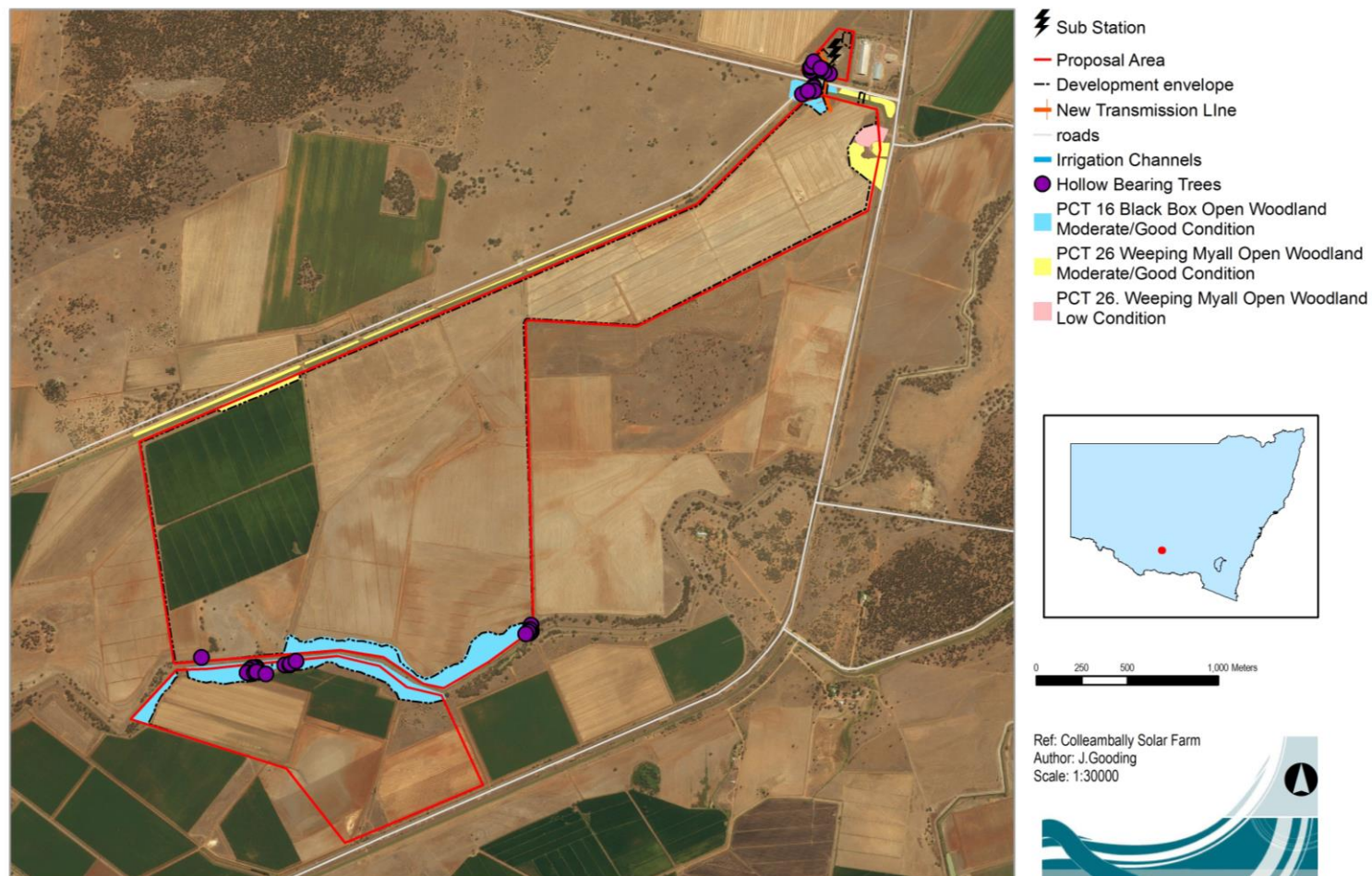


Figure 4-1 Hollow bearing trees within the Proposal Area

4.3 SUMMARY OF ECOSYSTEM CREDIT AND SPECIES CREDIT SPECIES

In summary, applying the information to the BCC assessment, using the BCC landscape assessment data, including the geographic features relevant to the area, vegetation zones and the results of comprehensive and targeted surveys:

- Eighteen ecosystem species credit species are relevant to the project. All of these are fauna species.
- Eight species credit species are relevant to the project. These include seven flora species and one fauna species.

These are listed in the table below. No additional threatened species were detected onsite or have been added to the calculator.

Table 4-6 Final list of ecosystem credit and species credit species

Species returned by the BCC	Recorded within development footprint	Ecosystem credit species	Species credit species
Flora			
Winged Peppercress <i>Lepidium monolocoides</i>	No	No	No
Menindee Nightshade <i>Solanum karsense</i>	No	No	No
Mossgiel Daisy <i>Brachyscome papillosa</i>	No	No	No
A Burr-Daisy (<i>Calotis moorei</i>)	No	No	Yes
Bindweed (<i>Convolvulus tedmoorei</i>)	No	No	Yes
Lanky Buttons (<i>Leptorhynchus orientalis</i>)	No	No	Yes
Fauna			
Australian Bustard <i>Ardeotis australis</i>	No	No	No
Grey Falcon <i>Falco hypoleucos</i>	No	No	No
Barking Owl <i>Ninox connivens</i>	No	Yes	No
Brolga <i>Grus rubicunda</i>	No	Yes	No
Bush Stone Curlew <i>Burhinus grallarius</i>	No	Yes	No
Diamond Firetail <i>stagonopleura guttata</i>	No	Yes	No
Grey-crowned Babbler <i>Pomatostomus temporalis ssp temporalis</i>	No	Yes	No
Hooded Robin <i>Melanodryas cucullate ssp culcullata</i>	No	Yes	No
Little Eagle <i>Hieraetus morphnoides</i>	No	Yes	No
Little Pied Bat <i>Chalinolobbus picatus</i>	No	Yes	No

Species returned by the BCC	Recorded within development footprint	Ecosystem credit species	Species credit species
Magpie Goose <i>Anseranas semipalmata</i>	No	Yes	No
Major Mitchells Cockatoo <i>Lophochroa leadbeateri</i>	No	Yes	No
Masked Owl <i>Tyto novaehollandiae</i>	No	Yes	No
Painted Honeyeater <i>Grantiella picta</i>	No	Yes	No
Pied Honeyeater <i>Certhionyx variegatus</i>	No	Yes	No
Regent Parrot (eastern subspecies) <i>Polytelis anthopeplus ssp monarchoides</i>	No	Yes	No
Spotted Harrier <i>Circus assimilis</i>	No	Yes	No
Square-tailed Kite <i>Lophocinia isura</i>	No	Yes	No
Squirrel Glider <i>Petaurus norfolcensis</i>	No	No	Yes
Varied Sittella <i>Daphoenositta chrysoptera</i>	No	Yes	No

5 EPBC MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on the 12 December 2016 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to Appendix E). Relevant to Biodiversity these include:

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

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

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

Four wetlands of international importance were returned from the protected matters report. All these wetlands are over 300km away and are not connected to the proposal site. The nearest of these is the Hattah-kulkyne lakes. None would be affected by the development.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Four threatened ecological communities were returned from the protected matters report. One of these, the Weeping Myall Woodlands EEC occurs in the proposal site but will not be impacted by the development.

5.3 THREATENED SPECIES

Sixteen threatened species were returned from the protected matters report. Of these, two are considered to have the potential to utilise the habitats at the development site:

- Superb Parrot (*Polytelis swainsonii*) – Vulnerable EPBC Act
- Painted Honeyeater (*Grantiella picta*) – Vulnerable EPBC Act

These species are included in Section 4.2.2. Neither were detected on the proposal site which is dominated by cropped and pastoral agricultural land that does not provide habitat for this species. While they are presumed to occur on occasion, habitat elements that occur onsite are common in the local area. **It is highly unlikely that the proposal will cause an adverse impact to these species, should they occur.**

5.4 MIGRATORY SPECIES

Six listed migratory species were returned from the protected matters report. These are:

Name	Scientific Name	Impact?
Fork-tailed Swift	<i>Apus pacificus</i>	Unlikely
Yellow Wagtail	<i>Motacilla flava</i>	Unlikely
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	Unlikely
Curlew Sandpiper	<i>Calidris ferruginea</i>	Unlikely
Latham's Snipe	<i>Gallinago hardwickii</i>	Unlikely
Eastern Curlew	<i>Numenius madagascariensis</i>	Unlikely

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 DIRECT IMPACTS

6.1.1 Site selection and planning phase

A preliminary constraints analysis was conducted by NGH Environmental (2016) which informed the site layout design. Vegetation constituting the highest ecological constraints such as forming components of EECs and providing threatened flora and fauna habitat were identified to be avoided as far as particular, with the net outcome being an impact of only 0.74ha of native vegetation removal out of a total development site of approximately 570ha (Approximately <0.05%).

Most areas of EEC in the study area have been avoided through the design process with an aim for avoiding offsets. These areas include the patches of Weeping Myall Woodland (EEC-TSC & EPBC Act) within the proposed site boundary, as well as the majority of the Black Box Woodland along the irrigation drain which will be retained on-site. This, in turn would also minimise impacts to threatened species predicted to occur in the study area through the BCC (Section 4.1).

Residual impacts are discussed below for construction and operation phases of the proposal.

6.1.2 Construction phase

The construction phase of the project can have a number of direct impacts on biodiversity values. Direct impacts are as follows:

Impact	Frequency	Intensity	Duration	Consequence
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, compound sites, stockpile sites, access tracks & transmission line)	Regular	High	Construction phase	• Direct loss of native flora and fauna habitat • Potential over clearing of habitat outside of the development footprint. • Injury and mortality to fauna during clearing of fauna habitat and habitat trees. • Disturbance to fallen timber, dead wood and bush rock

A range of mitigation measures would be implemented to ensure that impacts on biodiversity during the construction phase are avoided where possible, and minimised where they cannot be avoided. The mitigation measures that would be employed during the construction phase are provided in Table 6-1

Table 6-1 Measures proposed to avoid and minimise direct impacts of the project during the construction phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
Habitat clearance for permanent and temporary construction facilities	Direct loss of native flora and fauna habitat	- Develop and implement a construction Flora and Fauna Management Plan (FFMP) for incorporation of construction related environmental management safeguards. A 'Clearing and Grubbing Plan' will be developed to; - include best practice methods for the removal of woody vegetation and non-woody vegetation. - Trees will be removed in such a way as not to cause damage to surrounding vegetation. Root systems of trees and shrubs to be removed will be retained in-ground to ensure surrounding ground layer vegetation is undisturbed and to prevent soil erosion. - Require that where work cannot avoid encroaching into the TPZ, it not impinge on the structural root zones (SRZ) of trees to be retained. Details for calculating the SRZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>. - Where possible, trees to be removed will be mulched on-site and re-used to stabilise disturbed areas. - Tree clearing protocol, that includes staged habitat removal, and a requirement for an ecologist being present during tree-felling of all hollow-bearing trees to ensure that any potential impacts on fauna are minimised	Pre-construction phase Construction phase Post-construction phase	Minimise the impacts of habitat removal on native flora and fauna	Neoen Contractor

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
	Potential over clearing and/or damage of habitat outside of the development footprint.	- Prior to the commencement of work, a physical vegetation clearing boundary at the approved clearing limit is to be clearly demarcated and implemented. This will include environmentally sensitive areas such as EECs. The delineation of such a boundary may include the use of temporary fencing, flagging tape, parawebbing or similar. - Clearing and construction contractors would be given inductions that make clear the importance of the sensitive area habitat and its species. - Where trees are to be retained, an adequate tree protection zone (TPZ) will be provided around each tree for the duration of construction. Details for calculating TPZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>.	Construction phase	Prevention of over-clearing	Contractor
	Injury and mortality to fauna during clearing of fauna habitat and habitat trees	- A pre-clearing process will be implemented before clearing begins. Pre-clearing surveys will be carried out by an ecologist and will include general fauna surveys, general tree hollow inspections and dam/waterway inspections. Habitat trees will be clearly marked with flagging tape. - When programming the works, consider breeding periods of fauna that may be impacted (<i>eg If hollow-dependent fauna are found breeding in tree hollows to be cleared, consider avoiding works in these locations until the breeding season has finished</i>). - An unexpected threatened species finds procedure will be developed before clearing commences.	Construction phase	Prevent and minimise the risk of injury and mortality to fauna Minimise displacement of fauna	Contractor

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
	Disturbance to fallen timber, dead wood and bush rock	Any fallen timber, dead wood and bush rock (if present) encountered on site will be left in situ or relocated to a suitable place outside the construction area nearby. Rock will be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Construction phase	Minimise loss and/or damage to native flora and fauna habitats	Contractor
	Introduction and spread of noxious weeds and pathogens	A Weed Management Plan would be developed for the proposal to prevent/minimise the spread of weeds. This would include: - Management protocol for declared noxious weeds as stipulated by the <i>Noxious Weeds Act 1993</i> during and post construction - A protocol for weed hygiene in relation to plant, machinery and importation and management of fill - Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated and reported.	Construction phase	Prevent spread of Noxious Weeds and pathogens	Contractor

6.1.3 Operational phase

The operational phase of the project can have a number of direct impacts on biodiversity values. Direct impacts are as follows:

Impact	Frequency	Intensity	Duration	Consequence
Existence of new and permanent solar infrastructure	Constant	Moderate	Operational phase	• Permanent removal of flora and fauna habitat • Collision risk to birds and microbats to exterior barbed-wire fencing
Inappropriate landscaping	Constant	Moderate	Operational phase	• Reduction in the quality of habitat for native flora and fauna species

Measures to avoid and minimise impacts that may occur during the operational phase would be implemented as part of the project. Where practical, measures to avoid impacts on biodiversity during operation have been identified. Where impacts are unavoidable measures to minimise impacts would be implemented. Table 6-2 outlines the mitigation measures that would be implemented during operation, or to ensure the operational phase avoids and minimises impacts on biodiversity to the greatest extent possible.

Section 7 outlines the requirements for biodiversity offsets for those impacts that cannot be avoided as a result of the project.

Table 6-2 Measures proposed to avoid and minimise direct impacts of the project during the operational phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
Existence of permanent solar infrastructure	Collision risks to birds and microbats on solar infrastructure and barbed wire fencing	Use of reflective power line marking balls on any overhead transmission lines if required by authorities	Operational phase	Minimise impacts to fauna and flora as a result of infrastructure	Operator
Inappropriate landscaping	Reduction in the quality of habitat for native flora and fauna species	Any onsite landscape plantings (such as to address visual impacts) will be comprised of local indigenous species (such as <i>A. pendula</i>) with the object of increasing the structure of the existing vegetation. Planting locations would be designed to improve the connectivity between patches in the landscape where consistent with landscaping outcomes and the solar farm operation.	Operational phase	Increase/improve native species diversity and connectivity	Operator

6.2 INDIRECT IMPACTS

Vegetation and habitat removal are considered *direct impacts* of the project.

Indirect impacts could occur as a consequence of the proposal, and can include impacts such as soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. A number of indirect impacts to biodiversity during construction and operation have been identified below.

6.2.1 Site selection and planning phase

During the design phase of the proposal the layout of the solar farm was refined to avoid as much vegetation clearing as possible. This, in turn, minimises potential indirect impacts resulting from the clearing. This is consistent with the principles of avoiding and minimising biodiversity impacts, as outlined under the FBA.

6.2.2 Construction phase

Indirect impacts on biodiversity values during the construction phase of the proposal are outlined in the table below. Measures to avoid and minimise these impacts are detailed in Table 6-3

Impact	Frequency	Intensity	Duration	Consequence
Accidental spills and contamination from construction activities (including compound sites)	Rare	Moderate	Construction phase	Pollution of waterways
Earthworks	Regular	Moderate	Construction phase	Erosion and sedimentation of waterways
Noise	Regular	Low	Construction phase	Construction machinery and activities may disturb local fauna
Dust generation	Regular	Low	Construction phase	Inhibit the function of plant species and communities, waterways
Light spills during night works	Rare	Low	Construction phase	Night works may alter fauna activities/movements
Increased vehicle traffic	Regular	Low	Construction phase	Increase potential for fauna mortality through vehicle strike
General construction activities	Regular	Moderate	Construction phase	Feral pest, weed and/or pathogen encroachment

Table 6-3 Measures proposed to avoid and minimise indirect impacts of the project during the construction phase

Impact	Measures to be implemented	Timing	Outcome	Responsibility
Accidental spills and contamination from construction activities	- Carry out refuelling of plant and equipment, chemical storage and decanting at least 50 m away from aquatic habitats in impervious bunds. - Ensure that dry and wet spill kits are readily available.	Construction phase	Prevent/minimise pollution of ephemeral waterways and dams, and sensitive adjacent habitat.	Contractor
Earthworks	An erosion sediment and control plan must be prepared and implemented.	Construction phase	Prevent/minimise erosion and sedimentation of ephemeral waterways and dams, and sensitive adjacent habitat.	Contractor
Dust generation	The Construction phase would include measures to prevent dust spreading to nearby ephemeral drainage lines or dams.	Construction phase	Prevent dust inhibiting the function of plant species and communities ephemeral waterways and dams.	Contractor
Light spill	If night work is unavoidable, ensure lights are directed away from wildlife or habitat corridor (native vegetation).	Construction phase	Prevent disturbance to local fauna utilising native vegetation.	Contractor
Increased vehicle traffic	Awareness training during site inductions, enforcement of site speed limits.	Operational phase	Minimise fauna strikes	
General construction activities	Weed and hygiene protocols will be prepared and implemented.	Construction phase	Prevent feral pest, weed and/or pathogen encroachment into vegetation adjoining study area.	Neoen Contractor

6.2.3 Operational phase

Indirect impacts on biodiversity values during the operational phase of the proposal are outlined in Table 6-4 below. Measures to avoid and minimise these impacts are detailed in Table 6-5.

Table 6-4 Indirect impact on biodiversity during the operational phase.

Impact	Frequency	Intensity	Duration	Consequence
Weed encroachment	Regular	Moderate	Operational phase	Ingress of weeds along the boundary of the development
Increased vehicle traffic	Regular	Low	Operational phase	Increase potential for fauna mortality through vehicle strike
Perimeter fencing creating a barrier to fauna movement	Regular	Moderate	Operational phase	Alter movement of fauna through the landscape, potentially channelling onto roads.

Table 6-5 Measures proposed to avoid and minimise indirect impacts of the proposal during the operational phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
Weed encroachment	Ingress of weeds along the boundary of the study area	Weed and planting protocols will be prepared and implemented.	Operational phase	Prevent spread of weeds	Operator
Increased Vehicle Traffic	Increase potential for fauna mortality through vehicle strike	Awareness training during site inductions regarding enforcing site speed limits.	Operational phase	Minimise fauna strikes	Operator

6.3 CUMULATIVE IMPACTS

The clearing of native vegetation, which is a key threatening process at both State and Commonwealth level, is considered a major factor in the loss of biological diversity. At least 61 per cent of the native vegetation in NSW has been cleared or highly modified since European settlement (NSW Scientific Committee 2001), and the removal of vegetation for this proposal is contributing to this process. The cumulative impact of similar solar energy projects, which impact on large areas of land, can be considerable given that many poorly-conserved vegetation communities have a substantial portion of their extents represented on private land.

For this project, all EEC impacts (impacts on poorly conserved vegetation communities) have been avoided. The amount of common native vegetation to be removed (0.74 ha) is relatively minor compared to the size of the development. It contains no important habitat features such as nests or hollows. The vast majority of the development envelope (95%) is located within existing highly modified and exotic dominated vegetation and is therefore considered appropriately located to minimise cumulative impacts of solar farm development in regional areas.

7 IMPACT SUMMARY

7.1 AREAS NOT REQUIRING ASSESSMENT

Areas within the development footprint without native vegetation or aquatic features do not need to be assessed further. They include treeless paddock areas with an understory of exotic plants and cropping areas. Furthermore, areas without any vegetation such as roads, existing infrastructure and other developments do not require further assessment (Figure 3-7). The total area of land within the study area not requiring further assessment is approximately 255ha.

7.2 AREAS REQUIRING AN OFFSET

7.2.1 Impacts on native vegetation

Offsets are not required where the project would impact on PCTs that:

- Have a site value score of <17 and are not identified as CEEC or EEC.
- Are not associated with threatened species habitat and are not identified as CEEC or EEC

All native vegetation within the development footprint has a site value score of >17.

Two vegetation communities would be impacted:

- 0.66 ha of Blackbox Grassy Open Woodland of rarely flooded depressions in South Western NSW
- 0.08ha of Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (EEC)

Under the FBA non EEC vegetation (0.66 ha) of Black Box Grassy open woodland does not require offsetting if it does not provide threatened species habitat.

Weeping Myall Open Woodland is listed as an EEC and would require offsetting.

Table 7-1 Extent of vegetation communities within the development footprint and the estimated loss of those communities from the development footprint.

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	Plot Id	Biometric vegetation condition	Site value score	Extent of vegetation (ha) impacted in development envelope	Extent of Vegetation (ha) in proposal site
Black Box Grassy Open Woodland wetland of rarely flooded depressions in south western NSW (PCT 16)	No	Blackbox 1	Moderate – good	42.00	0.20	9.12
Black Box Grassy Open Woodland wetland of rarely	No	Blackbox 2	Moderate - good	37.33	0.16	3.2

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	Plot Id	Biometric vegetation condition	Site value score	Extent of vegetation (ha) impacted in development envelope	Extent of Vegetation (ha) in proposal site
flooded depressions in south western NSW (PCT 16)						
Black Box Grassy Open Woodland wetland of rarely flooded depressions in south western NSW (PCT 16)	No	Blackbox 3	Moderate to Good	70.67	0.30	9.81
Weeping Myall open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Yes	Myall 1	Moderate to Good	31.33	0.084	1.23
				TOTAL	0.74	23.36

7.2.2 Impacts on species and populations

Offsets are not required where the project:

- Impacts on non-threatened species and populations that do not form part of a CEEC or EEC
- Impacts on threatened species habitat associated with a PCT within a vegetation zone with a site value score of <17

Non-threatened species or populations do not form part of the offset requirement.

As discussed in Section 4.2.1, four threatened species are presumed to occur until such time as appropriate timed surveys can be completed and the surveys confirm that the species are not likely to occur. Targeted surveys are recommended to occur within the next flowering season which will be between September and November 2017. Three of these species, A Burr-daisy (*Calotis moorei*), Bindweed (*Convolvulus tedmoorei*) and Lanky Buttons (*Leptorhynchos orientalis*) are species credit species associated with Weeping Myall Open Woodland.

The Squirrel Glider (*Petaurus norfolcensis*) is a species credit species associated with hollow bearing trees in Zone 3 of the Black Box Grassy Open Woodland. Credits are generated for this species, unless appropriate timed surveys find the species does not occur onsite. Should it occur, the Black Box Grassy Open Woodland wetland of rarely flooded depressions in south western NSW (PCT 16) would be classed as threatened species habitat and would also require offsets.

As discussed in Table 4-2, no other threatened species are considered to be affected by the proposal.

7.3 IMPACTS REQUIRING FURTHER CONSIDERATION

7.3.1 Impacts on landscape features

Impacts reducing width of riparian buffer of important rivers, streams and estuaries

Further consideration is required where the project would impact on areas of native vegetation within:

- a) 20 m either side of a 4th and 5th order stream;
- b) 50 m either side of a 6th order stream;
- c) 50 m around an estuarine area.

No 4th, 5th or 6th order streams, or estuarine areas will be impacted by the proposal.

Impacts on important wetlands

Further consideration is required where the proposal would impact on an important wetland and/or its buffer distance of 50 m. Important wetlands are those identified as SEPP 14 Coastal wetlands or those listed in the Directory of Important Wetlands of Australia (DIWA). There are no important wetlands listed for the study area. The project would not impact on any important wetlands, nor on the buffer area of any important wetland, therefore, further consideration is not required.

Impacts on species movements along corridors

No state significant biodiversity links as defined by the FBA occur within the study area, therefore the proposal does not trigger the requirement for further consideration to impacts on species movement along corridors.

7.3.2 Impacts on native vegetation

Further consideration is required where there will be impacts to native vegetation that are likely to cause the extinction of an EEC/CEEC from an IBRA subregion or significantly reduce its viability. No CEECs or EECs would be impacted by the proposal. No further consideration of impacts on native vegetation is required.

7.3.3 Impacts on threatened species

Endangered Ecological Communities

MYALL WOODLAND IN THE DARLING RIVERINE PLAIN, BRIGALOW BELT SOUTH, COBAR PENEPLAIN, MURRAY DARLING DEPRESSION, RIVERINA AND NSW SOUTH WESTERN SLOPES BIOREGION.

5.03ha of this community was detected in the proposal area. Only 0.08ha of this community will be impacted on in the proposal area through the construction of an access road. No Weeping Myall trees would be removed. As discussed in section 7.4 two ecosystem credits are required to be offset for this impact.

INLAND GREY BOX WOODLAND IN THE RIVERINA, NSW SOUTH WESTERN SLOPES, COBAR PENEPLAIN, NANDEWAR AND BRIGALOW BELT SOUTH BIOREGIONS.

This Community was not detected in the proposal area and will not be impacted by the proposal.

Flora

Mossgiel Daisy (*Brachyscome papillosa*), Bindweed (*Convolvulus tedmoorei*), Winged Peppergrass (*Lepidium monophloeoides*), Chariot Wheels (*Maireana cheelii*), Austral Pillwort (*Pilularia novae-hollandiae*), Slender Darling Pea (*Swainsona murrayana*).

These species are discussed in section 4.1 and section 4.2.

Fauna

MAJOR MITCHELL'S COCKATOO (*LOPHROCHROA LEADBEATERI*) – NEST TREES ONLY, SUPERB PARROT (*POLYTELIS SWAINSONII*) – NEST TREES ONLY, BARKING OWL (*NINOX CONNIVENS*) – NEST TREES ONLY

None of these species were observed in the proposal area. Records of Supurb Parrots have been sighted along the Kidman Way within 1km from the site. The Major Mitchell's Cockatoo has been recorded over 30km away and the nearest Barking Owl record is 80km away. Seven hollow bearing trees were detected in the proposal area. These were detected in approximately 4 ha of Black Box Woodland surveyed. Of these, five hollow bearing trees would be removed in Zone 3. Another 18 ha of Black Box Woodland occurs in the proposal area that would not be impacted and likely to carry the same density of hollow bearing trees. Due to the highly mobile nature of these species and the abundance of similar habitat, **it is highly unlikely that the proposal will cause an adverse impact to these species**, should they occur.

SPOTTED HARRIER (*CIRCUS ASSIMILIS*) – NEST TREES ONLY, GREY FALCON (*FALCO HYPOLEUCOS*) – NEST TREES ONLY, BLACK FALCON (*FALCO SUBNIGER*) – NEST TREES ONLY, SQUARE-TAILED KITE (*LOPOICTINIA ISURA*) – NEST TREES ONLY

No stick nests were observed in trees and no dead trees were observed along watercourses. Due to the large territories and wide ranging nature of these species it is unlikely the removal of 0.74ha of Woodland would cause an adverse impact to these species.

7.3.4 Impacts on critical habitat

The proposal area does not contain any areas that have been declared as critical habitat under either the TSC Act or EPBC Act.

7.4 ECOSYSTEMS AND SPECIES CREDITS

A total of 25 ecosystem credits and 8357 species credits have been generated for the development site (BCC Major Project 144/2017/4276D Version 1). The BCC full credit report is provided in Appendix C.

Ecosystem credits

Ecosystem credits are generated for the following Plant Community Types:

- PCT 26 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion) – **23 Credits**
- PCT 16 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion – **2 credits**

Full details are provided in Table 7-2 below. It is noted that Black Box grassy open woodland wetland is considered threatened species habitat and therefore will require offsets, unless it is demonstrated these species do not occur (see section below). Table 2-1

Table 7-2 Ecosystem Credits

Zone	Plant community type	Management zone area (ha)	Loss in Landscape Value	Loss in site value score	EEC Offset Multiplier	Credits required for Threatened species	Threatened Species with highest credit requirements	TS offset multiplier	Ecosystem credits required
1	PCT # 26 – Black Box grassy open woodland wetland	0.20	0	42.00	1	5	Australian Bustard	2.6	5
2	PCT # 26 – Black Box grassy open woodland wetland	0.16	0	32.00	1	4	Masked Owl	3.0	4
3	PCT # 26 – Black Box grassy open woodland wetland	0.30	0	70.67	1	14	Australian Bustard	2.6	14
4	PCT #16 – Weeping Myall open woodland	0.08	0	31.33	3	2	Australian Bustard	2.6	2

Species credits

Unless it is demonstrated these species do not occur, species credits are required for the following species as shown in Table 7-3.

Table 7-3 Species credit species

Scientific name	Common name	TS multiplier	offset Species credits required
<i>Calotis moorei</i>	A burr-daisy	7.7	3850
<i>Convolvulus tedmoorei</i>	Bindweed	7.7	3850
<i>Leptorhynchos orientalis</i>	Lanky Buttons	1.3	650
<i>Petaurus norfolcensis</i>	Squirrel Glider	2.2	7

As discussed in Section 4.2.1, these species are presumed to occur until such time as appropriate timed surveys can be completed in September – November 2017. Credits are generated for this species, unless appropriate timed surveys find the species does not occur onsite.

If these species are not present then non EEC vegetation (0.66 ha of Black Box Grassy open woodland) does not require offsetting as it does not provide threatened species habitat.

8 CONCLUSION

NGH Environmental has prepared this BAR on behalf of Neoen for the proposed Coleambally Solar Farm, Coleambally NSW. The purpose of this BAR was to address the requirements of the FBA, developed for Major Projects, and to address the biodiversity matters raised in the SEARs. In this BAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the requirements in Appendix 4 of the FBA
- Mitigation measures which have been outline in Table 6-1, Table 6-2 and Table 6-5 to reduce the impacts to biodiversity
- The generation of 25 ecosystem credits within the development site, and 8357 species credits which will need to be offset

Once final threatened species suveys have been completed, a Biodiversity Offset Strategy (BOS) is required to be developed and implemented as part of the approval of the proposal unless these impacts can be avoided.

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

- (a) acquiring or retiring credits under the BioBanking scheme in the TSC Act;
- (b) making payments into an offset fund that has been established by the NSW Government;
- or
- (c) providing suitable supplementary measures.

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APPENDIX A SPECIES LIST

A.1 FLORA SPECIES LIST

Scientific name	Common name	Family	Weeping Myall BM Plot 1		Weeping Myall BM Plot 2		Weeping Myall BM Plot 3		Blackbox Woodland BM Plot 1		Black Box Woodland BM Plot 2		Black Box Woodland BM Plot 2		Weeping Myall RM	Black Box 1 RM	Black Box 2 RM	Exotic Veg RM
			% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indi.	Present	Present	Present	Present
Trees																		
Acacia pendula	Weeping Myall	Fabaceae	2	1	1	2								*				
Acacia implexa	Hickory Wattle	Fabaceae															*	
Eucalyptus largiflorens	Black Box	Myrtaceae							5.9	7	4.7		13	7		*	*	
Shrubs																		
Atriplex semibaccata	Creeping Saltbush	Chenopodiaceae	3	30	2	20	5	30	5	2			5	80	*	*	*	
Acacia pendula	Weeping Myall	Fabaceae					0.5	2						*				
Amyema quandang var quandang.	Mistletoe	Lornathaceae												*				
Einadia hastata	Berry Saltbush	Chenopoidaceae												*	*		*	
Einadia nutans subsp. nutans	Climbing Saltbush	Chenopodiaceae	1	3							1	10	4	20	*	*		
Enchylaena tomentosa	Ruby Saltbush	Chenopodiaceae	1	10	5	30	8	80			2	20	10	80		*		
*Lycium ferocissimum	*African Boxthorn	Solanaceae												*				
Maireana decalvens	Black Cottonbush	Chenopodiaceae	1	4			1	5			1	3	4	20				
Rhagodia spinescens	Spiny Saltbush	Chenopodiaceae																
Salsola australis	Prickly Saltwort	Chenopodiaceae	1	2	0.5	3							1	5				

Scientific name	Common name	Family	Weeping Myall BM Plot 1		Weeping Myall BM Plot 2		Weeping Myall BM Plot 3		Blackbox Woodland BM Plot 1		Black Box Woodland BM Plot 2		Black Box Woodland BM Plot 2		Weeping Myall RM	Black Box 1 RM	Black Box 2 RM	Exotic Veg RM
			% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indi.	Present	Present	Present	Present
<i>Sclerolaean birchii</i>	Galvanised Burr						2	20									*	
<i>Sclerolaena decurrens</i>	Green Copper Burr	Chenopodiaceae													*	*		
<i>Sclerolaena muricata</i>	Black Rolypoly	Chenopodiaceae	1	10	0.5	1					5	6			*	*		
Forbs																		
<i>Boerhavia dominii</i>	Tarvine	Nyctaginaceae	0.5	1					0.5	3	1	15						
<i>*Cirsium vulgare</i>	Spear Thistle	Asteraceae	0.5	1					0.5	5								*
<i>Chamaesyce drummondii</i>	Caustic Weed	Euphorbiaceae	0.5	4			0.5	1										
<i>Convolvulus sp.</i>	Bindweed	Convolvulaceae	0.1	1														
<i>*Helminthotheca echinoides</i>	Ox-Tongue	Asteraceae	4	20														
<i>*Heliotropium europeum</i>	Common Heliotrope	Boraginaceae	0.5	3														
<i>Hibiscus trinonium</i>	Flour-of-an-hour	Malvaceae									0.5	2						
<i>*Lactuca serriola</i>	Prickly Lettuce	Asteraceae	15	500	1	10			5	100	1	50	2	50	*	*		*
<i>Leiocarpa tomentosa</i>	Woolly Plover Daisy	Asteraceae	1	30	1	10									*			
<i>*Lepidium africanum</i>	Common Peppergrass	Brassicaceae	0.5	10													*	
<i>Malva sp.</i>		Malvaceae									1	5						
<i>Malva preissiana</i>	Native Hollyhock	Malvaceae													*			
<i>Marsilea drummondii</i>	Common Nardoo	Marsileaceae															*	
<i>*Marubium vulgare</i>	Horehound	Lamiaceae	1	5					1	10	1	20	1	5	*	*		

Scientific name	Common name	Family	Weeping Myall BM Plot 1		Weeping Myall BM Plot 2		Weeping Myall BM Plot 3		Blackbox Woodland BM Plot 1		Black Box Woodland BM Plot 2		Black Box Woodland BM Plot 2		Weeping Myall RM	Black Box 1 RM	Black Box 2 RM	Exotic Veg RM
			% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indi.	Present	Present	Present	Present
<i>*Medicago sativa</i>	Lucerne	Fabaceae													*			
<i>Ptilotus nobilis ssp. semilanatus</i>	Lambs Tails	Asteraceae													*			
<i>Sida cunninghamia</i>	Ridged Sida	Malvaceae	2	50	1	20					2	8	2	20		*		
<i>Sida corrugata</i>	Corrugated Sida	Malvaceae	1	10											*			
<i>*Silybum marianum</i>	Variegated Thistle	Asteraceae									1	10						*
<i>Solanum esuriale</i>	Quena	Solanaceae	2	30			3	20			40	1000			*			
<i>*Sonchus oleraceus</i>	*Milk Thistle	Astereaceae													*			*
<i>*Trifolium arvense</i>	*Haresfoot Clover	Fabaceae	1	20														
<i>Vittadinia cuneata</i>	A Fuzzweed	Asteraceae	1	4			2	20	1	3			1	10				
<i>*Xanthium spinosum</i>	*Bathurst Burr	Asteraceae															*	*
<i>Zaleya galericulata</i>	Hogweed	Aizoaceae									0.5	1						
Grasses																		
<i>Austrostipa aristiglumis</i>	Plains Grass	Poaceae	10	80	30	1000	40	1000	1	6	0.5	1	1	10	*			*
<i>Austrostipa sp</i>	Speargrass	Poaceae			5	50										*		
<i>*Avena spp.</i>	Wild Oats	Poaceae	60	1000	40	2000	40	1000	80	1000	50	1000	10	200	*			
<i>*Bromus catharticus</i>	*Prairie Grass	Poaceae													*	*		
<i>*Bromus diandrus</i>	Great Brome	Poaceae	2	40					3	100								
<i>*Brassica sp.</i>	Wild Mustard	Brassicaceae											5	300				*
<i>Bothriochloa macra</i>	Red Grass	Poaceae															*	
<i>*Chenopodium album</i>	Fat Hen	Chenopodiaceae																*

Scientific name	Common name	Family	Weeping Myall BM Plot 1		Weeping Myall BM Plot 2		Weeping Myall BM Plot 3		Blackbox Woodland BM Plot 1		Black Box Woodland BM Plot 2		Black Box Woodland BM Plot 2		Weeping Myall RM	Black Box 1 RM	Black Box 2 RM	Exotic Veg RM
			% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indi.	Present	Present	Present	Present
<i>Chloris truncate</i>	Windmill Grass	Poaceae														*		
<i>*Cirsium vulgare</i>	Spear Thistle	Astereaceae															*	
<i>*Conyza sp.</i>	Fleabane	Astereaceae															*	
<i>Cynodon dactylon</i>	Couch	Poaceae														*		
<i>*Echium plantagineum</i>	Pattersons Curse	Boraginaceae															*	
<i>Elymus scaber</i>	Native Wheat	Poaceae							1	10								
<i>Enteropogon acicularis</i>	Curly Windmill Grass	Poaceae	10	80					2	30								
<i>Eragrostic sp.</i>	Love Grass	Poaceae													*			
<i>*Heliotropium europaeum</i>	*Common Heliotrop	Boraginaceae															*	
<i>*Hordeum leporinum</i>	*Barley Grass	Poaceae							1	30						*		
<i>*Lolium sp.</i>	*Rye Grass	Poaceae											10	300		*		
<i>*Paspalum sp.</i>		Poaceae	1	10														
<i>*Paspalum dilatatum</i>	Paspalum	Poaceae							1	10								
<i>Panicum effusum</i>	Hairy Panic	Poaceae	10	100					5	30				*	*			
<i>*Phalaris aquatica</i>	Phalaris	Poaceae							3	20								
<i>Rytidosperma sp.</i>	A Wallaby Grass	Poaceae			10	200			1	5			5	50	*			
<i>*Silybum marianum</i>	*Variegated Thistle	Astereacea															*	
<i>*Sonchus oleraceus</i>	*Milk Thistle	Astereceae															*	
<i>*Triticum aestivum</i>	*Common Wheat	Poaceae															*	
<i>*Vulpia bromoides</i>	*Silver Grass	Poaceae														*		

Scientific name	Common name	Family	Weeping Myall BM Plot 1		Weeping Myall BM Plot 2		Weeping Myall BM Plot 3		Blackbox Woodland BM Plot 1		Black Box Woodland BM Plot 2		Black Box Woodland BM Plot 2		Weeping Myall RM	Black Box 1 RM	Black Box 2 RM	Exotic Veg RM
			% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indiv.	% cover	# indi.	Present	Present	Present	Present
Graminoids																		
<i>Lomandra sp.</i>	Mat Rush	Lomandraceae	1	5														

A.2 FAUNA SPECIES LIST

Class	Scientific Name	Common Name	Status (TSC/EPBC)	Number	Location	Observation Type
Amphibia						
	<i>Crinia signifera</i>	Common Eastern Froglet		-	Weeping Myall	Heard
Aves						
	<i>Gymnorhiza tibicen</i>	Australian Magpie		5+	All	Observed/Heard
	<i>Falco subniger</i>	Black Falcon	Vulnerable - TSC Act	1	Black Box	Observed
	<i>Manorina melanocephala</i>	Noisy Miner		4	Black Box	Observed
	<i>Platycercus eximius</i>	Eastern Rosella		2	Black Box	Observed
	<i>Elanus caeruleus</i>	Black-shouldered Kite		5	Woodland	Observed
	<i>Milvus migrans</i>	Black Kite		15	Weeping Myall	Observed
	<i>Grallina cyanoleuca</i>	Australian Magpie Lark		2	Cropping Areas	Observed
	<i>Dicaeum hirundinaceum</i>	Mistletoe Bird		2	Weeping Myall - nesting	Observed
	<i>Podargus strigoides</i>	Tawny Frogmouth		1	Weeping Myall	Observed
	<i>Threskiornis spinicollis</i>	Staw-necked Ibis		1	Black Box	Observed
	<i>Taeniopygia guttate</i>	Zebra Finch		10	Woodland	Observed
	<i>Corvus coronoides</i>	Australian Raven		20	Cropping Paddock	Observed
	<i>Lichmera indistincta</i>	Brown Honey Eater		2	Weeping Myall	Observed
	<i>Dromaius novaehollandiae</i>	Emu		3	Black Box	Observed
	<i>Egretta novaehollandiae</i>	White Faced Heron		1	Transgrid substation	Observed
					Irrigation Channel	Observed

APPENDIX B HOLLOW BEARING TREE DATA

ID	X coordinate	Y coordinate	Species	Height (m)	DBH (cm)	Number of Hollows		
						Small	Med	Large
HBT1	-35.107518	147.370561	<i>E. largiflorens</i>	10	50	1		
HBT2	-34.771535	145.919142	<i>E. largiflorens</i>	8	60	1		
HBT3	-34.77146	145.91802	<i>E. largiflorens</i>	12	50	1		
HBT4	-34.771445	145.918449	<i>E. largiflorens</i>	10	60	1		
HBT5	-34.771418	145.918583	<i>E. largiflorens</i>	12	70	1	1	
HBT6	-34.771318	145.918143	<i>E. largiflorens</i>	12	60	1		
HBT7	-34.771267	145.918555	<i>E. largiflorens</i>	10	80	1	1	
HBT8	-34.771205	145.91832	<i>E. largiflorens</i>	10	70	1	1	
HBT9	-34.77124	145.9189	<i>E. largiflorens</i>	10	60	1		
HBT10	-34.77113	145.92074	<i>E. largiflorens</i>	8	60	1		1
HBT11	-34.77106	145.92081	<i>E. largiflorens</i>	9	100		1	2
HBT12	-34.7711	145.92075	<i>E. largiflorens</i>	9	70	1	5	
HBT13	-34.77095	145.92114	<i>E. largiflorens</i>	8	150		2	
HBT14	-34.77076	145.91553	<i>E. largiflorens</i>	12	120	1		
HBT15	-34.73	145.951	<i>E. largiflorens</i>	8	80	3		
HBT16	-34.742	145.952	<i>E. largiflorens</i>	9	80	2		
HBT17	-34.74824	145.95255	Stag	8	80	3		
HBT18	-34.74265	145.9526	<i>E. largiflorens</i>	10	120	3		
HBT19	-34.74268	145.95261	<i>E. largiflorens</i>	9	130	2		
HBT20	-34.74204	145.95357	<i>E. largiflorens</i>	10	100	2		
HBT21	-34.74187	145.95302	<i>E. largiflorens</i>	10	80	2		
HBT22	-34.7419	145.95302	<i>E. largiflorens</i>	10	80	1+		
HBT23	-34.741844	145.952817	<i>E. largiflorens</i>	10	90	1+		
HBT24	-34.741836	145.952466	<i>E. largiflorens</i>	10	80	1+		
HBT25	-34.741808	145.953087	<i>E. largiflorens</i>	10	90	1+		
HBT26	-34.741789	145.952619	<i>E. largiflorens</i>	8	80	1+		
HBT27	-34.741738	145.952901	<i>E. largiflorens</i>	9	80	1+		
HBT28	-34.741709	145.952837	<i>E. largiflorens</i>	9	90	1+		
HBT29	-34.741699	145.95228	<i>E. largiflorens</i>	10	80	1+		
HBT30	-34.741637	145.952322	<i>E. largiflorens</i>	12	90	1+		
HBT31	-34.741615	145.952644	<i>E. largiflorens</i>	10	80	1+		
HBT32	-34.741406	145.952483	<i>E. largiflorens</i>	10	80	1+		
HBT33	-34.769246	145.769246	<i>E. largiflorens</i>	12	140	1	3	1
HBT34	-34.76956	145.935141	<i>E. largiflorens</i>	12	70	1		
HBT35	-34.769463	145.935059	<i>E. largiflorens</i>	14	60	1		
HBT36	-34.769569	145.934954	<i>E. largiflorens</i>	10	60	1		
HBT37	-34.769769	145.934811	<i>E. largiflorens</i>	10	60	1		

APPENDIX C CREDIT PROFILE

As of 21/03/2017.

Proposal ID for the assessment: 144/2017/4276D

Assessment type: 'Major Proposal'.

Major Project details

Proposal ID:	144/2017/4276D
Proposal name:	Coleambally Solar Farm
Proposal address:	The Kidman Way Coleambally NSW 2707
Proponent name:	Neoen Australia Pty Ltd
Proponent address:	Suite 4 Level 7 60 Park Street Sydney NSW 2000
Proponent phone:	0456 006 545
Assessor name:	Dave Maynard
Assessor address:	PO Box 470 Bega NSW 2550
Assessor phone:	(02) 64928311
Assessor accreditation:	144

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	0.66	23.00
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	0.08	2.00
Total	0.74	25

Credit profiles

1. Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR518)

Number of ecosystem credits created 4
 IBRA sub-region MR - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR518) Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR517) Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR519)	MR - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR518)

Number of ecosystem credits created 19
 IBRA sub-region MR - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR518) Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR517) Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MR519)	MR - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, (MR639)

Number of ecosystem credits created 2
 IBRA sub-region MR - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, (MR639)	MR - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
A burr-daisy	Calotis moorei	50.00	3,850
Bindweed	Convolvulus tedmoorei	50.00	3,850
Lanky Buttons	Leptorhynchos orientalis	50.00	650
Squirrel Glider	Petaurus norfolcensis	0.30	7

APPENDIX D SEARS

The proposal is considered State Significant Infrastructure and requires assessment under Part 5.1 of the EP&A Act. Biodiversity factors are to be assessed in an EIS, as per the Secretary Environmental Assessment Requirements (SEARs) for environmental impact assessment. A Final SEARs was provided by the Department of Planning and Environment on 13th February 2017.

Environmental Assessment Requirements

State Significant Development

Section 78A(8A) of the *Environmental Planning and Assessment Act 1979*

Application Number	SSD 8208
Proposal	Coleambally Solar which includes: • the construction and operation of a solar photovoltaic (PV) generation facility with an estimated capacity of up to 150 megawatts; and • associated infrastructure, including a grid connection and substation expansion.
Location	5 kilometres north east of Coleambally (Murumbidgee Council)
Applicant	Neoen Australia Pty Ltd
Date of Issue	13 February 2017
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>. In particular, the EIS must include: • a full description of the development, including: – details of construction, operation and decommissioning; – a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); – a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development; • a strategic justification of the development focusing on site selection and the suitability of the proposed site; • an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: – a description of the existing environment likely to be affected by the development; – an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice; – a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and – a description of the measures that would be implemented to monitor and report on the environmental performance of the development; • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and • the reasons why the development should be approved having regard to the biophysical, economic and social costs and benefits of the development. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies, and plans that may be relevant to the environmental assessment of this development. In addition to the matters set out in Schedule 1 of the <i>Environmental Planning and Assessment Regulation 2000</i>, the development application must be accompanied by: • a signed report from a suitably qualified person that includes an accurate estimate of the capital investment value of the development (as defined in Clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>); and

	the consent in writing of the owner of the land (as required in clause 49(1)(b) of the <i>Environmental Planning and Assessment Regulation 2000</i>).
Specific Issues	The EIS must address the following specific issues: Biodiversity – including an assessment of the likely biodiversity impacts of the development, (including but not limited to the impacts on <i>Weeping Myall Woodland</i> endangered ecological community) having regard to the <i>NSW Biodiversity Offsets Policy for Major Projects</i>, and in accordance with the <i>Framework for Biodiversity Assessment</i>, unless otherwise agreed by the Department; Heritage – including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community; Land – including an assessment of the impact of the development on agricultural land, flood prone land, quarries, mineral resources and exploration activities, and a soil survey to consider the potential for erosion to occur, and paying particular attention to the compatibility of the development with the existing land uses on the site and adjacent land during operation and after decommissioning, with reference to the zoning provisions applying to the land; Visual – including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners; Noise – including an assessment of the construction noise impacts of the development in accordance with the <i>Interim Construction Noise Guideline</i> (ICNG) and operational noise impacts in accordance with the <i>NSW Industrial Noise Policy</i> (INP) (including substation upgrades and operation), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria; Transport – including an assessment of the site access route, site access point and likely transport impacts of the development (including connection to the substation) on the capacity and condition of roads (including on any Crown land), a description of the measures that would be implemented to mitigate any impacts during construction, and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required); Water – including: - an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including watercourses, wetlands, riparian land, groundwater dependent ecosystems and acid sulfate soils), related infrastructure (including irrigation channels), adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; - details of water supply arrangements; and - a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with <i>Managing Urban Stormwater: Soils & Construction</i> (Landcom 2004); Hazards and Electromagnetic Interference – an assessment of potential hazards and risks associated with bushfires and the proposed transmission line and substation against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) <i>Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields</i>; and Socio-Economic – including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.

Consultation	In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and exploration licence holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development and Murrumbidgee Council. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.
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Environmental Planning Instruments, Policies, Guidelines & Plans

Biodiversity

Framework for Biodiversity Assessment (OEH)
 NSW Biodiversity Offsets Policy for Major Projects (OEH)
 Threatened Species Assessment Guidelines - Assessment of Significance (OEH)
 Biosecurity Act 2015
 Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI)
 Policy and Guidelines for Fish Habitat Conservation and Management (DPI)

Heritage

Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH)
 Code of Practice for Archaeological Investigations of Objects in NSW (OEH)
 Guide to investigating, assessing and reporting on aboriginal cultural heritage in NSW (OEH).
 NSW Heritage Manual (OEH)

Land

Primefact 1063: Infrastructure proposals on rural land (DPI)
 Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry (ARENA)
 Local Land Services Act 2013
 Australian Soil and Land Survey Handbook (CSIRO)
 Guidelines for Surveying Soil and Land Resources (CSIRO)
 The land and soil capability assessment scheme: second approximation (OEH)

Noise

NSW Industrial Noise Policy (EPA)
 Interim Construction Noise Guideline (EPA)
 NSW Road Noise Policy (EPA)

Transport

Guide to Traffic Generating Development (RTA)
 Road Design Guide (RMS) & relevant Austroads Standards
 Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development

Water

Managing Urban Stormwater: Soils & Construction (Landcom)
 Floodplain Development Manual (OEH)
 Guidelines for Controlled Activities on Waterfront Land (DPI Water)
 Water Sharing Plans (DPI Water)
 Floodplain Management Plan (DPI Water)
 Guidelines for Watercourse Crossings on Waterfront Land (DPI Water)

Waste

Waste Classification Guidelines (EPA)

Electromagnetic Interference

ICNIRP Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields

Environmental Planning Instruments

State Environmental Planning Policy (State and Regional Development) 2011
 State Environmental Planning Policy (Infrastructure) 2007
 State Environmental Planning Policy (Rural Lands) 2008
 State Environmental Planning Policy No. 44 – Koala Habitat Protection
 State Environmental Planning Policy No. 55 – Remediation of Land
 Murrumbidgee Local Environmental Plan 2013



Office of
Environment
& Heritage

Your reference: SSD 8208
Our reference: DOC 17/35640
Contact: Andrew Fisher
Ph. 6022 0623

Ms Elle Donnelley
A/Senior Planner - Resource Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Ms Donnelley

RE: SEARs for proposed Coleambally Solar Farm (SSD 8208)

I refer to your email dated 23 January 2017 seeking input into the Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the proposed Coleambally Solar Farm (SSD 8208).

OEH has reviewed the available supporting documentation and provides SEARs for the proposed development in **Attachments A and B** and guidance material in **Attachment C**. Please note that both **Attachments A and B** include biodiversity matters that will need to be addressed. The assessment must include all ancillary infrastructure, such as transmission lines, parking facilities, equipment sheds and new vehicle tracks.

OEH recommends the EIS needs to appropriately address the following:

1. Biodiversity and offsetting;
2. Aboriginal cultural heritage;
3. Water and soils; and
4. Cumulative impact.

Please note that the NSW Biodiversity Offsets Policy for Major Projects www.environment.nsw.gov.au/resources/biodiversity/140672biopolicy.pdf is now being implemented. The policy provides a standard method for assessing impacts of major projects on biodiversity and determining offsetting arrangements. The policy is underpinned by the Framework for Biodiversity Assessment (FBA) www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf which contains the assessment methodology that is adopted by the policy to quantify and describe the impact assessment requirements and offset guidance that applies to Major Projects. The FBA must be used by a proponent to assess all biodiversity values on the development site.

Based on the information provided, the proposed site is largely cleared for cultivation but appears to contain at least seven patches of remnant vegetation. These include areas of Weeping Myall Woodland which is classified as an endangered ecological community under the *Threatened Species Conservation Act 1995*. These patches may also meet the definition of the Weeping Myall Woodland endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Preliminary Assessment Report identified 16 previously recorded Aboriginal sites within ten kilometres of the proposal area with one site occurring within 200 metres of the northern boundary however current AHIMS database search results will need to be provided in the EIS to evidence this. The study also identifies that areas containing native vegetation are likely to contain previously undisturbed archaeological deposits associated with Aboriginal occupation. It is also noted in this report that an ecology field survey identified a potential heritage/scarred tree (European or Aboriginal) located within the Black Box Woodland wetland community at the Kook and Ercildoune Road junction opposite the substation. It is for these reasons that we recommend a comprehensive Aboriginal cultural heritage assessment, inclusive of any trees intended for impact, be undertaken in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal objects in NSW*. This should also be inclusive of consultation with the relevant Aboriginal parties.

We also recommend that this letter and attachments be provided to the proponent along with the SEARs as it contains additional information to support preparation of an adequate EIS. Of particular importance is the list of threatened entities identified in **Attachment B** which will require further consideration and provision of the information specified in s9.2 of the FBA.

If you have any questions regarding this matter please contact Andrew Fisher 6022 0623 or by email on andrew.fisher@environment.nsw.gov.au.

Yours sincerely

Handwritten signature of Peter Ewin, consisting of the letters 'PE' followed by a horizontal line and the date '2/2/17'.

PETER EWIN
Senior Team Leader Planning
South West Region
Regional Operations
Office of Environment and Heritage

ATTACHMENT A – Standard Environmental Assessment Requirements
ATTACHMENT B – Project specific Environmental Assessment Requirements
ATTACHMENT C – Guidance Material

Attachment A – Standard Environmental Assessment Requirements

Biodiversity 1. Biodiversity impacts related to the proposed Coleambally Solar Farm are to be assessed and documented in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the <i>Threatened Species Conservation Act 1995</i>.
Aboriginal cultural heritage 2. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the proposed Coleambally Solar Farm and document these in the EIS. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and should also be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with OEH regional officers. 3. Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS. 4. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.
Historic heritage 5. The EIS must provide a heritage assessment including but not limited to an assessment of impacts to <i>State and local heritage</i> including conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, trees should be assessed. Where impacts to State or locally significant heritage items are identified, the assessment shall: - outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the NSW Heritage Manual (1996), - be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria), - include a statement of heritage impact for all heritage items (including significance assessment), - consider impacts including, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant), and

- e. where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design, to guide physical archaeological test excavations (terrestrial and maritime as relevant) and include the results of these test excavations.

Water and soils

6. The EIS must map the following features relevant to water and soils including:
 - a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).
 - b. Rivers, streams, wetlands, estuaries (as described in Appendix 2 of the [Framework for Biodiversity Assessment](#)).
 - c. Groundwater.
 - d. Groundwater dependent ecosystems.
 - e. Proposed intake and discharge locations.
7. The EIS must describe background conditions for any water resource likely to be affected by the proposed Coleambally Solar Farm, including:
 - a. Existing surface and groundwater.
 - b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.
 - c. Water Quality Objectives (as endorsed by the NSW Government <http://www.environment.nsw.gov.au/ieo/index.htm>) including groundwater as appropriate that represent the community's uses and values for the receiving waters.
 - d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the [ANZECC \(2000\) Guidelines for Fresh and Marine Water Quality](#) and/or local objectives, criteria or targets endorsed by the NSW Government.
8. The EIS must assess the impacts of the proposed Coleambally Solar Farm on water quality, including:
 - a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.
 - b. Identification of proposed monitoring of water quality.
9. The EIS must assess the impact of the proposed Coleambally Solar Farm on hydrology, including:
 - a. Water balance including quantity, quality and source.
 - b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.
 - c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.

- d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).
- e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.
- f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.
- g. Identification of proposed monitoring of hydrological attributes.

Flooding

10. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:
 - a. Flood prone land
 - b. Flood planning area, the area below the flood planning level.
 - c. Hydraulic (floodways and flood storage areas).
11. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.
12. The EIS must model the effect of the proposed Coleambally Solar Farm (including fill) on the flood behaviour under the following scenarios:
 - a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.
13. Modelling in the EIS must consider and document:
 - a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.
 - b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories.
 - c. Relevant provisions of the NSW Floodplain Development Manual 2005.
14. The EIS must assess the impacts on the proposed Coleambally Solar Farm on flood behaviour, including:
 - a. Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure.
 - b. Consistency with Council floodplain risk management plans.
 - c. Compatibility with the flood hazard of the land.
 - d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
 - e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.

- f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
- g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council.
- h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.
- i. Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.
- j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

Attachment B – Project specific Environmental Assessment Requirements

Biodiversity

15. Impacts on the following species, populations and ecological communities will require further consideration and provision of the information specified in s9.2 of the Framework for

Biodiversity Assessment:

- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- *Brachyscome papillosa* (Mossgiel Daisy)
- *Convolvulus tedmoorei* (Bindweed)
- *Lepidium monoplacoides* (Winged Peppergrass)
- *Maireana cheelii* (Chariot Wheels)
- *Pilularia novae-hollandiae* (Austral Pillwort)
- *Swainsona murrayana* (Slender Darling Pea)
- *Lophochroa leadbeateri* (Major Mitchell's Cockatoo) - nest trees only
- *Polytelis swainsonii* (Superb Parrot) - nest trees only
- *Circus assimilis* (Spotted Harrier) - nest trees only
- *Falco hypoleucos* (Grey Falcon) - nest trees only
- *Falco subniger* (Black Falcon) - nest trees only
- *Lophoictinia isura* (Square-tailed Kite) - nest trees only
- *Hieraaetus morphnoides* (Little Eagle) - nest trees only
- *Ninox connivens* (Barking Owl) - nest trees only

Attachment C – Guidance material

Title	Web address
<u>Relevant Legislation</u>	
<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>	www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
<i>Environmental Planning and Assessment Act 1979</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
<i>Fisheries Management Act 1994</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
<i>Marine Parks Act 1997</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
<i>National Parks and Wildlife Act 1974</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
<i>Protection of the Environment Operations Act 1997</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
<i>Threatened Species Conservation Act 1995</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+101+1995+cd+0+N
<i>Water Management Act 2000</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
<i>Wilderness Act 1987</i>	www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
<u>Biodiversity</u>	
NSW Biodiversity Offsets Policy for Major Projects (OEH 2013)	www.environment.nsw.gov.au/resources/biodiversity/140672biopolICY.pdf
Framework for Biodiversity Assessment (OEH 2013)	www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf
OEH Threatened Species Website	www.environment.nsw.gov.au/threatenedspecies/
NSW BioNet (Atlas of NSW Wildlife)	www.bionet.nsw.gov.au/
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC 2004)	www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna - Amphibians (DECCW 2009)	www.environment.nsw.gov.au/resources/threatenedspecies/09213aamphibians.pdf
NSW guide to surveying threatened plants (OEH 2016)	www.environment.nsw.gov.au/resources/threatenedspecies/160129-threatened-plants-survey-guide.pdf
OEH threatened species survey and assessment guideline information	www.environment.nsw.gov.au/threatenedspecies/surveyassessmentguidelines.htm
Fisheries NSW policies and guidelines	www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
List of national parks	www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx

Title	Web address
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW 2010)	www.environment.nsw.gov.au/resources/protectedareas/080290devadjoindecc.pdf
VIS Classification - NSW Plant Community Type (PCT) database	www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm
Interim Vegetation Mapping Standard and VIS Plot	www.environment.nsw.gov.au/research/VISplot.htm
OEH data Portal (access to online spatial data)	data.environment.nsw.gov.au/
<u>Heritage</u>	
The Burra Charter (The Australia ICOMOS charter for places of cultural significance)	australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf
Statements of Heritage Impact 2002 (HO & DUAP)	www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf
NSW Heritage Manual (DUAP) (scroll through alphabetical list to 'N')	www.environment.nsw.gov.au/Heritage/publications/index.htm#M-O
<u>Aboriginal Cultural Heritage</u>	
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)	www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)	www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
Aboriginal Site Recording Form	www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf
Aboriginal Site Impact Recording Form	www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf

<u>Water and Soils</u>	
Acid sulphate soils	
Acid Sulfate Soils Planning Maps via 'The NSW Natural Resource Atlas'	www.nratlas.nsw.gov.au/
Acid Sulfate Soils Manual (Stone et al. 1998)	Manual available for purchase from: www.landcom.com.au/whats-new/the-blue-book.aspx Chapters 1 and 2 are on DPI's Guidelines Register at: Chapter 1 Acid Sulfate Soils Planning Guidelines: www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Planning%20Guidelines.pdf Chapter 2 Acid Sulfate Soils Assessment Guidelines: www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Assessment%20Guidelines.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	www.advancedenvironmentalmanagement.com/Reports/Savannah/Appendix%2015.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding	
Floodplain Development Manual	www.environment.nsw.gov.au/floodplains/manual.htm
NSW Climate Impact Profile	NSW Climate Impact Profile
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

APPENDIX E 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: 12/12/16 09:22:52

[Summary](#)

[Details](#)

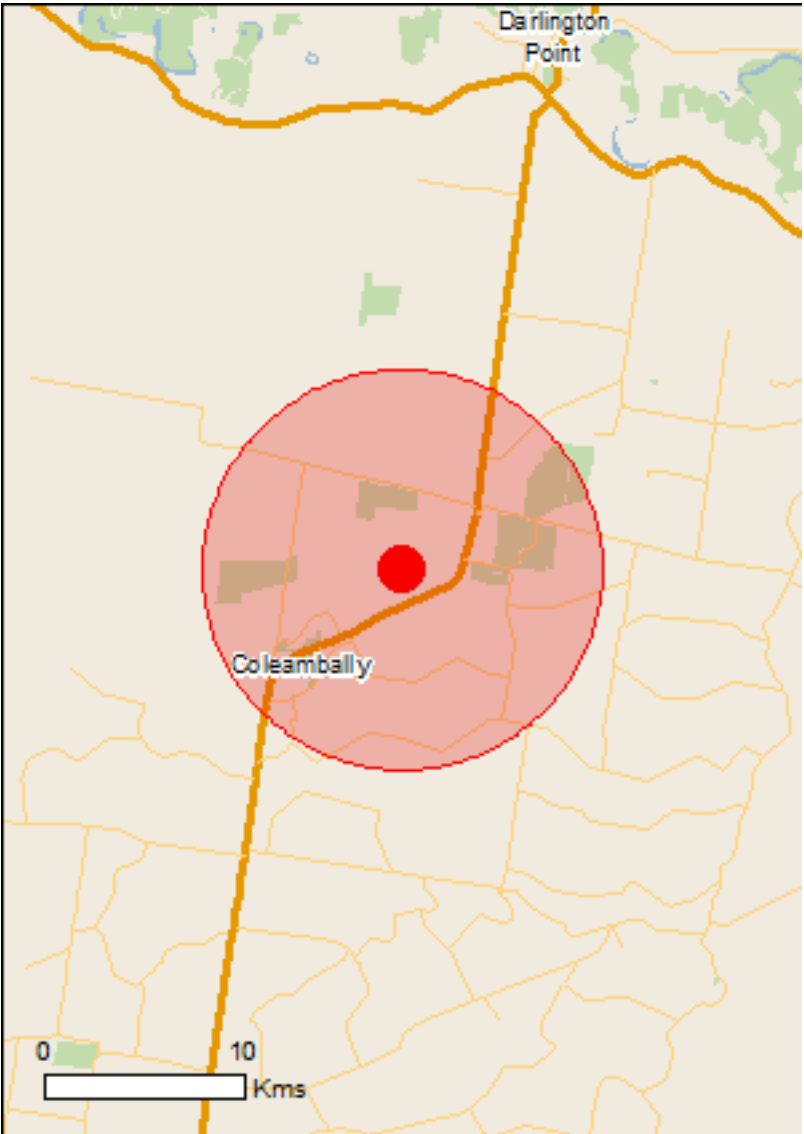
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

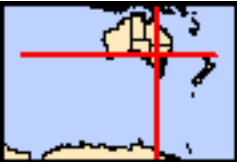
[Acknowledgements](#)



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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:	4
Listed Threatened Species:	16
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	11
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:	1
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	500 - 600km upstream	
Hattah-kulkyne lakes	300 - 400km upstream	
Riverland	400 - 500km upstream	
The coorong, and lakes alexandrina and albert wetland	500 - 600km upstream	

Listed Threatened Ecological Communities	[Resource Information]
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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
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species	[Resource Information]
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Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known 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 known 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
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species

Name	Status	Type of Presence
habitat may occur within area		
Fish		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella 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
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Plants		
Brachyscome papillosa Mossgiel Daisy [6625]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
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		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	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

Commonwealth Land

[Resource Information]

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

Name
Commonwealth Land - Australian Telecommunications Commission

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		

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 known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	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 may 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

State and Territory Reserves		[Resource Information]
Name		State
Murrumbidgee Valley		NSW

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
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
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur

Name	Status	Type of Presence
Vulpes vulpes Red Fox, Fox [18]		within area 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
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

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

-34.7668 145.92493

Acknowledgements

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

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

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

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