

# Biodiversity Assessment Report

SUNRAYSIA SOLAR FARM



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## Acronyms and Abbreviations

BBAM	BioBanking Assessment Methodology
BCC	BioBanking Credit Calculator
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
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 for Biodiversity Assessment
ha	Hectares
km	Kilometres
m	Metres
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage (formerly DECCW)
PCTs	Plant Community Types
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy (NSW)
sp/spp	Species/multiple species
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>

## EXECUTIVE SUMMARY

Maoneng Australia Pty. Ltd. is proposing the construction of a 200 megawatt solar photovoltaic array and associated infrastructure within the Balranald Shire Local Government Area, NSW. This Biodiversity Assessment Report (BAR) has been prepared by NGH Environmental on behalf of Maoneng Australia Pty. Ltd. The aim of this BAR is to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) and to address the requirements of the Framework for Biodiversity Assessment (FBA), developed for Major Proposals as part of the Biodiversity Offsets Policy for Major Proposals. This BAR will be used to inform an Environmental Impact Assessment as part of an application for a Major Proposal under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The FBA underpins the Biodiversity Offsets Policy for Major Proposals. 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 Proposals. This report follows the BAR format required by the FBA.

The primary assumption and limitation of this assessment is that 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.

Consultation was undertaken with the NSW Office of Environment and Heritage (OEH) to discuss appropriate and consistent mapping criteria for the low condition EEC occurring within the proposal area.

Comprehensive mapping and field surveys were completed in accordance with the requirements in Appendix 4 of the FBA, and resulted in the identification of three threatened species, one migratory species and one Endangered Ecological Community (EEC) within the proposal area and adjacent vegetation. The impacts to these identities have been thoroughly and adequately assessed. Threatened and Migratory/Marine species identified within and adjacent to the proposal area included:

- Grey-crowned Babbler (Eastern subspecies) *Pomatostomus temporalis temporalis* – Vulnerable (TSC Act)
- Major Mitchell's Cockatoo *Lophochroa leadbeateri* – Vulnerable (TSC Act)
- Regent Parrot (Eastern subspecies) *Polytelis anthopeplus monarchoides* – Endangered/Vulnerable (TSC Act/ EPBC Act)
- Rainbow Bee-eater *Merops ornatus* – Marine/migratory (EPBC Act)

Additionally, field surveys of the proposal area identified one EEC listed under the *Threatened Species Conservation Act 1995* (TSC Act)- moderate to good condition *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions. The proposal would result in the removal of 1.29 ha of this EEC. Targeted surveys were undertaken for threatened flora and fauna listed in the BioBanking Credit Calculator and SEARs, however none were detected on site.

The clearing of a total of 12.11 ha of three Plant Community Types (PCTs) constituting predicted habitat for threatened fauna, in addition to this EEC, resulted in the generation of 391 Ecosystem Credits.

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the proposal to date. Site selection options have been assessed against key environmental, social and economic criteria, with photovoltaic array layout options being eliminated due to their impact on environmental values; notably on EECs, and threatened species habitat. The option selection process has

ensured the greatest avoidance and minimisation of impacts on biodiversity possible while still allowing for the solar farm.

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

A Biodiversity Offset Strategy (BOS) will be prepared in accordance with the FBA. The proponent proposes offsetting the impacts through the generation and retirement of Ecosystem credits through the implementation of a formal BioBanking Agreement within retained vegetation owned by the proponent, including a significant area of *Acacia melvillei shrubland* EEC. The offset area is proposed to include approximately 58.5 ha of EEC and non-EEC vegetation, and known threatened fauna habitat. Should additional credits be required could be purchased and retired using the BioBanking Credit Register, an additional BioBank Site could be sought and established, or payment could be made into the FBA Credit Fund following negotiation with consent authorities.

# 1 INTRODUCTION

When developed Sunraysia Solar Farm (Sunraysia SF) would be one of the largest utility scale solar farms in Australia with a capacity of around 200 MWAC, enough to power approximately 90,000 households within the NSW/VIC region. The power generated by Sunraysia will be fed into the National Electricity Market (NEM) at the transmission level from Transgrid's Balranald Substation where the energy may be partly consumed by the township of Balranald and various nearby towns, and support interconnecting power flows between New South Wales and Victoria.

Sunraysia Solar Farm Pty Ltd proposes to develop approximately 800 ha of the 1000 ha proposal site (**Error! Reference source not found.**). The Sunraysia SF would include the following elements:

- PV modules using crystalline or thin-film technology with solar tracking system.
- Battery storage
- A site office and maintenance building
- An access road from Yanga Way to the site
- Internal access tracks to allow for site maintenance
- Perimeter security fencing
- Grid connection to the substation to the north via an overhead line (220kV) within a 50-metre-wide easement
- Native vegetation screening, where required to break up views of infrastructure

The proposed development may be undertaken in stages. Stage 1 would be 100MWAC and Stage 2 100MWAC. In total, the construction phase of the proposal is expected to take 7 to 12 months.

The Sunraysia SF proposal would have a capital investment cost estimated to be \$300 million.

The Sunraysia SF is expected to have a 30 year operating life and would employ operations and maintenance personnel. At the end of its operating life, the Sunraysia SF could be either decommissioned returning the site to its existing land capability or, subject to planning approvals, be retrofitted with new equipment. If decommissioned, all above ground infrastructure would be removed and the site would be rehabilitated to allow for a return to agricultural or other land use.

The Sunraysia SF design and construction, upgrade and decommissioning requirements are described in more detail in Chapter 3 of the EIS (NGH Environmental, 2016). The final design would be informed by the mitigation measures determined in the EIS, any additional development consent conditions and technical aspects from the detailed design phase.



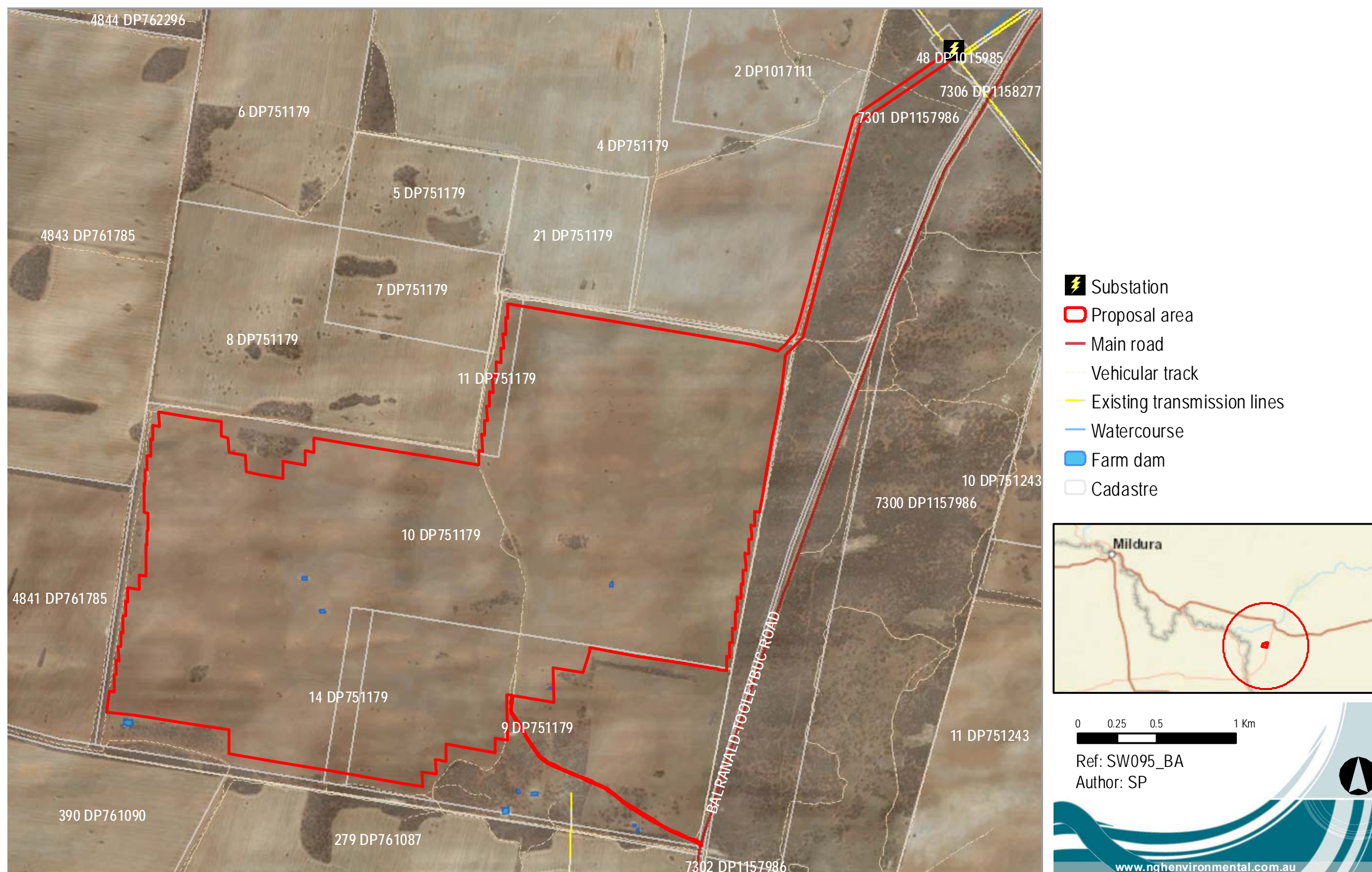


Figure 1-1 Site context



## 1.1 STUDY AIMS

This Biodiversity Assessment Report (BAR) has been prepared by NGH Environmental on behalf of Maoneng Australia Pty. Ltd.

The aim of this BAR is to address the requirements of the Framework for Biodiversity Assessment (FBA) (NSW Office of Environment and Heritage, 2014), developed for Major Proposals, and to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs). In addition, the Office of Environment and Heritage (OEH) has been consulted during the writing of this assessment via email and telephone conversation. This report addresses the requirements of OEH and relevant guidance documents.

Secretary's Environmental Assessment Requirement	Where addressed
<p>The EIS must address the following specific issues:</p> <ul style="list-style-type: none"><li>• <b>Biodiversity</b> – including an assessment of the likely biodiversity impacts of the development, having regard to the <i>NSW Biodiversity Offsets Policy Major Proposals</i>, and in accordance with the <i>Framework for Biodiversity Assessment</i>, unless otherwise agreed by the Department.</li></ul>	<b>Sections 5 -8.</b>

## 1.2 REPORT STRUCTURE

This BAR follows the reporting requirements of sections 1 and 2 of the FBA, including 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 a Major Proposal under the NSW planning legislation - Chapter 5 (Avoid and Minimise Impacts), Chapter 6 (Impact Summary).

## 1.3 DEFINITIONS

### Sunraysia Solar Farm ('the proposal')

This refers to all infrastructure and activities required to construct, operate and decommission the proposed solar farm.

The proposal is contained within the Balranald Shire LGA.

### The development envelope ('proposal area')

This refers to the main site containing most operational infrastructure in addition to the broader area within which infrastructure would be located. This includes the solar array, temporary construction facilities, the access track and cabling and the easement for the transmission line.

The development envelope is the area assessed in this BAR. It is a larger area than the actual constructed footprint would be, to allow some design flexibility regarding the final infrastructure placement.

The development envelope is approximately 815 ha (Figure 1-2).

## Assessment Circles

Two circles centered over the area of greatest impact (the inner and outer assessment circles), in which the percent native vegetation cover in the landscape is assessed, take into account both cover and condition of vegetation. The inner assessment circle: outer assessment circle ratio must be 1:10, as per the requirements of the FBA. The area of the inner and outer assessment circles for this assessment are 2000 ha and 20,000 ha respectively (Figure 1-3).

## 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 Maoneng Australia Pty. Ltd. 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).
- Environment Australia (2001) A Directory of Important Wetlands in Australia. 3rd Edition. Environment Australia, Canberra.
- 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.

## 1.5 OEH CONSULTATION

Consultation was undertaken with Peter Ewin (Senior Team Leader Planning, South West) and Miranda Kerr (Biodiversity Conservation Officer). This included a telephone conversation between Aleksei Atkin of NGH Environmental and Peter Ewin on the 18<sup>th</sup> of October, 2016. This telephone conversation included discussion of the proposed survey methodology, in addition to the identification of Endangered Ecological Communities and potential threatened species on site. An email was sent from Peter Ewin which provided NGH Environmental with the advice letter OEH had prepared for DP&E regarding the SEARs for the proposal.

Following survey, advice was sought from both Peter Ewin and Miranda Kerr regarding the level of assessment required for species if they were not found on site, and clarifying which Plant Community Types conformed to particular Endangered Ecological Communities. Evidence of this consultation is provided in Appendix E of this report.



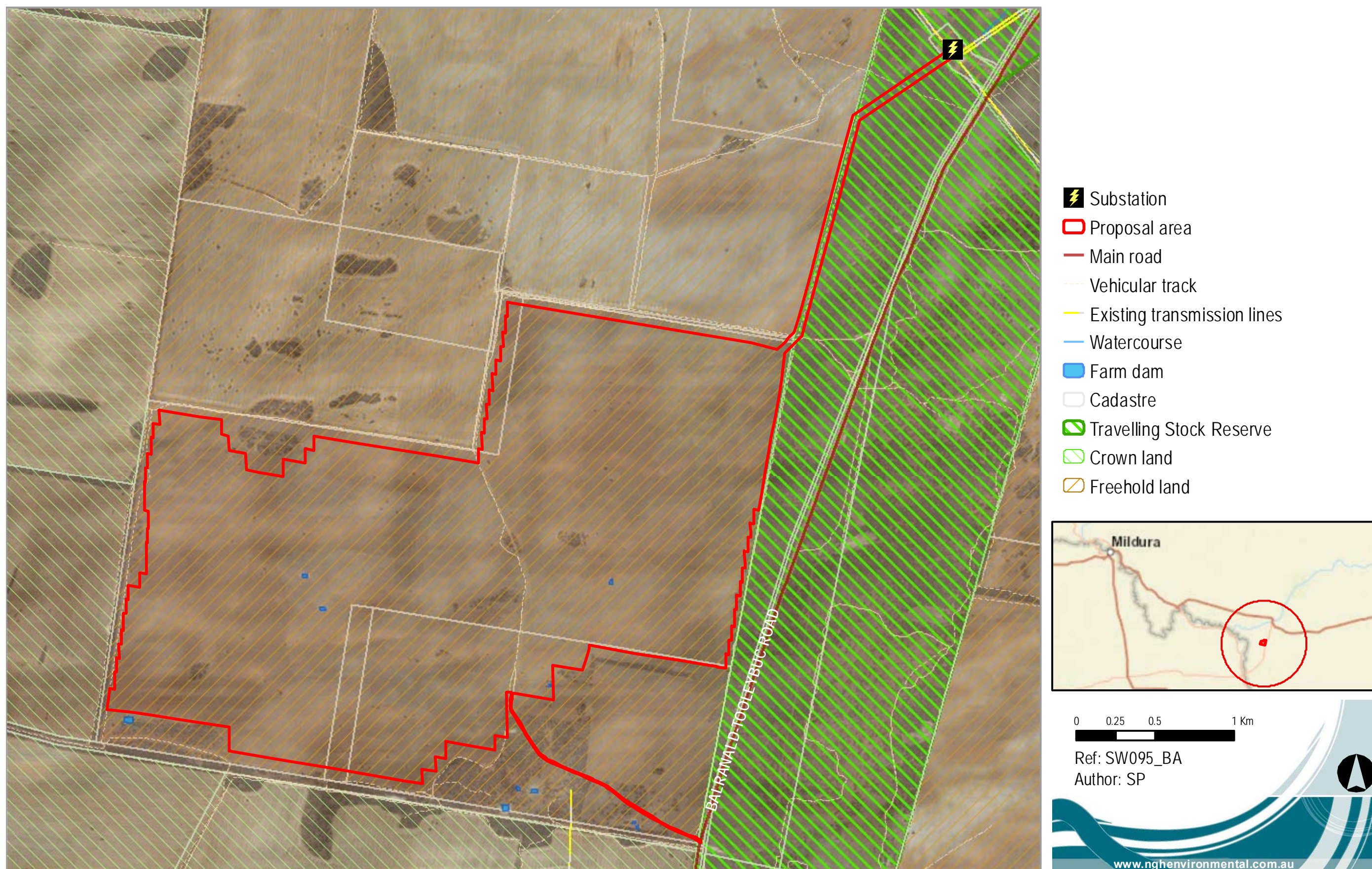


Figure 1-2 Site Map



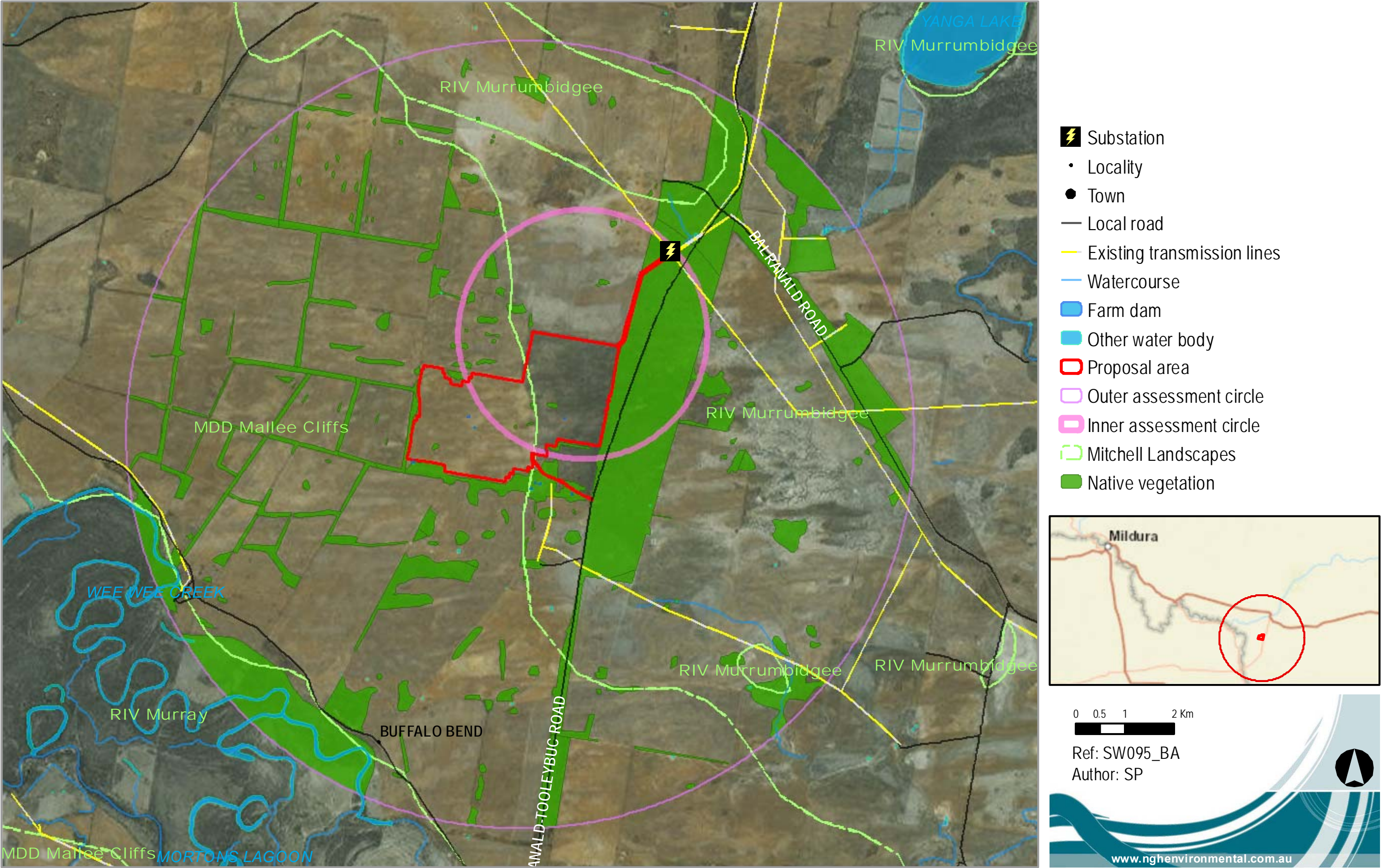


Figure 1-3 Location Map



## 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 Murray Darling Depressions Bioregion and the South Olary Plain Subregion (IBRA v.7 2012). The geology of the region is late Mesozoic to Quaternary (248 million years) in age, with landforms described as sand plains, dune fields, salt lakes and alluvial plains. The dominant pre-European vegetation type is considered to be Eucalyptus Mallee Tall Shrubland (ASRIS accessed 7/11/16).

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

### 2.2 NSW LANDSCAPE REGIONS (MITCHELL LANDSCAPES)

Two Mitchell Landscapes occur within the proposal area; Murrumbidgee Depression Plains and Mallee Cliffs Sandplains (Table 2-1) (Figure 1-3)

- Murrumbidgee Depression Plains occurs throughout the majority of the proposal area. The per cent cleared estimate for this landscape is currently 93% (OEH 2007).
- Mallee Cliffs Sandplains occurs in the western section of the proposal area. The per cent cleared estimate for this landscape is currently 30% (OEH 2007).

The Mitchell Landscape descriptions are provided below.

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

Mitchell Landscape
<p><b>Murrumbidgee Depression Plains (801644.14)</b></p> <p>Quaternary alluvial plains with numerous circular depressions interpreted as high floodplains or low terraces beyond the reach of average floodwaters, relief to 10 m. Grey to brown clays and clay loams with linear patterns of sandy prior streams.</p> <p>Now extensive grasslands of white-top, windmill grass, sand broom, and spear grasses, heavily grazed and invaded by exotic species. Reported to have originally been myall <i>Acacia pendula</i>, old man saltbush <i>Atriplex nummularia</i> and bladder saltbush <i>Atriplex vesicaria</i>. Sandy ridges of prior streams support patches of white cypress pine <i>Callitris glaucophylla</i>, with needlewood <i>Hakea leucoptera</i>, western pittosporum <i>Pittosporum phylliraeoides</i> and spear grasses <i>Austrostipa</i> sp..</p>
<p><b>Mallee Cliffs Sandplains (845611.49)</b></p> <p>Mallee Cliffs Sandplains landscape includes parts of twelve land systems: Ashmont, Bulgamurra, Frenchmans, Gulthul, Hatfield, Menilta, Mulurulu, Overnewton, Quambi, Roo Roo, Trelega and Wilkura.</p> <p>Extensive, slightly undulating sandplain of Quaternary aeolian sands with east-west trending dunes, often with blowouts, partly scalded broad swales and small depressions, relief 6 to 10 m. Solonized brown soils, calcareous loamy sand, and texture-contrast soils on the plain, red and brown sands on dunes, non-cracking grey or brown clays in depressions.</p> <p>Rosewood <i>Alectryon oleifolius</i>, white cypress pine <i>Callitris glaucophylla</i>, sugarwood <i>Myoporum platycarpum</i>, belah <i>Casuarina cristata</i>, dense clumps of black bluebush <i>Maireana pyramidata</i>, or pearl bluebush <i>Maireana sedifolia</i>, with variable speargrass <i>Austrostipa variabilis</i>, bottlewashers <i>Enneapogon</i> sp. and copperburr <i>Sclerolaena</i> sp. on plains. Scattered rosewood, belah, mallee patches <i>Eucalyptus</i> sp., with</p>

#### Mitchell Landscape

isolated porcupine grass *Triodia irritans*, white cypress pine, narrow-leaf hopbush *Dodonaea attenuata*, punty bush *Senna eremophila* and grasses on dunes. Annual saltbush *Atriplex* sp., canegrass *Eragrostis australasica*, lignum *Muehlenbeckia cunninghamii* and nitre goosefoot *Chenopodium nitrariaceum* in depressions usually fringed by black box *Eucalyptus largiflorens*.

The dominant Mitchell Landscape affected by the proposal is Murrumbidgee Depression Plains. The Murrumbidgee Depression Plains was entered into the BCC for the proposal.

## 2.3 NATIVE VEGETATION EXTENT

Using GIS, an inner and outer assessment circle with the ratio of 1:10 was established. A 20,000 ha outer assessment circle and 2000 ha inner assessment was established over the proposal area and centred over the area of native vegetation that is impacted most by the proposal.

The total area of native vegetation mapped within the outer assessment circle is 3672.34 ha (Figure 1-3).

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. The local area's native vegetation is derived from woodland; no natural grasslands are relevant to the proposal area.

## 2.4 CLEARED AREAS

Cleared areas in the proposal area are primarily used for agriculture and provide very little in terms of fauna habitat. These areas provide suitable foraging habitat for raptors, parrots, cockatoos and macropods, and introduced species such as cats, foxes and rabbits. Approximately 803.49 ha (98.52%) within the proposal area is cleared (non-native vegetation) land.

## 2.5 RIVERS AND STREAMS

No rivers or streams are present within the proposal area.

## 2.6 WETLANDS

There are four man-made dams occurring within the proposal area. These wetlands provide habitat for wetland birds and amphibians, although it is considered low quality due to a sparse covering of aquatic vegetation. The closest Nationally Important Wetland to the proposal area is Yanga Lake approximately eight kilometres to the north-east.

## 2.7 STATE OR REGIONALLY SIGNIFICANT BIODIVERSITY LINKS

State significant biodiversity links, regionally significant biodiversity links, very large area biodiversity links, large area biodiversity links or local area 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 state or regionally significant biodiversity links occur within the proposal area and within the inner and outer assessment circles.

## 2.8 LANDSCAPE VALUE SCORE COMPONENTS

A BioBanking credit (BCC) assessment was completed for this proposal. The proposal ID for the assessment is 205/2016/4042MP Version 1 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 has been used in the assessment, in accordance with Appendix 4 of the FBA for major proposals.

### 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 proposal layout as of November 2016.

#### Assessing percent current extent of native vegetation cover in the inner and outer assessment circles

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 2000 ha
- The total area of the outer assessment circle, including the proposal area, is 20,000 ha
- Current native vegetation cover within the inner assessment circle is 30.60%, rounding this gives a native vegetation cover of 31%
- Current native vegetation cover within the outer assessment circle is 18.81%, rounding this gives a native vegetation cover of 19%
- In accordance with Table 9 of the FBA, the score for the percent current extent of native vegetation cover in the:
  - Inner assessment circle was determined to be 5.1.
  - Outer assessment circle was determined to be 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:

- The total area of the inner assessment circle is 2000 ha.
- The total area of the outer assessment circle, including the proposal area, is 20,000 ha
- Future native vegetation cover in the inner assessment circle is 29.62%, rounding this gives a native vegetation cover of 30%
- Future native vegetation cover in the outer assessment circle is 18.71%, rounding this gives a native vegetation cover of 19%
- In accordance with Table 9 of the FBA, the score for the percent future extent of native vegetation cover in the:
  - Inner assessment circle was determined to be 4.5.
  - Outer assessment circle was determined to be 5.



### 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	Score
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	12
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	9

#### Current linkage width class

For a site-based development, the assessor must determine the current linkage width class of each connecting link identified previously by measuring the width of each connecting link at the narrowest area of the connecting link and looking up the corresponding linkage width class in Table 11 of the FBA. This area may be located on or off the site.

Extract from the FBA Table 11: Linkage width classes for site-based development

Linkage width (metres)	0 – 5	>5 - 30	>30 - 100	>100 - 500	>500
Linkage width class	Very narrow	Narrow	Moderate	Wide	Very Wide

#### Future linkage width class

For a site-based development, the assessor must determine the number of linkage width classes that will be lost for each connecting link as follows:

0 = no change or change is within the class, i.e. does not cross a threshold between the classes

1 = crosses one linkage width threshold, i.e. changes from one linkage width class to the next one across one threshold

2 = crosses two linkage width thresholds, i.e. changes from one linkage width class to another class across two thresholds

3 = crosses three linkage width thresholds, i.e. changes from one linkage width class to another linkage width class across three thresholds

4 = crosses four linkage width thresholds, i.e. changes from one linkage width class to another linkage width class across four thresholds

The number of linkage width classes that are crossed as a result of the Major Proposal is used to determine the connectivity value score for the connecting link.

### **Current linkage condition class**

For each connecting link, the assessor must determine whether any part of the connecting link within the outer assessment circle contains a PCT identified by the assessor that is a woody PCT.

Where it contains a woody PCT:

- a) estimate the current average condition of the over-storey vegetation (including exotic vegetation) for each link, or part thereof, within that outer assessment circle using the categories set out in Table 12, and
- b) estimate the current average condition of either the mid-storey or ground cover vegetation (including exotic vegetation) for each link, or part thereof, within that outer assessment circle using the categories set out in Table 12 of the FBA. The assessor must use whichever of those strata is the most appropriate for assessing connectivity for those woody PCTs, and
- c) determine the corresponding current linkage condition class for the estimates for each link using Table 12.

All PCTs observed at the site were determined to be woody PCTs.

### **Future linkage condition class**

For each connecting link identified in Step 1 in this section of the FBA, determine whether any part of the connecting link within the outer assessment circle (referred to in Section 1 of this appendix) contains a PCT identified by the assessor under Subsection 5.2.1 of the FBA that is a woody PCT.

Where it contains such a woody PCT:

- a) take into account the impacts of the development to estimate the future average condition of the over-storey vegetation (including exotic vegetation) for each link, or part thereof, within that outer assessment circle using the categories set out in Table 12 of the FBA, and
- b) condition of either the mid-storey or ground cover vegetation (including exotic vegetation) for each link, or part thereof, within that outer assessment circle using the categories set out in Table 12 of the FBA. The assessor must use whichever of those strata is the most appropriate for assessing connectivity for those woody PCTs, and
- c) determine the corresponding future linkage condition class for those estimates for each connecting link using Table 12 of the FBA.

### **The number of linkage condition classes that are crossed – lost**

The assessor must determine the number of linkage condition class thresholds that are crossed for each connecting link as follows:

0 = no change or change is within the same linkage condition class

1 = crosses one linkage condition threshold, i.e. changes from one linkage condition class to the next one across one threshold

2 = crosses two linkage condition thresholds, i.e. changes from one linkage condition class to another class across two thresholds

3 = crosses three linkage condition thresholds, i.e. changes from one linkage condition class to another class across three thresholds.

### Connectivity value score

The proposal does not impact on a state or regionally significant biodiversity link, whilst the change in the linkage width and the linkage condition are within the same class. Therefore, the score for the connectivity value is 0.

### 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

For a site-based development, the assessor must assess the patch size for each Mitchell landscape in which most of the development occurs. The results are as follows:

Mitchell landscape 1:

Murrumbidgee Depression Plains 93% cleared

Largest patch size: >50 ha

Table 18 score: 12

Mitchell landscape 2:

Mallee Cliffs Sandplains 30% cleared

Largest patch size: >1000 ha

Table 18 score: 12

The final patch size score, determined by using the largest patch size score in which most of the development occurs, is 12.

Extract from the FBA Table 18: Criteria for assessing patch size Patch size class

Percent native vegetation cleared in each Mitchell landscape in which most of the Major Proposal occurs					
Patch size class	<30%	30–70%	>70–90%	>90%	Patch size (score)
Extra large	>1000 ha	>200 ha	>100 ha	>50 ha	12
Very large	>500 – 1000 ha	>100 – 200 ha	>50 – 100 ha	>20 – 50 ha	9

Percent native vegetation cleared in each Mitchell landscape in which most of the Major Proposal occurs					
Large	>200 – 500 ha	>50 – 100 ha	>20 – 50 ha	6	7.5
Medium	>100 – 200 ha	>20 – 50 ha	>10 – 20 ha	>1 – 10 ha	3
Small	≤100 ha	≤20 ha	≤10 ha	≤1 ha	1
nil	0	0	0	0	0

## 2.9 LANDSCAPE VALUE SCORE

The assessor must calculate the change in landscape value score for the proposal area using Equation 4 in Appendix 1 of the FBA.

$$\begin{aligned}
 \text{Impact of development on landscape scale attributes} &= \text{CURRENT} - \text{FUTURE} \\
 &= (A+B +D+E) - (A+B) \\
 &= (0.6+5.1+0+12) - (0.6+4.5) = 12.60
 \end{aligned}$$

Where:

a = score for percent extent native vegetation cover in accordance with Appendix 4

b = score for percent native vegetation cover within an inner assessment circle for the site calculated in accordance with Appendix 4

d = connectivity value score for the Major Proposal determined in accordance with Appendix 4

e = total patch size score determined in accordance with Appendix 4.

The landscape value score is 12.60.

## 2.10 SUMMARY OF LANDSCAPE VALUE SCORE COMPONENTS

- Current native vegetation cover extent:
  - Inner assessment circle = 31%
  - Outer assessment circle = 19%
- Future native vegetation cover extent:
  - Inner assessment circle = 30%
  - Outer assessment circle = 19%
- Connectivity value = 0
- Patch size = 12
- Landscape value score = 12.60

## 3 NATIVE VEGETATION

### 3.1 PLANT COMMUNITY TYPES

#### 3.1.1 Vegetation communities

Four distinct Plant Community Types (PCTs) were observed in the proposal area. These include:

1. Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones
2. Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion
3. Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
4. Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones

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

#### Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (PCT 170)

Within the proposal area, PCT 170 occurred within the proposed transmission line and in remnant patches within the proposal area (Figure 3-1 **Error! Reference source not found.**). The proposal will require complete removal of this community within the proposal area including within the proposed transmission line. This vegetation community is not listed as an EEC under the TSC Act or EPBC Act<sup>1</sup>.

The dominant tree species in the community consisted of White Mallee *Eucalyptus dumosa* and Red Mallee *E. socialis*. The mid-storey was generally open, with sparse shrubs including Thorny Saltbush *Rhagodia spinescens*, Ruby saltbush *Enchylaena tomentosa*, Emubush *Eremophila longifolia*, Black Bluebush *Maireana pyramidata* and Grey Copperburr *Sclerolaena diacantha*. The understorey was generally dominated by a diverse assemblage of exotic grass and forb species including Barley Grass *Hordeum leporinum*, Smooth Mustard *Sisymbrium erysimoides*, Wiry Noon-flower *Psilocaulon tenue*, Wolly Burr-medic *Medicago minima* and Wards Weed *Carrichtera annua*. A minor native understorey component was also apparent and included species such as Speargrass *Austrostipa scabra*, Crassula *Crassula colorata*, Calandrinia *Calandrinia eremaea*, Bluebells *Wahlenbergia luteola* and Ground-heads *Chthonocephalus pseudevax*.

Table 3-1 Summary of Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone of the proposal area.

Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone	
<b>Vegetation formation</b>	Semi-arid woodlands (shrubby)
<b>Vegetation class</b>	Sand Plain Mallee Woodlands

<sup>1</sup> Email advice received from Miranda Kerr (OEH Biobanking team) regarding EEC classification 9/11/2016

Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone		
<b>Vegetation type</b>	<b>Plant Community Type (PCT) ID</b>	170
	<b>Biometric Vegetation Type ID</b>	LA131, LM116, MR542, MU534, WE83
	<b>Common Community Name</b>	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone
<b>Approximate extent within proposal</b>	This vegetation community includes the majority of native vegetation within the proposal area of which 9.59 ha is proposed to be cleared (Figure 3-1)	
<b>Condition</b>	Moderate to good	
<b>Survey Effort</b>	6 biometric plots (approximately 18 hours)	
<b>Conservation Status</b>	This vegetation community is not listed as an endangered ecological community (EEC) under the TSC Act or the EPBC Act <sup>2</sup> .	
<b>Estimate of percent cleared</b>	90%	
<b>Threatened plant species habitat</b>	Within the disturbed remnant patches, this community provides habitat for threatened flora species, including, A spear-grass <i>Austrostipa metatoris</i> , Bitter Quandong <i>Santalum murrayanum</i> and the Winged Peppercress <i>Lepidium monoplacoides</i> .	
<b>Fauna Habitat</b>	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. The mid-storey provides foraging and nesting habitat for smaller birds, as well as refuge for small-medium sized mammals and reptiles. Ground cover plants, logs and fallen leaves also provide shelter and foraging habitat for terrestrial fauna. Where hollow-bearing trees are present, they may provide daytime resting habitat for bats and mammals, and roosting habitat for birds.	

<sup>2</sup> Email advice received from Miranda Kerr (OEH Biobanking team) regarding EEC classification 9/11/2016

### Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone

#### Example



Figure 3-1 Example of moderate to good condition Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zone in the proposal area.

### Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion

Within the proposal area, PCT 58 occurred within the proposed transmission line in the north-east region (Figure 3-2). The proposed above ground transmission line will require some clearing of this community. This vegetation community is not listed as an EEC under the TSC Act or EPBC Act<sup>1</sup>.

The over-storey component of this community was dominated by Black Oak *Casuarina pauper*. The open mid-storey consisted of shrubs including Copperburr (*Sclerolaena obliquicuspis*), Ruby saltbush *Enchylaena tomentosa* and Grey Copperburr *Sclerolaena diacantha*. The understorey consisted of a diverse assemblage of native and exotic species including Wolly Burr-medic *Medicago minim*), Common White Sunray *Rhodanthe floribunda*, Wards Weed *Carrichtera annua*, Speargrass *Austrostipa scabra*, Crassula *Crassula colorata*, Calandrinia *Calandrinia eremaea*, Bluebells *Wahlenbergia luteola* and Ground-heads *Chthonocephalus pseudevax*.



Table 3-2 Summary of Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion in the proposal area.

Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion		
<b>Vegetation formation</b>	Semi-arid woodlands (shrubby)	
<b>Vegetation class</b>	Semi-arid Sand Plain Mallee Woodlands	
<b>Vegetation type</b>	<b>Plant Community Type (PCT) ID</b>	58
	<b>Biometric Vegetation Type ID</b>	LA111, LM108, MR521, MU517, WE86
	<b>Common Community Name</b>	Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion
<b>Approximate extent within proposal</b>	This vegetation community occurs in the north-east of the proposal area of which 1.23 ha is proposed to be cleared (Figure 3-2).	
<b>Condition</b>	Moderate to good	
<b>Survey Effort</b>	2 biometric plots (approximately 6 hours)	
<b>Conservation Status</b>	This vegetation community is not listed as an endangered ecological community (EEC) under the TSC Act or the EPBC Act <sup>1</sup> .	
<b>Estimate of percent cleared</b>	75%	
<b>Threatened plant species habitat</b>	Within the disturbed remnant patches, this community provides habitat for threatened flora species, including, A spear-grass <i>Austrostipa metatoris</i> , Bitter Quandong <i>Santalum murrayanum</i> and the Winged Peppercress <i>Lepidium monoplacoides</i> .	
<b>Fauna Habitat</b>	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. The mid-storey provides foraging and nesting habitat for smaller birds, as well as refuge for small-medium sized mammals and reptiles. Ground cover plants, logs and fallen leaves also provide shelter and foraging habitat for terrestrial fauna. Where hollow-bearing trees are present, they may provide daytime resting habitat for bats and mammals, and roosting habitat for birds.	

**Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion**

**Example**



Figure 3-2 Example of moderate to good condition Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion in the proposal area.

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

Within the proposal area, PCT 16 occurred as a small isolated remnant patch in the south-east of the proposal area (Figure 3-3). The proposal will require some clearing of this community. This vegetation community is not listed as an EEC under the TSC Act or EPBC Act.

The over-storey component of this community was dominated by Black Box *E. Largiflorens*. The mid-storey was dominated by shrubs including Copperburr *Sclerolaena obliquicuspis* and Thorny Saltbush *Rhagodia spinescens*. The understorey was dominated by exotic species including Barley Grass *Hordeum leporinum* and Smooth Mustard *Sisymbrium erysimoides*.

Table 3-3 Summary of Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) in the proposal area.

Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)		
<b>Vegetation formation</b>	Semi-arid woodlands (grassy)	
<b>Vegetation class</b>	Inland Floodplain Woodlands	
<b>Vegetation type</b>	<b>Plant Community Type (PCT) ID</b>	16
	<b>Biometric Vegetation Type ID</b>	LA109, LM104, MR518, MU514, WE126
	<b>Common Community Name</b>	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
<b>Approximate extent within proposal</b>	This vegetation community occurs as a small isolated remnant patch in the south east in the proposal area of which 0.01 ha is proposed to be cleared (Figure 3-3).	
<b>Condition</b>	Moderate to good	
<b>Survey Effort</b>	1 biometric plot (approximately 3 hours)	
<b>Conservation Status</b>	This vegetation community is not listed as an endangered ecological community (EEC) under the TSC Act or the EPBC Act.	
<b>Estimate of percent cleared</b>	60%	
<b>Threatened plant species habitat</b>	Within the disturbed remnant patches, this community provides habitat for threatened flora species, including, A spear-grass <i>Austrostipa metatoris</i> , Bitter Quandong <i>Santalum murrayanum</i> and the Winged Peppercress <i>Lepidium monoplacoides</i> .	
<b>Fauna Habitat</b>	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. The mid-storey provides foraging and nesting habitat for smaller birds, as well as refuge for small-medium sized mammals and reptiles. Ground cover plants, logs and fallen leaves also provide shelter and foraging for terrestrial fauna. Where hollow-bearing trees are present, they may provide daytime resting habitat for bats and mammals, and roosting habitat for birds.	

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

**Example**



Figure 3-3 Example of moderate to good condition Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) in the proposal area.

**Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones**

Within the proposal area, PCT 23 occurred as remnant patches within the proposed transmission line in the north-east and the south-east regions of the proposal area. This vegetation community is listed as an EEC under the TSC Act – *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression Bioregions. The proposal will require some clearing of this community in both the north-east and south-east regions of the proposal area (Figure 3-4).

This over-storey component of this community was dominated by Yarran *Acacia melvillei*. The understorey consisted of a diverse assemblage of native and exotic species including Grey Copperburr *Sclerolaena diacantha*, Copperburr *Sclerolaena obliquicuspis*, Wolly Burr-medic *Medicago minima*, Wards Weed *Carrichtera annua*, Speargrass *Austrostipa scabra*, *Brachyscome dentate*, Hairy Rupturewort *Herniaria cinerea* and Perennial Ryegrass *Lolium perenne*.



Table 3-4 Summary of Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zone in the proposal.

Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zone		
<b>Vegetation formation</b>	Semi-arid woodlands (shrubby)	
<b>Vegetation class</b>	Riverine Sandhill Woodlands	
<b>Vegetation type</b>	<b>Plant Community Type (PCT) ID</b>	23
	<b>Biometric Vegetation Type ID</b>	LA224, LM160, MR646, MU609, NA180, WE82
	<b>Common Community Name</b>	Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zone
<b>Approximate extent within proposal</b>	This vegetation community occurs in the north-east and the south-east of the proposal area of which 1.29 ha is proposed to be cleared (Figure 3-4).	
<b>Condition</b>	Moderate to good	
<b>Survey Effort</b>	3 biometric plots (approximately 9 hours)	
<b>Conservation Status</b>	<b>This vegetation community is listed as an endangered ecological community (EEC) under the TSC Act – Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression Bioregions.</b>	
<b>Estimate of percent cleared</b>	75%	
<b>Threatened plant species habitat</b>	Within the disturbed remnant patches, this community provides habitat for threatened flora species, including, A spear-grass <i>Austrostipa metatoris</i> , Bitter Quandong <i>Santalum murrayanum</i> and the Winged Peppercress <i>Lepidium monoplacoides</i> .	
<b>Fauna Habitat</b>	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. The mid-storey provides foraging and nesting habitat for smaller birds, as well as refuge for small-medium sized mammals and reptiles. Ground cover plants, logs and fallen leaves also provide shelter and foraging habitat for terrestrial fauna. Where hollow-bearing trees are present, they may provide daytime resting habitat for bats and mammals, and roosting habitat for birds.	

Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zone

Example



Figure 3-4 Example of moderate to good condition Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zone in the proposal area.

Cleared areas (exotic dominated cropped land)

This highly disturbed or modified vegetation community occupies the majority of the site and is found where there is a prevalence of exotic or planted non-local flora species that make up groundcover layers and is confined to cropped land areas (Figure 3-5). Non-indigenous vegetation covers the majority of the proposal area, making it the most abundant community in the proposal area. The groundcover is mainly exotic with common crop species including Wheat *Triticum aestivum* and Lucerne *Medicago sativa*.

As this vegetation often lacked a native canopy cover and was either cleared or had over 50 % exotic species composition in the ground cover, then in accordance with the FBA, this vegetation community does not need to be assessed further.



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



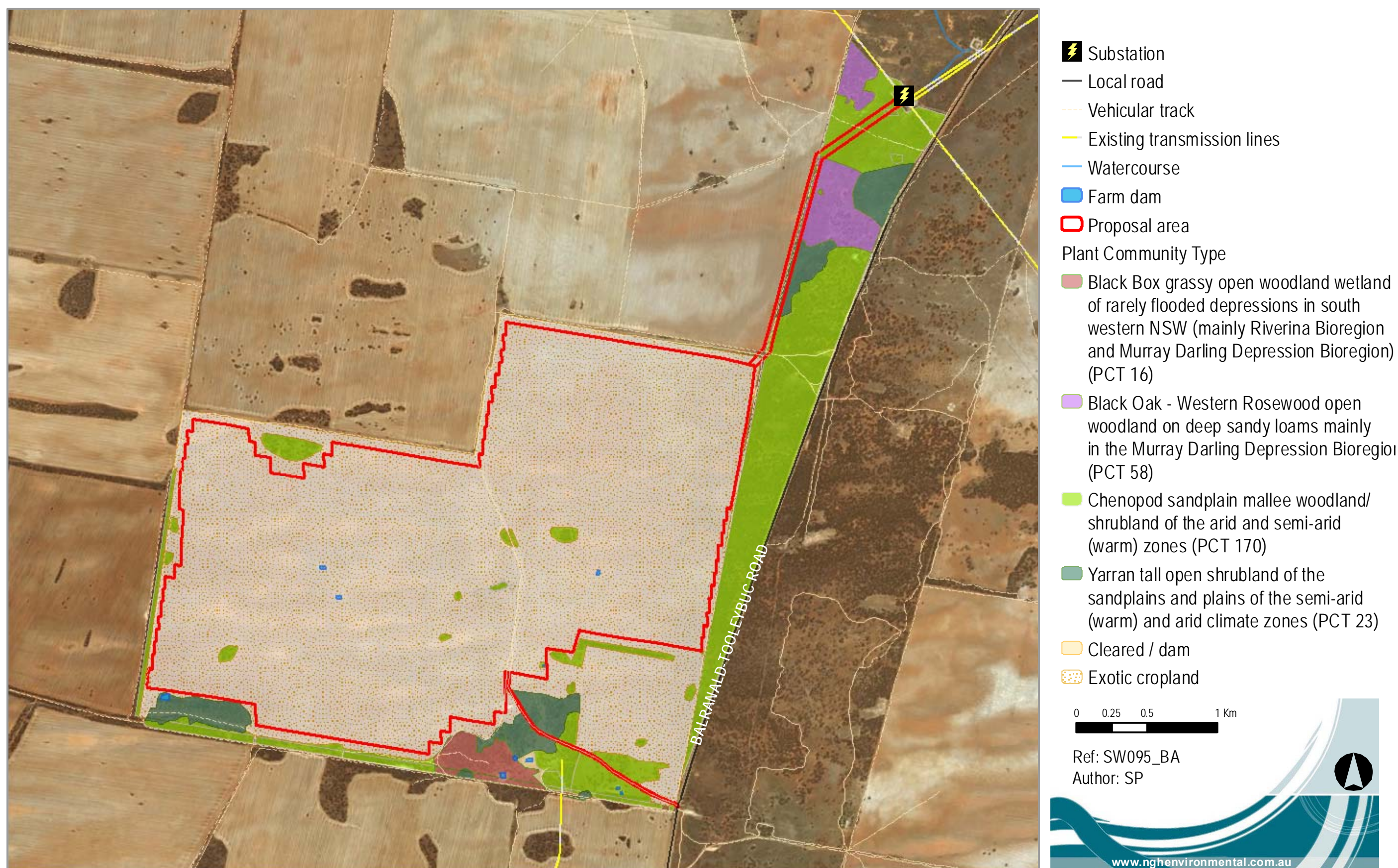


Figure 3-6 PCTs within the proposal area



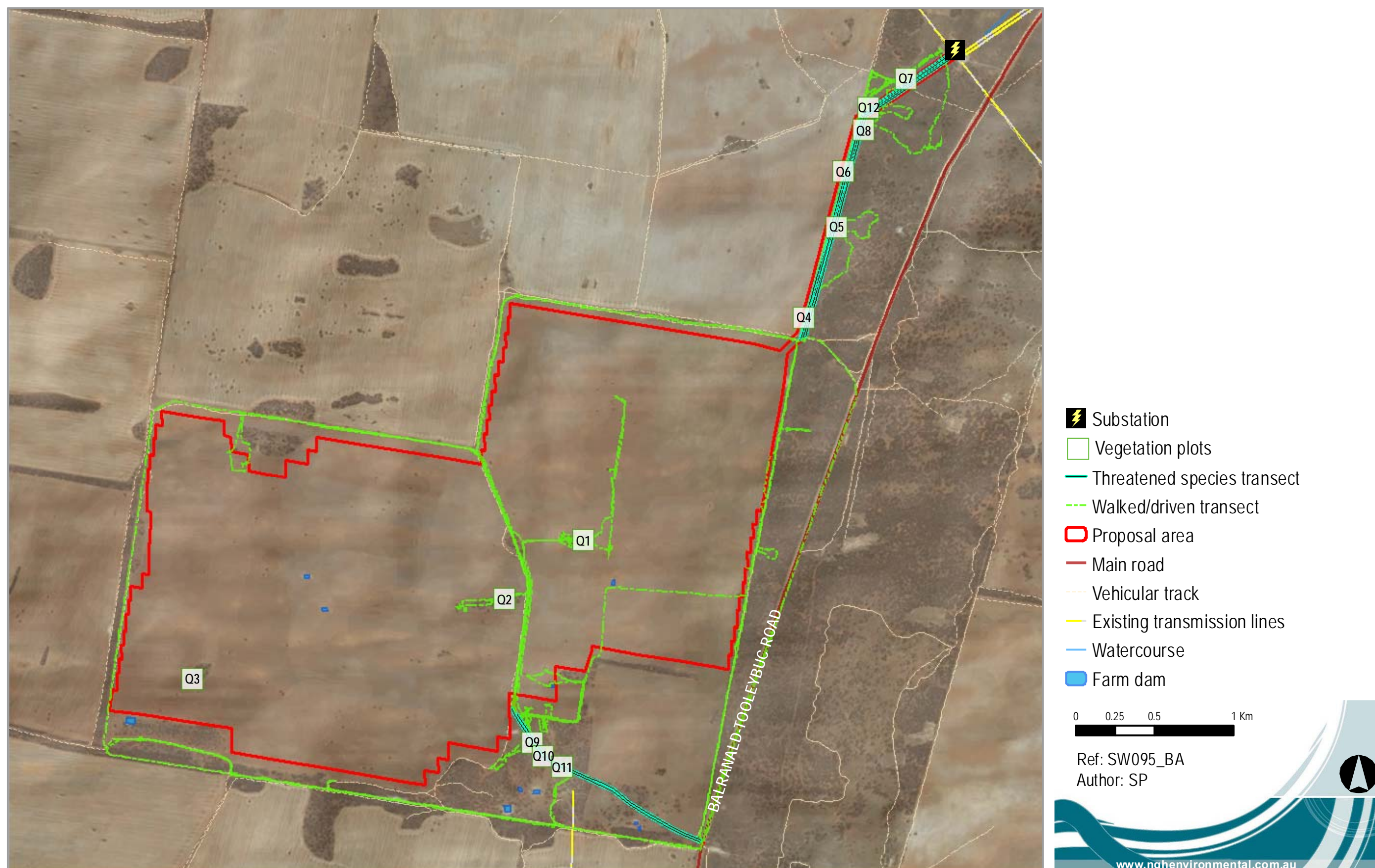


Figure 3-7 Plot and transect locations relative to PCTs and Condition Class in the proposal area



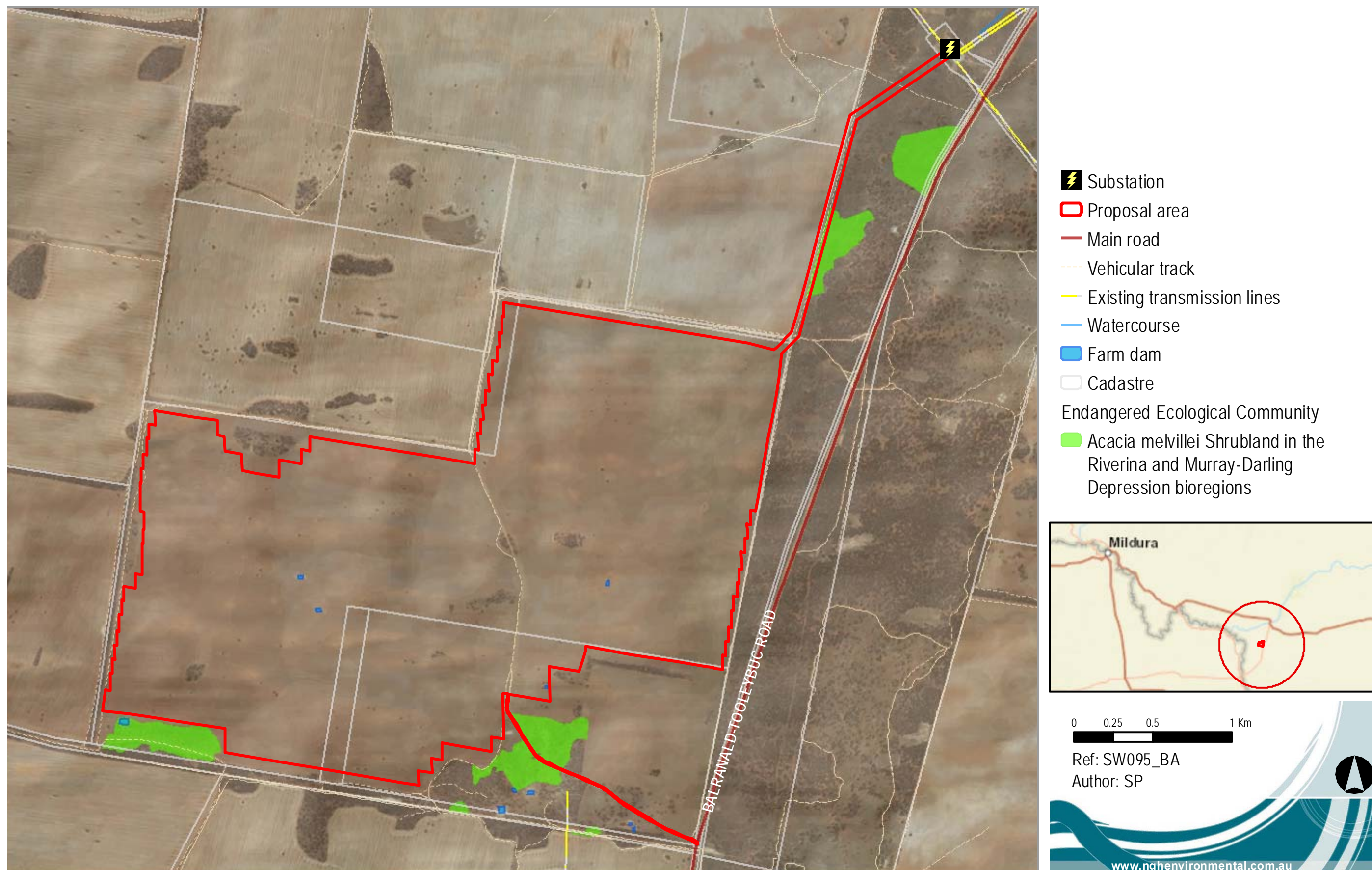


Figure 3-8 EECs within the proposal area

### 3.1.2 Vegetation zones in the BCC

The vegetation zones that would be impacted by the proposal, as 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 3-5 Vegetation zones within the proposal

Zone ID	Vegetation zones	Condition class	Area (ha) within proposal area	Survey effort (number of plots)	Site value score (current)
1	PCT #170 BVT # MU534 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate - good	9.59	6	51.85
2	PCT #23 BVT # MU609 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Moderate - good	1.29	3	44.62
3	PCT # 16 BVT # MU514 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate - good	0.01	1	40.00
4	PCT # 23 BVT # 517 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate - good	1.23	2	61.46

Notes:

- Threatened species subzones / management zones were entered equivalent to the vegetation zones. No additional polygons were mapped.
- No vegetation zones had site value scores of <17.

### 3.1.3 Site values (plot data entered into BCC)

The following plot data was collected in November 2016 for vegetation zones 1, 2, 3 and 4. The management scores *with development* have been entered as 9.59 ha for zone 1, 1.29 ha for zone 2, 0.01 ha for zone 3 and 1.23 ha for zone 4— that is, total removal of vegetation that would result from the development.

Table 3-6 Plot data

**PCT #170 BVT # MU534 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones**

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	Overstory regeneration	Total length of fallen logs	Easting	Northing	Zone
Q1	8	3.6	0	0	20	2	50	0	0	12.7	728719	6145838	54
Q2	22	6.5	0	3	29	14	39	0	0	47.8	728217	6145468	54
Q3	10	7.5	0	0	14	7	45	2	1	5	726247	6144963	54
Q4	14	2.5	0	4	19	3	20	2	0	59.8	730115	6147250	54
Q7	15	0	0	0	22	32	45	0	0	21	730761	6148763	54
Q12	15	0	0	26	1	10	26	0	0	0	730526	6148577	54

**PCT #23 BVT # MU609 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones**

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	Overstory regeneration	Total length of fallen logs	Easting	Northing	Zone
Q5	17	0	0	19	4	17	12	0	0	0	730321	6147823	54
Q9	13	2	3	9	18	4	15	1	0	15	728395	6144562	54
Q11	12	7	0	5	10	1	22	0	0	0	728588	6144406	54

**PCT # 16 BVT # MU514 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression 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	Overstory regeneration	Total length of fallen logs	Easting	Northing	Zone
Q10	13	2.5	0.5	7	31	0	10	0	0	17	728462	6144476	54

**PCT # 23 BVT # 517 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression 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	Overstory regeneration	Total length of fallen logs	Easting	Northing	Zone
<b>Q6</b>	19	0	0	3	14	18	35	1	0	6.1	730364	6148173	54
<b>Q8</b>	12	8	1	4	26	4	10	0	1	11.1	730490	6148436	54



## 4 THREATENED SPECIES

### 4.1 ECOSYSTEM CREDIT SPECIES

The following habitat feature was entered for the proposal area, in the Geographic / habitat feature tab of the BCC.

Table 4-1 Geographic / habitat features

Impact?	Common name	Scientific name	Feature
Yes	Winged Peppercress	<i>Lepidium monoplacoides</i>	Land containing seasonally damp or waterlogged sites
Yes	Bitter Quandong	<i>Santalum murrayanum</i>	Land west of Moulamein in the Murrumbidgee CMA sub-region

The Black-breasted Buzzard *Hamirostira malanosternon* was identified as potentially occurring within the site by the BCC, however the lack of riparian vegetation precludes this species from being included in the assessment. Similarly, the Grey Falcon *Falco hypoleucos* was precluded as the site does not contain 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.

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
Bush Stone-curlew	<i>Burhinus grallarius</i>	2.6
Chestnut Quail-thrush	<i>Cinclosoma castanotum</i>	1.3
Corbans Long-eared Bat	<i>Nyctophilus corbeni</i>	2.1
Diamond Firetail	<i>Stagonopleura guttata</i>	1.3
Gilberts Whistler	<i>Pachycephala inornata</i>	1.3
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis subsp. temporalis</i>	1.3
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata subsp. cucullata</i>	1.7
Little Eagle	<i>Hieraaetus morphnoides</i>	1.4
Major Mitchells Cockatoo	<i>Lophochroa leadbeateri</i>	1.9
Painted Honeyeater	<i>Grantiella picta</i>	1.3

Common name	Scientific name	TS offset multiplier
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
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1.3

## 4.2 SECRETARY ENVIRONMENTAL ASSESSMENT REQUIREMENTS SPECIES

The SEARs for the proposal does not specifically detail any species, communities or populations that must be considered, however a letter of advice from OEH to DP&E identifies several threatened species and ecological communities considered to require further assessment.

The following are detailed within the advice letter as requiring further assessment under Section 9.2 of the FBA.

Common name	Scientific name	Condition
<i>Acacia melvillei</i> shrubland in the Riverina and Murray-Darling Depression bioregions		
A spear-grass	<i>Austrostipa metatoris</i>	
Black Falcon	<i>Falco subniger</i>	Nest trees only
Little Eagle	<i>Hieraaetus morphnoides</i>	Nest trees only
Spotted Harrier	<i>Circus assimilis</i>	Nest trees only
Bitter Quandong	<i>Santalum murrayanum</i>	

Targeted surveys were conducted for these species and their habitats.

## 4.3 SPECIES CREDIT SPECIES PRESENT

### 4.3.1 Candidate species

The following species were returned by the BCC as requiring survey. The table below states whether each species was detected during surveys and furthermore, if they are expected to be impacted by the proposal and therefore are required to be offset. It is noted that no species credit species were detected during surveys.

Table 4-3 Threatened species requiring survey

Common name	Scientific name	Surveys	Present/presumed present	Affected by the proposal
Winged Peppergrass	<i>Lepidium monoplacoides</i>	Not detected	No	Unlikely – not recorded within the proposal area, only one record within 20 km of site, marginal habitat
A spear-grass	<i>Austrostipa metatoris</i>	Not detected	No	Unlikely – not recorded within the proposal area
Grey Falcon	<i>Falco hypoleucos</i>	Not detected	No	Unlikely – not recorded within the proposal area
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Not detected	No	Unlikely – not recorded within the proposal area
Bitter Quandong	<i>Santalum murrayanum</i>	Not detected	No	Unlikely – not recorded within the proposal area

#### 4.3.2 Targeted surveys

Comprehensive and targeted survey methods and results are included below. The following section sets out the surveys undertaken that underpin the knowledge of the proposal area. This information is used in the BCC assessment and particularly, to support the decisions regarding candidate species that would be affected by the proposal. Section 6.2.2 also addresses this issue.

Flora and fauna field surveys were undertaken in November 2016 to ensure that all species likely to be occurring within the proposal area could be detected, and in accordance with the threatened species survey timing matrix produced by the BCC. This includes flowering times of threatened flora and maximum activity times of threatened fauna likely to be occurring within the proposal area.

#### Site surveys

##### AIMS

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 targeted 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.

## TARGETED SEARCHES FOR THREATENED FLORA SPECIES

Targeted surveys were conducted within suitable habitat for threatened flora species predicted to occur within the proposal area as determined by habitat evaluations, previous records in the local area and the BCC. These species included Winged Peppergrass *Lepidium monophlooides*, A spear-grass *Austrostipa metatoris* and Bitter Quandong *Santalum murrayanum*. Surveys were undertaken within the optimal detection period for all species (i.e. flowering/ fruiting period).

Surveys were conducted in accordance with the NSW Guide to Surveying Threatened Plants, and included formal linear transects within the proposal area, in addition to random meanders (after Cropper 1993) across all areas of suitable habitat. Formal linear transects (parallel field traverses) were walked by two surveyors at a distance of 10 m. Transects were walked within linear corridors, and random meanders were conducted within discrete vegetation patches. A total of 8 km of linear transects were completed within the north-east portion of the proposal area, with a further 3 km of linear transects conducted within the south-east portion of the proposal area. Additional random meander transects were conducted within all vegetation survey plots and within discrete patches of vegetation in the central areas of the proposal area.

This method provides a comprehensive approach in terms of detecting species and variation within vegetation types, and improves opportunities for detecting significant or sparsely distributed plant species.

Approximately 30 hours were spent surveying the proposal area to search for threatened plant species and assess the condition and extent of vegetation communities present in the proposal 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 (2014). The plots were placed using a stratified approach to ensure that all native vegetation types were adequately surveyed. In total, twelve plots were surveyed within the proposal area. These vegetation plots were undertaken utilising the methodology presented in BBAM 2014. Each vegetation plot was assigned to a suitable PCT, as per the OEH Vegetation Information System Classification database.

Vegetation plots included:

- 1 plot was conducted in moderate to good condition Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- 2 plots were conducted in moderate to good condition Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion
- 6 plots were conducted in moderate to good condition Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones
- 3 plots were conducted in moderate to good condition Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones

Locations of all vegetation plots have been mapped (Figure 3-7).

## FAUNA HABITAT ASSESSMENT

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

Over 200 isolated trees have been previously identified within the proposal area. A number of these were considered to be potentially hollow-bearing. An assessment was undertaken of all accessible trees within the proposal area to record the species, presence of hollows, tree height, diameter and number, and size and location of hollows. Photographs were taken of each tree surveyed.

Where paddock trees were not accessible, they were assessed visually from a distance, and a ratio of likely hollows applied based on previous counts of trees of the same genus and age class within other portions of the proposal area. Fifty-one isolated paddock trees were surveyed by direct observation, with a further 41 trees identified to genus level from a distance.

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

Approximately 22 hours were spent assessing fauna habitat within the proposal area.

### OPPORTUNISTIC

An opportunistic record of fauna species observed during the fauna assessments was also taken.

### TARGETED FAUNA SURVEYS

A detailed literature review was undertaken prior to commencement of surveys to determine nest tree requirements for target species. This literature review determined that the majority of species utilised previously constructed raptor or corvid nests, often in larger or dead trees elevated above the general canopy of wooded areas. Using this as a basis for surveys, all trees were inspected, and those containing stick nests thoroughly checked for signs of current or recent occupation.

Additionally, bird surveys were undertaken throughout the survey period. Approximately 40 hours were spent traversing the site, inspecting trees for hollows and stick nests, covering all portions of the proposal area. If raptors were detected, they would be identified to species level utilising distinguishing features listed in Debus (2012). Where species-level identification was not possible, high resolution photographs were taken using a digital single lens reflex camera with telephoto lens. Target species included:

- Black Falcon *Falco subniger* Nest trees only
- Little Eagle *Hieraaetus morphnoides* Nest trees only
- Spotted Harrier *Circus assimilis* Nest trees only
- Grey Falcon *Falco hypoleucos*
- Black-breasted Buzzard *Hamirostra melanosternon*

These bird surveys were used to target the threatened species predicted to occur in the proposal area and the threatened species requiring survey through the BCC.

### OTHER THREATENED SPECIES OF NOTE

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

Table 4-4:

Table 4-4 Other threatened species of note identified in background searches with previous records within a 10 km radius:

Common name / Status (TSC Act, EPBC Act)	Scientific name	Number of records (OEH/AoLA/NGH)*	Suitable habitat within the proposal area	Surveys	Present/presumed present	Affected by the proposal
Brown Treecreeper (Eastern subspecies) (V/-)	<i>Climacteris picumnus victoriae</i>	1/2/0	Marginal	Not detected	Not associated with PCTs present on site, records in the locality but unlikely to utilise proposal area as core habitat	Unlikely
Freckled Duck (V/-)	<i>Stictonetta naevosa</i>	1/0/0	Marginal	Not detected	Not presumed present, only two small waterbodies on site, unlikely to utilise these areas as core habitat	Unlikely
Grey-crowned Babbler (Eastern subspecies) (V/-)	<i>Pomatostomus temporalis temporalis</i>	3/10/1 (adjacent)	Suitable	Detected adjacent to proposal area	Yes, presumed present, suitable habitat present and records adjacent to proposal area	Unlikely
Major Mitchell's Cockatoo (V/-)	<i>Lophochroa leadbeateri</i>	7/12/2	Suitable	Detected within proposal area	Yes, known to occur within moderate - good quality native vegetation within and adjacent to proposal area	Likely, included in offset calculator
Regent Parrot (Eastern subspecies) (E/V)	<i>Polytelis anthopeplus monarchoides</i>	2/0/3	Suitable	Detected within proposal area	Yes, known to occur within moderate - good quality native vegetation within and adjacent to proposal area	Likely, included in offset calculator
Southern Bell Frog (E/V)	<i>Litoria raniformis</i>	2/0/0	No	Not detected	Not presumed present	Unlikely
Spotted Harrier (V/-)	<i>Circus assimilis</i>	1/4/0	Suitable	Not detected	Yes, record immediately south of proposal area, suitable habitat present	Likely, included in offset calculator
Rainbow Bee-eater (-/M)	<i>Merops ornatus</i>	0/8/1	Suitable	Detected within	Yes, record immediately south of proposal area,	Likely, included



Common name / Status (TSC Act, EPBC Act)	Scientific name	Number of records (OEH/AoLA/ NGH)*	Suitable habitat within the proposal area	Surveys	Present/presumed present	Affected by the proposal
				proposal area	suitable habitat present	in offset calculator

\*Office of Environment and Heritage BioNet Atlas of NSW Wildlife (OEH), Atlas of Living Australia (AoLA), NGH Current Survey (NGH)

## PREVIOUS SURVEYS CONDUCTED IN THE LOCAL AREA

In addition to the current surveys undertaken for the proposal area, an initial site survey was undertaken by NGH Environmental in August 2016. It is understood that Birds Australia atlas surveys have been undertaken within vegetation to the north and south of the proposal area, within Murrumbidgee State Conservation Area and along the Wakool river to the south of the proposal area. Additionally, Biosis Pty. Ltd. recently conducted surveys to assess a development proposal immediately north of the proposal area. Review of the preliminary environmental assessment (EMM, 2016) indicated that Biosis detected Major Mitchell's Cockatoo during the survey, however the exact location of the record is not yet available via BioNet.

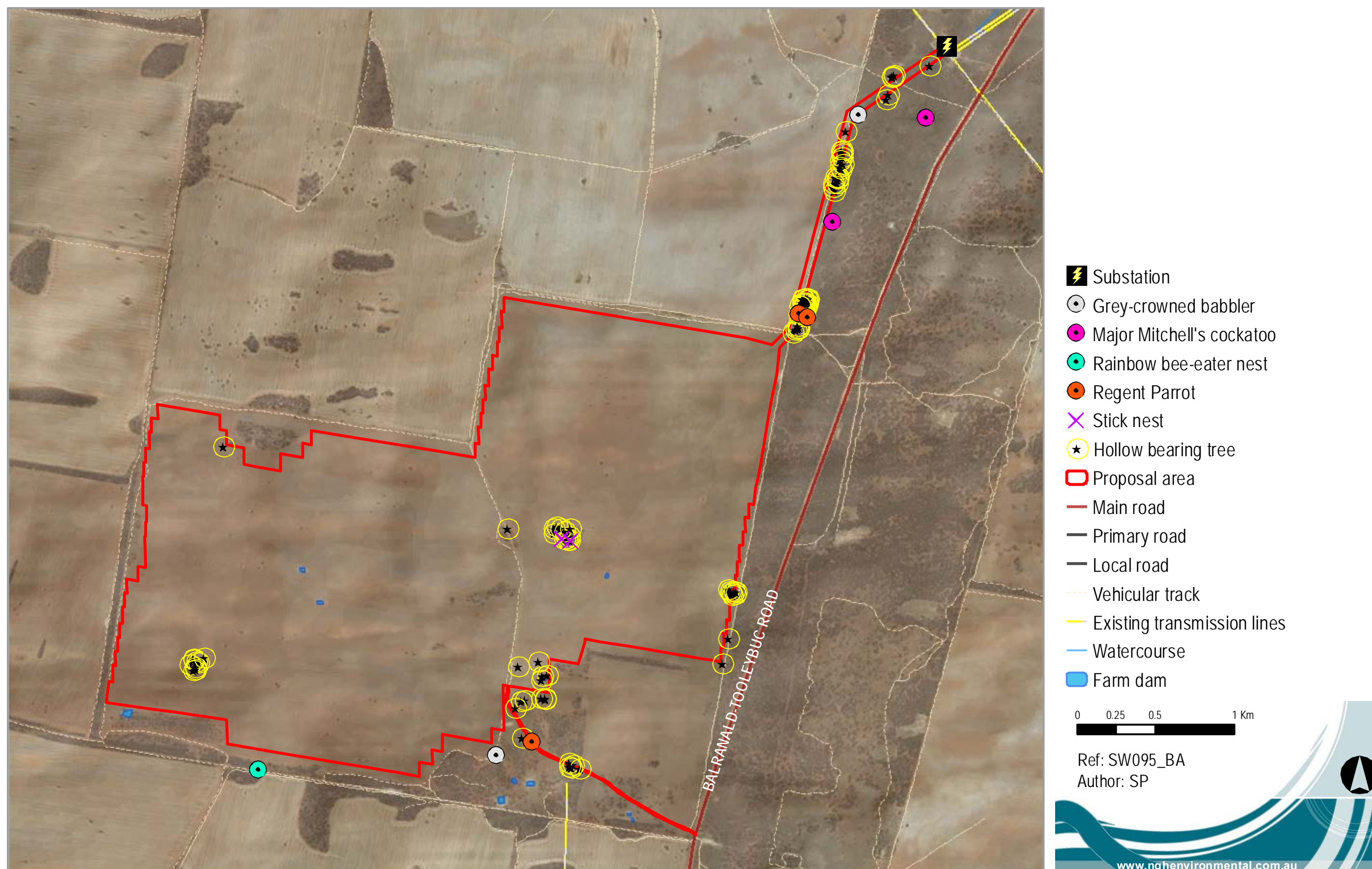


Figure 4-1 Fauna survey results

### Weather conditions during the field surveys

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

Date	Temperature min (°C)	Temperature max (°C)	Rain (mm)	Wind speed @ 9am (km/h)
31/10/2016	6.1	20.0	0	4
01/11/2016	7.3	20.5	0	2
02/11/2016	9.0	22.8	0	7
03/11/2016	10.0	25.5	0	4
04/11/2016	9.1	-	0	7

### 4.3.3 Survey results

Seventy-three flora species and 33 fauna species were detected during the surveys. Three threatened species and one migratory species listed under the NSW TSC Act and EPBC Act were detected during the survey, including:

- Grey-crowned Babbler (Eastern subspecies) *Pomatostomus temporalis temporalis* – Vulnerable (TSC Act)
- Major Mitchell's Cockatoo *Lophochroa leadbeateri* – Vulnerable (TSC Act)
- Regent Parrot (Eastern subspecies) *Polytelis anthopeplus monarchoides* – Endangered/ Vulnerable (TSC Act/ EPBC Act)
- Rainbow Bee-eater *Merops ornatus* – Marine/migratory (EPBC Act)

Four threatened species returned by the BCC assessment as requiring survey (and therefore with potential to generate species credits) were considered to have some potential to occur in the proposal area, however, based on the extensive survey effort undertaken within the optimal season (described in Section 4.3.2) and the areas that would be impacted by the proposal, none of these threatened species were considered likely to be *adversely impacted* by the proposal. These species included:

- A spear-grass *Austrostipa metatoris* Vulnerable/ Vulnerable (TSC Act/ EPBC Act)
- Grey Falcon *Falco hypoleucos* Endangered (TSC Act)
- Bitter Quandong *Santalum murrayanum* Endangered (TSC Act)
- Winged Peppercreep *Lepidium monoplacoides* Endangered (TSC Act)

Species of note are discussed below to justify this assumption.

### Speargrass

Speargrass *Austrostipa metatoris* is listed as vulnerable under the TSC Act and EPBC Act. This species is a perennial spear-grass that grows in tussocks to one metre tall. The species grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Its associated species include *Eucalyptus populnea*, *E. intertexta*, *Callitris glaucophylla*, *Casuarina cristata*, *Santalum acuminatum* and *Dodonaea viscosa*. As such, areas of the proposal area constitute suitable habitat for the species.



This species has been previously recorded approximately 12 km to the south of the proposal area. Although targeted, this species was not recorded during the current surveys. The species can be difficult to differentiate from other *Austrostipa* species (OEH, 2016), however individuals of *Austrostipa* detected on site had fruiting bodies present, thus were positively identified to species level as *Austrostipa scabra*, utilising the descriptions provided on Plantnet (RBGS, 2016).

While the proposal area may contain some suitable habitat for this species and an individual has been recorded approximately 12 km to the south of the proposal area, considering the extensive survey effort with no plants recorded, **it is unlikely that a population of Speargrass (*Austrostipa metatoris*) would be impacted by the proposal.**

### Grey Falcon

Grey Falcon *Falco hypoleucos* is listed as endangered under the TSC Act. The species is a medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. It is associated with shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Therefore, suitable habitat is considered to occur within the proposal area.

This species has been previously recorded approximately 35 km to the north of the proposal area. Although targeted, this species was not recorded during the current surveys.

While the proposal area may contain some suitable habitat for this species and an individual has been recorded approximately 35 km to the north of the proposal area, considering the extensive survey effort with no individuals recorded, **it is unlikely that a population of Grey Falcon *Falco hypoleucos* relies on the site as permanent, long-standing habitat, and would therefore be unlikely to be impacted by the proposal.**

### Bitter Quandong

The Bitter Quandong *Santalum murrayanum* has been recorded approximately 25 km to the north-west of the site in cleared paddocks adjacent to a road verge, in mallee woodland. Although targeted, this species was not recorded during the current surveys. Species within the same genus were detected within the proposal area, however were identified to species level using the key provided on Plantnet (RBGS, 2016). The species is considered conspicuous, thus there is a high level of confidence that surveys would have detected the species if present.

While the proposal area may contain some marginal habitat for this species, considering the extensive survey effort and no previous records within 25 km of the proposal area, **it is unlikely that a population of a Bitter Quandong *Santalum murrayanum* would be impacted by the proposal.**

### Winged Peppercreess

The Winged Peppercreess *Lepidium monoplacoides* has been recorded approximately 15 km to the north of the site within vegetation contiguous with that occurring in the eastern portion of the proposal area. The species occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by Bulloak *Allocasuarina luehmannii* and/or eucalypts, particularly Black Box *Eucalyptus largiflorens* or Poplar Box *Eucalyptus populnea*. The field layer of the surrounding woodland is dominated by tussock grasses. The proposal area contains some habitat, albeit sub-optimal in that the soils are not considered heavy nor fertile. Although the species was targeted, this species was not recorded during the current surveys.



While the proposal area may contain some marginal habitat for this species, considering the extensive survey effort and no previous records within 15 km of the proposal area, **it is unlikely that a population of Winged Peppercress *Lepidium monolocoides* would be impacted by the proposal.**

#### 4.4 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:

- Seventeen ecosystem species credit species are relevant to the proposal. All of these are fauna species.
- Four species credit species were considered relevant to the proposal. These include one fauna species and three flora species.

These are listed in the table below.

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

Species returned by the BCC	Recorded within proposal area	Ecosystem credit species	Species credit species
<b>Flora</b>			
A spear-grass ( <i>Austrostipa metatoris</i> )	No	No	Yes
Bitter Quandong ( <i>Santalum murrayanum</i> )	No	No	Yes
Winged Peppercress ( <i>Lepidium monolocoides</i> )	No	No	Yes
<b>Fauna</b>			
Grey Falcon ( <i>Falco hypoleucos</i> )	No	No	Yes
Australian Bustard ( <i>Ardeotis australis</i> )	No	Yes	No
Bush Stone-curlew ( <i>Burhinus grallarius</i> )	No	Yes	No
Chestnut Quail-thrush ( <i>Cinclosoma castanotum</i> )	No	Yes	No
Corbens Long-eared Bat ( <i>Nyctophilus corbeni</i> )	No	Yes	No
Diamond Firetail ( <i>Stagonopleura guttata</i> )	No	Yes	No
Gilberts Whistler ( <i>Pachycephala inornata</i> )	No	Yes	No
Grey-crowned Babbler (eastern subspecies) ( <i>Pomatostomus temporalis</i> subsp. <i>Temporalis</i> )	No	Yes	No
Hooded Robin (south-eastern form) ( <i>Melanodryas cucullata</i> subsp. <i>Cucullata</i> )	No	Yes	No

Species returned by the BCC	Recorded within proposal area	Ecosystem credit species	Species credit species
Little Eagle ( <i>Hieraaetus morphnoides</i> )	No	Yes	No
Major Mitchells Cockatoo ( <i>Lophochroa leadbeateri</i> )	Yes	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 subsp. Monarchoides</i> )	Yes	Yes	No
Spotted Harrier ( <i>Circus assimilis</i> )	No	Yes	No
Varied Sittella ( <i>Daphoenositta chrysoptera</i> )	No	Yes	No

Notes:

- No species credit species were detected onsite. Therefore, no credits have been generated for species credit species.

## 5 AVOID AND MINIMISE IMPACTS

### 5.1 DIRECT IMPACTS

#### 5.1.1 Site selection and planning phase

Site selection for Sunraysia SF was constrained by minimising environmental impacts whilst also delivering the lowest cost for renewable energy integration into the Australian National Electricity Market.

The Sunraysia Solar Farm – Balranald was developed as a green field solar farm by Maoneng’s management team with the full understanding of options that were available at the time of site selection. This contrasts with the development of an asset through acquisition of a pre-developed site and provides the benefits of having engaged with local stakeholders during the site selection process.

Understanding of substation capacity is critical to utility scale solar power development. Having thoroughly examined various locations across NSW, Maoneng prioritised several non-congested areas of renewable energy penetration opportunities including but not limited to Balranald.

A Radial Risk Assessment constraints analysis was conducted by NGH Environmental centred on a substation which demonstrates the areas that were suitable for development near the selected substation. Land owners of low constraint conditions were contacted early on, and both technical and commercial discussions into the potential solar farm development occurred.

A preliminary constraints analysis informed the site layout design, with vegetation mapping conducted by NGH Environmental informing the layout. Vegetation constituting the highest ecological constraints such as forming components of EECs and providing threatened flora and fauna habitat were avoided as far as

practical, with the net outcome being an impact of only 12.11 ha of native vegetation removal, whilst still allowing for the development of approximately 815 ha (approximately 1.5% of the proposal area).

The Sunraysia SF site was finally selected through a rigorous process of commercial and technical discussions and reports (including the initial scoping study prepared by NGH Environmental) which ensures the lowest risk and environmental impact of the development. The final design footprint is detailed in Figure 5-1.



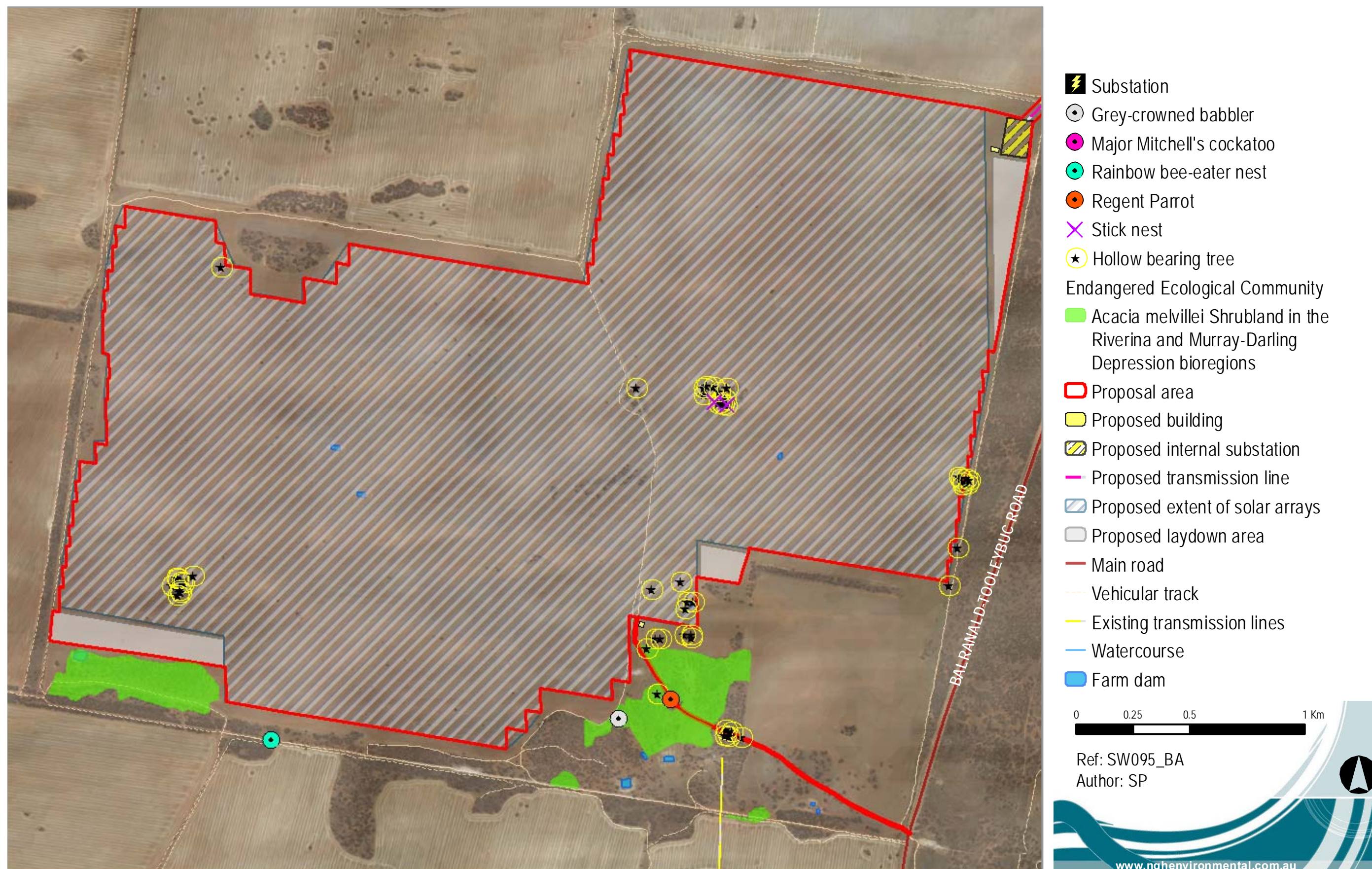


Figure 5-1 Proposed development and operational footprint - South



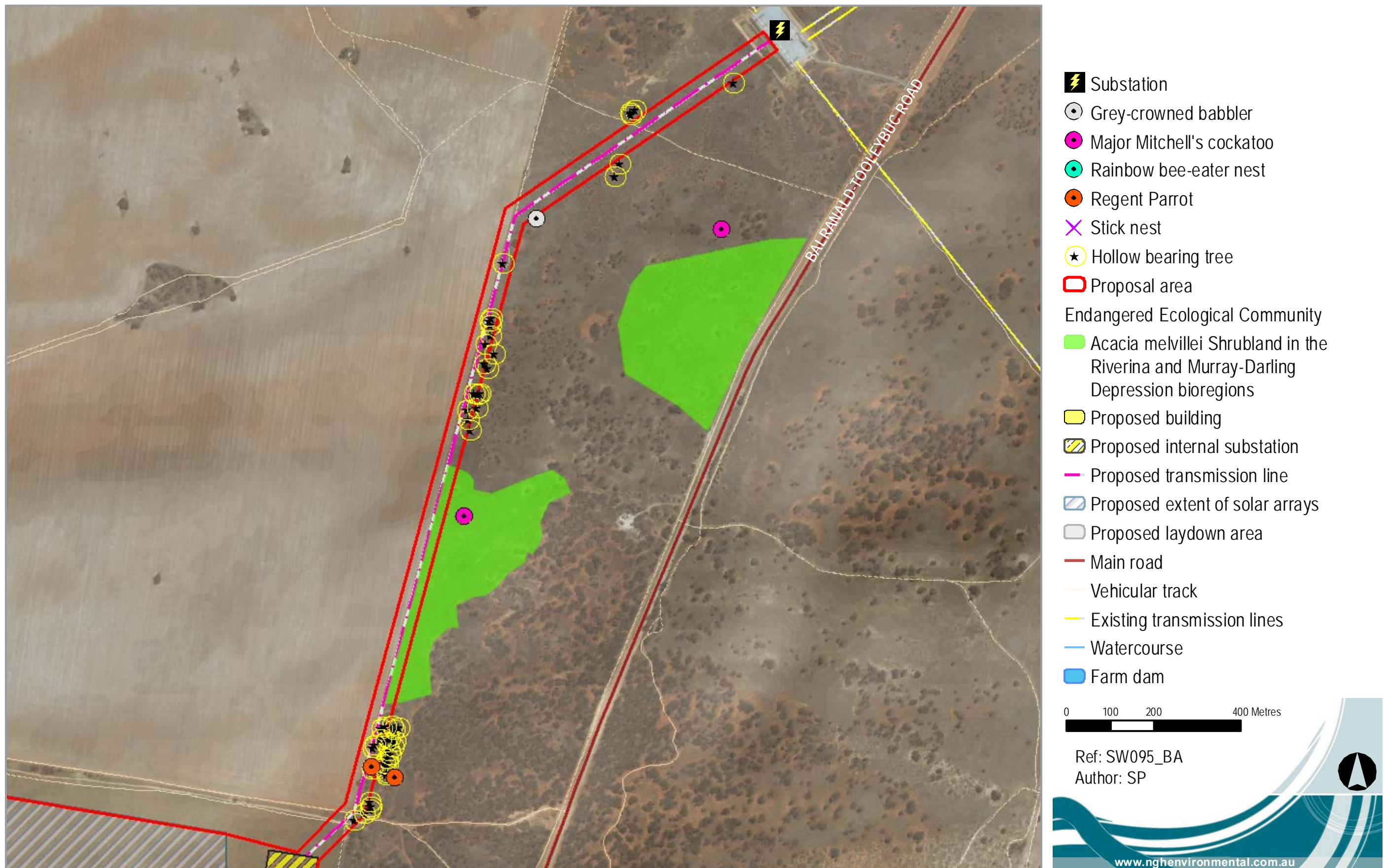


Figure 5-2 Proposed development and operational footprint - North

### 5.1.2 Construction phase

The construction phase of the proposal has the potential to impact a number of biodiversity values of the site. These are included in Table 5-1 below.

Table 5-1 Potential direct impacts to biodiversity during the construction phase

Impact	Frequency	Intensity	Duration	Consequence
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, transmission lines, compound sites, stockpile sites, access tracks)	Regular	High	Construction phase	<ul style="list-style-type: none"> <li>• Direct loss of native flora and fauna habitat</li> <li>• Potential clearing of habitat outside of the proposal area</li> <li>• Injury and mortality to fauna during clearing of fauna habitat</li> <li>• Introduction and spread of noxious weeds and pathogens</li> <li>• Disturbance to fallen timber, dead wood and bush rock</li> </ul>

A range of mitigation measures will 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 5-2. Mitigation measures have considered methods of clearing, clearing operations, timing of construction and other measures that would minimise impacts of the proposal on biodiversity values.

Table 5-2 Measures proposed to avoid and minimise direct impacts of the proposal during the construction phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
<b>Habitat clearance for permanent and temporary construction facilities</b>	<ul style="list-style-type: none"> <li>Direct loss of native flora and fauna habitat</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of a Flora and Fauna Management Plan (FFMP) that would incorporate mitigation strategies below. The FFMP would form part of the Sunraysia Solar Farm Construction Environmental Management Plan.</li> <li>A 'Clearing and Grubbing Plan' would be developed. This would include best practice methods for the removal of woody vegetation and non-woody vegetation.</li> <li>EEC areas to be retained would be delineated, and construction activities would be excluded from these areas. These areas are shown in Figure 5-1.</li> <li>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>.</li> <li>Where possible, native trees to be removed will be mulched on-site and re-used to stabilise disturbed areas.</li> <li>Minimise clearing of EEC, namely <i>Acacia melvillei</i> shrubland. Clearing and construction contractors should be given inductions that make clear the importance of the sensitive area habitat and its species.</li> </ul>	Pre-construction phase Construction phase	Minimise the impacts of habitat removal on native flora and fauna	Maoneng Australia Pty. Ltd. Contractor
	<ul style="list-style-type: none"> <li>Potential overclearing and/or</li> </ul>	<ul style="list-style-type: none"> <li>Stockpiling materials and equipment and parking vehicles will be avoided within the</li> </ul>	Construction phase	Prevention of over-clearing	Contractor



Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
	damage of habitat outside of the development footprint.	<p>dripline (extent of foliage cover) of any native tree.</p> <ul style="list-style-type: none"> <li>Stockpile and compound sites will be located using the following criteria: <ul style="list-style-type: none"> <li>Within the proposal area.</li> <li>In areas of low ecological conservation significance (i.e. pasture land).</li> </ul> </li> <li>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 EEC. The delineation of such a boundary may include the use of temporary fencing, flagging tape, parawebbing or similar.</li> </ul>			
	<ul style="list-style-type: none"> <li>Injury and mortality to fauna during clearing of fauna habitat and habitat trees</li> <li>Disturbance to fallen timber, dead wood and bush rock</li> </ul>	<ul style="list-style-type: none"> <li>A flora and fauna management plan is to be prepared prior to the commencement of works. This plan is to be prepared by a suitably qualified ecologist, and include details of the pre-clearing, clearing and post-clearing procols, in addition to an unexpected finds protocol.</li> <li>The clearing protocol will include assessment of breeding periods so as to avoid clearing during these periods.</li> <li>The clearing protocol will detail the staged removal of hollow-bearing trees and habitat features (such as fallen logs), utilising a two-stage clearing process. The two-stage</li> </ul>	Construction phase	<p>Prevent and minimise the risk of injury and mortality to fauna</p> <p>Minimise displacement of fauna</p>	Contractor



Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
		<p>clearing process is to involve the completion of a pre-clearing survey to identify and mark habitat features within one week of commencement of clearing. Following the pre-clearing survey, a pre-clearing report will be prepared which is to include a map of all habitat features identified, and is to identify a suitable fauna relocation point in land of secure tenure, containing known habitat features such as hollow-bearing trees or logs. Following delivery of this report, clearing of non-habitat vegetation to isolate habitat features is to commence. Habitat features are to be cleared around and left isolated for one night, and cleared the following day under the supervision of a suitably qualified and experienced ecologist. The ecologist is to record and relocate any animals caught that are not injured, and either euthenise or relocate to a vet any animals that are injured. Records of all species, relocation points and health are to be kept. Habitat features are to be left overnight once cleared, and checked the following morning to ensure that no fauna have re-inhabited the</p>			

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
		<p>features, before they are mulched or stockpiled.</p> <ul style="list-style-type: none"> <li>The Flora and Fauna Management plan will detail appropriate management of injured fauna such as attendance to a veterinary clinic or euthanasia</li> <li>An unexpected threatened species finds procedure will be developed prior to commencement of clearing, with detail included in site inductions and tool box talks as to potential species encountered, and actions to be taken when encountered</li> </ul>			
	<ul style="list-style-type: none"> <li>Introduction and spread of noxious weeds and pathogens</li> </ul>	<ul style="list-style-type: none"> <li>Prepare a weed management plan that would be incorporated into the Sunraysia Solar Farm Construction Environmental Management Plan. It would cover all weed management issues at the Sunraysia SF site. The plan must be consistent with DPI's <i>Prime Fact 1063 Infrastructure proposals on rural land</i> (DPI 2013), and include an assessment of the following: <ul style="list-style-type: none"> <li>Notifiable and problematic environmental weeds known to the area that could affect farm productivity;</li> </ul> </li> </ul>	Construction phase	Prevent spread of Noxious Weeds and pathogens	Contractor

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
		<ul style="list-style-type: none"> <li>○ An assessment of the additional risks resulting from the proposed development;</li> <li>○ State, regional or local plan or strategies relevant to specific weeds that occur on the proposal area or that may be transported to the proposal area from surrounding areas;</li> <li>○ Weed suppression, management and containment strategies for all disturbed areas;</li> <li>○ Measures to limit the spread of existing weeds including cleaning vehicle tyres before driving on site, footwear checks, minimising and monitoring soil movement between properties; and</li> <li>○ Monitoring programs for noxious and problematic weeds on site and in the surrounding areas and proposed follow up controls if weed problems occur.</li> </ul> <p>The plan must also include:</p> <ul style="list-style-type: none"> <li>• Declared noxious weeds would be managed according to the requirements stipulated by the <i>Noxious Weeds Act 1993</i> during and post construction (e.g. Chilean Needle Grass)</li> <li>• All pesticides would be used in accordance with the requirements on the label. Any</li> </ul>			

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
		<p>person undertaking pesticide (including herbicide) application would be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.</p> <ul style="list-style-type: none"> <li>Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated and reported.</li> </ul>			



### 5.1.3 Operational phase

The operational phase of the proposal has potential to result in direct impacts to biodiversity values. Direct impacts are as follows:

Impact	Frequency	Intensity	Duration	Consequence
Existence of new and permanent solar infrastructure	Constant	Moderate	Operational phase	<ul style="list-style-type: none"> <li>• Permanent removal of flora and fauna habitat</li> <li>• Collision risk to birds and microbats to exterior barbed-wire fencing</li> </ul>
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 proposal. 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 5-3 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 6 outlines the requirements for biodiversity offsets for those impacts that cannot be avoided as a result of the proposal.

Table 5-3 Measures proposed to avoid and minimise direct impacts of the proposal during the operational phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
<b>Existence of permanent solar infrastructure</b>	<ul style="list-style-type: none"> <li>Collision risks to birds and microbats on solar infrastructure, transmission lines and security fencing</li> </ul>	<ul style="list-style-type: none"> <li>Use non barbed-wire on exterior fencing</li> </ul>	Operational phase	Minimise impacts to fauna and flora as a result of infrastructure	Maoneng Australia Pty. Ltd. Contractor
<b>Inappropriate landscaping</b>	Reduction in the quality of habitat for native flora and fauna species	<ul style="list-style-type: none"> <li>Where possible, plantings will be carried out that increase the diversity of the existing vegetation, as well as to improve the connectivity between patches in the landscape.</li> </ul>	Operational phase	Increase/improve native species diversity and connectivity	Maoneng Australia Pty. Ltd. Contractor

## 5.2 INDIRECT IMPACTS

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

*Indirect impacts* could occur as a consequence of the proposal, and can include impacts such as soil 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 in Table 5-4 below.

### 5.2.1 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. The site was also selected to minimise biodiversity impacts (Section 5.1.1). This process has assisted in minimising indirect impacts to biodiversity. This selection process is consistent with the principles of avoiding and minimising biodiversity impacts, as outlined under the FBA.

### 5.2.2 Construction phase

Indirect impacts on biodiversity values during the construction phase of the proposal are outlined in Table 5-4 below.

Table 5-4 Indirect impacts on biodiversity during the construction phase.

Impact	Frequency	Intensity	Duration	Consequence
Accidental spills and contamination from construction activities (including compound sites)	Rare	Moderate	Construction phase	Pollution of soils and dams
Earthworks	Regular	Moderate	Construction phase	Erosion and sedimentation of soils and dams
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, soils and dams
Light spills during night works	Rare	Low	Construction phase	Night works may alter fauna activities/movements
General construction activities	Regular	Moderate	Construction phase	Feral pest, weed and/or pathogen encroachment
Increased Vehicle Traffic	Regular	Low	Operational phase	Increase potential for fauna mortality through vehicle strike



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

Impact	Measures to be implemented	Timing	Outcome	Responsibility
<b>Accidental spills and contamination from construction activities</b>	<ul style="list-style-type: none"> <li>Carry out refuelling of plant and equipment, chemical storage and decanting off site or at least 50 m away from farm dams in impervious bunds.</li> <li>Ensure that dry and wet spill kits are readily available</li> </ul>	Construction phase	Prevent/minimise pollution of ephemeral waterways and dams, and sensitive adjacent habitat	Contractor
<b>Earthworks</b>	<ul style="list-style-type: none"> <li>An Erosion and Sediment Control Plan must be prepared in conjunction with the final design and will be implemented.</li> </ul>	Construction phase	Prevent/minimise erosion and sedimentation of ephemeral waterways and dams, and sensitive adjacent habitat	Contractor
<b>Dust generation</b>	<ul style="list-style-type: none"> <li>The Construction Environmental Management Plan will include measures to prevent dust spreading to nearby habitats.</li> </ul>	Construction phase	Prevent dust inhibiting the function of plant species and communities, ephemeral waterways and dams.	Contractor
<b>Light spill</b>	<ul style="list-style-type: none"> <li>Avoid nightworks</li> <li>If night work is unavoidable, ensure any floodlights are directed away from vegetation.</li> </ul>	Construction phase	Prevent disturbance to local fauna at the habitat corridor location.	Contractor
<b>General construction activities</b>	<ul style="list-style-type: none"> <li>Weed and hygiene protocols will be prepared and implemented.</li> </ul>	Construction phase	Prevent feral pest, weed and/or pathogen encroachment into vegetation adjoining proposal area.	Maoneng Australia Pty. Ltd. Contractor
<b>Increased Vehicle Traffic</b>	<ul style="list-style-type: none"> <li>Awareness training during site inductions, enforcement of site speed limits</li> </ul>	Operational phase	Minimise fauna strikes	Maoneng Australia Pty. Ltd. Contractor

### 5.2.3 Operational phase

Indirect impacts on biodiversity values during the operational phase of the proposal are outlined in Table 5-6 below.

Table 5-6 Indirect impact on biodiversity during the operational phase.

Impact	Frequency	Intensity	Duration	Consequence
<b>Light spill</b>	Regular	Low	Operational phase	Alter movements of fauna through the landscape
<b>Weed encroachment</b>	Regular	Moderate	Operational phase	Ingress of weeds along the boundary of the development
<b>Increased Vehicle Traffic</b>	Regular	Low	Operational phase	Increase potential for fauna mortality through vehicle strike
<b>Solar Array Microclimate</b>	Regular	Moderate	Operational phase	Alter movement of fauna within site and through the landscape, potential shelter habitat for pest species
<b>Fences</b>	Regular	Moderate	Operational phase	Alter movement of fauna within site and through the landscape.
<b>Pest animals</b>	Irregular	Low	Operational phase	Increase in pest species specialising in edge habitats

Table 5-7 Measures proposed to avoid and minimise indirect impacts of the proposal during the operational phase

Impact	Consequence	Measures to be implemented	Timing	Outcome	Responsibility
<b>Light spill</b>	Alter movements of fauna through the landscape	<ul style="list-style-type: none"> <li>Direct lights away from vegetation.</li> </ul>	Operational phase	Minimise impacts to fauna movements and activity	Maoneng Australia Pty. Ltd.
<b>Weed encroachment</b>	Ingress of weeds along the boundary of the proposal area	<ul style="list-style-type: none"> <li>Weed and planting protocols will be prepared and implemented including vehicle washdown prior to site entry, use of native seed mixtures in plantings</li> </ul>	Operational phase	Prevent spread of weeds	Maoneng Australia Pty. Ltd. Contractor
<b>Increased Vehicle Traffic</b>	Increase potential for fauna mortality through vehicle strike	<ul style="list-style-type: none"> <li>Awareness training during site inductions regarding enforcing site speed limits</li> </ul>	Operational phase	Minimise fauna strikes	Maoneng Australia Pty. Ltd. Contractor
<b>Solar Array Microclimate</b>	Alter movement of fauna within site and through the landscape, potential shelter habitat for pest species	<ul style="list-style-type: none"> <li>Feral species to be monitored and a management plan to be prepared and implemented to reduce feral species abundance</li> <li>Implement offset management plan which ensures that fauna movement still possible around perimeter of proposal area</li> </ul>	Operational phase	Monitor and manage feral fauna populations, ensure no restriction to movement of fauna	Maoneng Australia Pty. Ltd.
<b>Fences</b>	Alter movement of fauna within site and through the landscape	<ul style="list-style-type: none"> <li>Ensure that fences enclose operational areas only and do not block fauna movement between offset area and TSR</li> </ul>	Operational phase	Ensure no restriction of fauna movement	Maoneng Australia Pty. Ltd.
<b>Pest animals</b>	Invasion of pest species specialising in edge habitats such as foxes	<ul style="list-style-type: none"> <li>Implement a vertebrate pest management plan targeting rabbits and hares.</li> </ul>	Operational phase	Minimise invasion of pest species	Maoneng Australia Pty. Ltd. Contractor



### 5.3 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 renewable energy proposals, particularly where EECs are involved, can be considerable given that many poorly-conserved vegetation communities have a substantial portion of their extents represented on private land, where the majority of renewable energy proposals are proposed. Small losses of such communities, which may be insignificant at a proposal level, may accumulate over time to cause a significant reduction in the extent of remnant patches and thus the distribution of communities as a whole at a landscape scale.

Cumulative impacts are considered best addressed by avoiding and minimising. Where avoidance is not possible, the impacts of each contributing proposal is assessed on a case by case basis. Long term mechanisms like offsetting through the BioBanking assessment methodology, are structured to address the ongoing impacts of multiple proposals in a cohesive manner.

## 6 IMPACT SUMMARY

### 6.1 AREAS NOT REQUIRING ASSESSMENT

Areas without native vegetation or aquatic features do not need to be assessed further. Within the proposal area, these include treeless paddock areas with an understory of exotic agricultural crop species. Furthermore, areas without any native vegetation such as cropped areas, roads, existing infrastructure and other developments do not require further assessment (Figure 3-6, Figure 3-7, Figure 3-8 **Error! Reference source not found.** ). The total area of land within the proposal area not requiring further assessment is approximately 803.49 ha.

### 6.2 AREAS NOT REQUIRING AN OFFSET

#### 6.2.1 Impacts on native vegetation

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

- a) Have a site value score of <17; or
- b) EEC where it has a site value score of <17 (as per NSW Biodiversity Offsets Policy for Major Projects: Practice Note)
- c) Are not identified as a Critically Endangered Ecological Community (CEEC).

All native vegetation within the proposal area that was considered in 'low condition' or had a site value score of <17 were not considered to require offsets.

All other native vegetation within the proposal area were either CEEC and/or EEC or in moderate to good condition and therefore, will require offsets in accordance with Table 4 of the FBA. The total area of vegetation within the proposal area is

All other areas within the proposal area will not require offsets (See Figure 5-1).

#### 6.2.2 Impacts on species and populations

Offsets are not required where the proposal:

- a) Impacts on non-threatened species and populations that do not form part of a CEEC
- b) 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, or EEC's with a site value of <17 do not form part of the offset requirement.

To ascertain whether native vegetation within the development site provided habitat for a threatened species or population, all vegetation zones were entered into the credit calculations:

- PCT # 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones
- PCT # 58 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion

- PCT # 16 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- PCT # 23 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones

Species that do not require any offsets are discussed specifically below. Refer also to Section 4.3.1.

## **Flora**

### **A SPEAR-GRASS (*AUSTROSTIPA METATORIS*)**

The proposal is not considered likely to impact any individuals of the species, as none were detected during targeted surveys within suitable habitat across the proposal area (as discussed in section Survey results 4.3.3). As a result, the species is not considered to be affected by the proposal. This species does not require offsets.

### **BITTER QUANDONG (*SANTALUM MURRAYANUM*)**

The proposal is not considered likely to impact any individuals of the species, as none were detected during targeted surveys within suitable habitat across the proposal area (as discussed in section Survey results 4.3.3). As a result, the species is not considered to be affected by the proposal. This species does not require offsets.

### **WINGED PEPPERCRESS (*LEPIDIUM MONOPLOCOIDES*)**

The proposal is not considered likely to impact any individuals of the species, as none were detected during targeted surveys within suitable habitat across the proposal area (as discussed in section Survey results 4.3.3). As a result, the species is not considered to be affected by the proposal. This species does not require offsets.

## **Fauna**

Specific to the BCC assessment, fauna not requiring offsets include:

### **GREY FALCON (*FALCO HYPOLEUCOS*)**

The relevant geographic feature was present, however targeted surveys did not record this species in the proposal area (as discussed in section 4.3.3). The proposal would only impact a small area of suitable foraging habitat for this species, with no areas of high-quality breeding habitat (constituting tree-lined watercourses or wetlands) occurring within or in proximity to the proposal area, and no individuals are likely to be affected by the proposal. This species does not require offsets.

## **Hollow-bearing trees**

A total of 84 hollow-bearing trees were identified within the proposal area that have the potential be removed as a result of the proposal. These trees contained a total of approximately 325 hollows, over a variety of size classes. In addition to these hollow-bearing trees, 41 paddock trees were not visited during the survey, so comment cannot be made as to whether these were hollow-bearing or not. These trees were identified to genus level, and species level where possible, from a distance. An estimate of hollow abundance has been generated for these trees based on the abundance of hollows within individuals of the same genus or species, and on the ratio of hollow-bearing to non hollow-bearing trees within patches sampled. Based on these calculations, it is estimated that the remaining 41 paddock trees would contain approximately 41.77 hollows in total, or slightly more than one hollow per tree.

Table 6-1, Table 6-2 and Table 6-3 below detail the data used to derive these estimates.

Table 6-1 Hollow occurrence within vegetation patches

Patch	Dominant Species	Trees with Hollows	Trees without Hollows	Ratio
1	<i>Eucalyptus dumosa</i>	9	25	0.36
2	<i>Eucalyptus dumosa</i>	0	26	0.00
3	<i>Eucalyptus dumosa</i>	1	18	0.06
			<b>Mean</b>	<b>0.14</b>
4	<i>Eucalyptus socialis</i>	11	35	0.31
5	<i>Eucalyptus socialis</i>	25	41	0.61
			<b>Mean</b>	<b>0.46</b>

Table 6-2 Tree species hollow abundance

Species	Number Sampled	Mean Hollow Abundance
<i>Acacia melvillei</i>	3	0
<i>Calitris</i> sp.	8	0.13
<i>Casuarina pauper</i>	9	1.7
<i>Eucalyptus dumosa</i>	9	3.1
<i>Eucalyptus socialis</i>	11	3.1
<i>Eucalyptus</i> sp.	35	3.7
<i>Hakea tephrosperma</i>	3	2.6
<i>Myoporum</i> sp.	6	2.5
<i>Santalum</i> sp.	1	2
Stag	6	2.8

Table 6-3 Estimated hollow abundance of trees not surveyed

Species	Total Estimated Hollows
<i>Acacia melvillei</i>	0
<i>Acacia</i> sp.	0
<i>Calitris</i>	2.86
<i>Eremophila</i>	0
<i>Eucalyptus dumosa</i>	8.25
<i>Eucalyptus socialis</i>	14.26
<i>Eucalyptus</i> sp.	11.1
<i>Myoporum</i>	2.5
Stag	2.8
<b>Total</b>	<b>41.77</b>



Hollows potentially provide roosting habitat for some species of microbats, parrots, owls and arboreal mammals. Hollow-dependant fauna species are likely to be impacted due to the proposal. However, the impacts on hollow-dependent fauna in the proposal area is likely to be low, as hollow abundance within vegetation surrounding the site is considered likely to be similar, and where possible, works will avoid hollow-bearing trees. Mitigation measures have been recommended to address the clearing risks to resident species (Section 5).

The number of hollows to be impacted is assessed within the BCC, via the plot data collected for each vegetation zone. This data adds to the value of the habitat to be removed, thereby requiring a greater number of credits to be retired. No specific requirement to offset hollows has been identified.

## 6.3 PCTS AND SPECIES POLYGONS REQUIRING AN OFFSET

### 6.3.1 Impacts on native vegetation

Offsets are required where the proposal would impact on any native vegetation that:

- a) is identified as a CEEC that is specifically nominated in the SEARs for the Major Project as a CEEC for which an impact does not require further consideration;
- b) is identified as an EEC that has a site value score  $\geq 17$ , unless it is an EEC that is specifically nominated in the SEARs for the proposal as an EEC for which an impact requires further consideration; or
- c) is associated with threatened species habitat and in a vegetation zone that has a site value score  $\geq 17$ .

The proposal would have a direct impact on one vegetation community listed as an EEC listed under the TSC Act within the proposal area as a result of vegetation clearing. Additionally, vegetation within the proposal area is known and predicted to provided habitat for a number of threatened fauna species, listed as ecosystem credit species within the BCC. Table 6-4 below details the extent of these communities within the proposal area, and the ecosystem credit species predicted to occur within them.

Table 6-4 Extent of vegetation communities within the proposal area and their impact areas

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT Id	Ecosystem species habitat	BioMetric vegetation condition	Extent of vegetation (ha) impacted in proposal area
<b>PCT#170</b> <b>BVT # MU534</b> <b>Chenopod sandplain mallee woodland/shrubl and of the arid and semi-arid (warm) zones</b>	No	170	Chestnut Quail-thrush <i>Cinclosoma castanotum</i> , Corbens Long-eared Bat <i>Nyctophilus corbeni</i> , Gilberts Whistler Pachycephala inornata Hooded Robin (south-eastern form) <i>Melanodryas cucullata</i> <i>subsp. Cucullata</i> , Little Eagle <i>Hieraaetus morphnoides</i> , Major Mitchells Cockatoo	Moderate - good	9.59

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT Id	Ecosystem species habitat	BioMetric vegetation condition	Extent of vegetation (ha) impacted in proposal area
			<i>Lophochroa leadbeateri</i> , Pied Honeyeater <i>Certhionyx variegatus</i> , Regent Parrot (eastern subspecies) <i>Polytelis anthopeplus</i> subsp. <i>Monarchoides</i> , Spotted Harrier <i>Circus assimilis</i> , Varied Sittella <i>Daphoenositta chrysoptera</i>		
<b>PCT # 58</b> <b>BVT # 517 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion</b>	No	58	Australian Bustard <i>Ardeotis australis</i> , Bush Stone-curlew <i>Burhinus grallarius</i> , Corbena Long-eared Bat <i>Nyctophilus corbeni</i> , Diamond Firetail <i>Stagonopleura guttata</i> , Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis</i> subsp. <i>Temporalis</i> , Hooded Robin (south-eastern form) <i>Melanodryas cucullata</i> subsp. <i>Cucullata</i> , Little Eagle <i>Hieraaetus morphnoides</i> , Major Mitchells Cockatoo <i>Lophochroa leadbeateri</i> , Painted Honeyeater <i>Grantiella picta</i> , Pied Honeyeater <i>Certhionyx variegatus</i> , Regent Parrot (eastern subspecies) <i>Polytelis anthopeplus</i> subsp. <i>Monarchoides</i> , Spotted Harrier <i>Circus assimilis</i> , Varied Sittella <i>Daphoenositta chrysoptera</i>	Moderate - good	1.23
<b>PCT # 16</b> <b>BVT # MU514 Black Box grassy open woodland wetland of rarely flooded depressions in</b>	No	16	Australian Bustard <i>Ardeotis australis</i> , Barking Owl <i>Ninox connivens</i> , Bush Stone-curlew <i>Burhinus grallarius</i> , Diamond Firetail <i>Stagonopleura guttata</i> , Gilberts Whistler	Moderate - good	0.001

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT Id	Ecosystem species habitat	BioMetric vegetation condition	Extent of vegetation (ha) impacted in proposal area
south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)			<i>Pachycephala inornata</i> , Diamond Firetail <i>Stagonopleura guttata</i> , Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis</i> subsp. <i>Temporalis</i> , Hooded Robin (south-eastern form) <i>Melanodryas cucullata</i> subsp. <i>Cucullata</i> , Little Eagle <i>Hieraaetus morphnoides</i> , Magpie Goose <i>Anseranas semipalmata</i> , Major Mitchells Cockatoo <i>Lophochroa leadbeateri</i> , Painted Honeyeater <i>Grantiella picta</i> , Pied Honeyeater <i>Certhionyx variegatus</i> , Regent Parrot (eastern subspecies) <i>Polytelis anthopeplus</i> subsp. <i>Monarchoides</i> , Spotted Harrier <i>Circus assimilis</i> , Varied Sittella <i>Daphoenositta chrysoptera</i>		
PCT # 23 BVT # MU609 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Yes - <i>Acacia melvillei</i> Shrubland in the Riverina and Murray-Darling Depression Bioregions	23	Australian Bustard <i>Ardeotis australis</i> , Corbena Long-eared Bat <i>Nyctophilus corbeni</i> , Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis</i> subsp. <i>Temporalis</i> , Hooded Robin (south-eastern form) <i>Melanodryas cucullata</i> subsp. <i>Cucullata</i> , Little Eagle <i>Hieraaetus morphnoides</i> , Major Mitchells Cockatoo <i>Lophochroa leadbeateri</i> , Painted Honeyeater <i>Grantiella picta</i> , Pied Honeyeater <i>Certhionyx</i>	Moderate - good	1.29

Vegetation Community	Threatened Ecological Community (TSC Act or EPBC Act)?	PCT Id	Ecosystem species habitat	BioMetric vegetation condition	Extent of vegetation (ha) impacted in proposal area
			<i>variegatus</i> , Spotted Harrier <i>Circus assimilis</i> , Varied <i>Sittella</i> <i>Daphoenositta</i> <i>chrysoptera</i>		
<b>Total Vegetation</b>	-	-	-	-	<b>12.11</b>

#### Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression Bioregion

*Acacia melvillei* shrubland occurs within the Riverina and Murray-Darling Depression bioregions. *Acacia melvillei* Shrubland typically has an open canopy of shrubs or small trees, sometimes with scattered mid-stratum shrubs, and with a sometimes sparse, but highly variable ground layer dominated by grasses, chenopods and herbs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall. *Acacia melvillei* Shrubland is generally not found on soils of high suitability for agriculture. However, some stands of the community are threatened by clearing for cropping, particularly in the east of its range. Most of the remaining stands of *Acacia melvillei* Shrubland are heavily degraded by overgrazing, which has resulted in simplification of community structure, changes in species composition, invasion of weeds and soil erosion. Overgrazing by domestic livestock and feral herbivores, including rabbits and goats, has resulted in a scarcity of woody understorey plants and a lack of regeneration of palatable trees and shrubs in the community. Consequently, senescent trees are not replaced with new individuals and there is a prolonged trend of stand degeneration, which is difficult to reverse, even under active conservation management (NSW Scientific Committee, 2010).

Cropping and overgrazing has occurred to the extent of the EEC within the proposal area. Within the proposal area, the southern extent of the community appears to have been historically cleared for the purpose of cropping, while in the northern extent of the proposal area, clearing and grazing has reduced the abundance of diagnostic canopy species of the community.

For the purposes of this assessment it has been estimated that 1.29 ha of *Acacia melvillei* shrubland would be directly removed as a result of the proposal (see Table 6-4). The NSW Scientific Committee Final Determination states that "Based on available mapping and site records, and using a grid scale of 4 km<sup>2</sup> (as recommended by IUCN 2006), *Acacia melvillei* Shrubland is estimated to occupy an area of about 800 km<sup>2</sup>". Thus, the 1.29 ha of the community that is present within the proposal area represents under 0.002% of the known extent of the community.



### 6.3.2 Impacts on species and populations

Offsets are required where the proposal would impact on:

- a) Any critically endangered species;
- b) A threatened species or population that was not specifically nominated in the SEARs as a species or population for which an impact requires further consideration; or
- c) Threatened species habitat associated with a PCT in a vegetation zone with a site value score of  $\geq 17$ .

#### Flora

Specific to the BCC assessment, no flora species require offsets. Targeted surveys were undertaken for threatened flora species identified within the SEARs as requiring further assessment, however consultation with Peter Ewin of OEH (pers. comm., 2016) confirmed that if the species were not detected on site, then they did not require further assessment. Similarly, targeted surveys were undertaken for threatened flora species identified within the BCC, during the correct survey period and at an appropriate scale. Threatened species were not detected within the proposal area, therefore do not require an offset.

#### Fauna

No threatened species constituting species credit species were detected within the proposal area. Targeted searches were undertaken for those species and their breeding habitat nominated in the SEARs, in addition to those nominated by the BCC as requiring survey.

The BCC found that 17 threatened ecosystem credit fauna species were predicted to occur and thus require offsets, including:

- Australian Bustard *Ardeotis australis*
- Barking Owl *Ninox connivens*
- Bush Stone-curlew *Burhinus grallarius*
- Chestnut Quail-thrush *Cinclosoma castanotum*
- Corbans Long-eared Bat *Nyctophilus corbeni*
- Diamond Firetail *Stagonopleura guttata*
- Gilberts Whistler *Pachycephala inornata*
- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis subsp. Temporalis*
- Hooded Robin (south-eastern form) *Melanodryas cucullata subsp. Cucullata*
- Little Eagle *Hieraaetus morphnoides*
- Magpie Goose *Anseranas semipalmata*
- Major Mitchells Cockatoo *Lophochroa leadbeateri*
- Painted Honeyeater *Grantiella picta*
- Pied Honeyeater *Certhionyx variegatus*
- Regent Parrot (eastern subspecies) *Polytelis anthopeplus subsp. Monarchoides*
- Spotted Harrier *Circus assimilis*
- Varied Sittella *Daphoenositta chrysoptera*

## 6.4 IMPACTS REQUIRING FURTHER CONSIDERATION

### 6.4.1 Impacts on landscape features

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

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

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

No 4<sup>th</sup>, 5<sup>th</sup> or 6<sup>th</sup> 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 proposal area. The proposal 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 are known to occur within the proposal area, therefore the proposal does not trigger the requirement for further consideration to impacts on species movement along corridors.

### 6.4.2 Impacts on native vegetation

No CEECs would be impacted by the proposal. One EEC, *Acacia melvillei* shrubland, has been identified within the SEARs for the proposal as likely to become extinct or have its viability significantly reduced in the IBRA subregion if it is impacted on by development.

#### Area, Condition and Extent

The *Acacia melvillei* shrubland community within the proposal area exists as moderate to good quality, however the presence of feral herbivores is considered likely to be suppressing regeneration of the community. Limited regeneration of community canopy species was observed. Approximately 1.29 ha of the EEC will be impacted as a result of the proposal.

An estimate of the extent of the EEC within the IBRA Subregion cannot be made, as detailed vegetation mapping for the region does not exist (Pers. Comms. Peter Ewin, 2016). As such, an estimate of EEC loss can only be made by comparing the extent of the EEC removed by the proposal to that proposed to be retained within the offset area, and in comparison to the estimated extent of the community. The proposed offset area contains an approximate area of 29.9 ha of the EEC in the same condition as the impact area. Additionally, the EEC is estimated to cover an area of approximately 80,000 ha (NSW Scientific Committee, 2008). The proposal would result in the removal of approximately 0.002% of the extent of the community as defined by the NSW Scientific Committee. NSW Vegetation Information System Database estimates that the community covers an area of 3,500 ha, with its pre-european extent being 120,000 ha.

## Impacts

It is not considered likely that the proposal will significantly influence abiotic factors affecting the long-term survival of the EEC. The removal of exotic crops and replacement with solar arrays has the potential to modify groundwater penetration patterns, however it is not considered likely that these patterns would be so significantly different to the current regime of ploughing, cropping and irrigation that it would lead to a long-term extinction of the EEC within the proposal area, offset area and throughout the EEC's extent.

No changes to fire or flooding regimes are considered likely, nor will plants forming components of the community be harvested. Additionally, it is proposed that an Operational Management Plan and Construction Environment Management Plan be prepared. These plans will include mitigation measures to avoid and manage any potential increases in feral animal utilisation of the site, and of any chemical spills which may influence the EEC. Further, the proposed offset area will be managed through a plan which will specifically target and monitor a reduction in vertebrate pest and weed species through baiting and fencing programs, and enhance the natural regeneration of the community.

The EEC within the proposal area is not considered to become more fragmented or isolated than it currently is. The components of the EEC within the proposal area currently exist as disjunct patches separated by tracks, crops and fences. The proposal will increase the width of the central access track, which will create a gap approximately 10 m wider between two patches of the community. Additionally, the powerline easement will increase the width of a cleared corridor by approximately 50 m. Though their fragmentation will be increased, these patches are considered likely to remain viable as they exist as part of large contiguous vegetation patches, and cross-pollination between patches is considered likely to still occur.

Measures proposed to contribute to the recovery of the EEC within the IBRA subregion include the formalisation of an offset through the Biodiversity Offset Strategy, in accordance with the FBA. As stated previously, the proposed offset includes an approximate area of 29.9 ha of the EEC. This offset site would be managed through a formal BioBanking Agreement, and include the implementation of management actions to mitigate factors threatening the EEC, such as feral herbivore control and fencing, implementation of appropriate fire regimes, and management of noxious and environmental weeds, in perpetuity. The implementation of this agreement would ensure the long-term survival of the EEC within both the offset site, and the IBRA subregion.

### 6.4.3 Impacts on threatened species

Further consideration is required where the proposal would impact:

- a) Any critically endangered species;
- b) A threatened species or population that is specifically nominated in the SEARS as a species or population that is likely to become extinct or have its viability significantly reduced in the IBRA subregion if it is impacted on by the development; or
- c) a threatened species that has not previously been recorded in the IBRA subregion according to records in the NSW Wildlife Atlas.

The SEARs identify the following species as requiring further assessment under Section 9.2 of the FBA:

- *Austrostipa metatoris* (a Spear Grass)
- *Falco subniger* (Black Falcon) - nest trees only
- *Hieraaetus morphnoides* (Little Eagle) - nest trees only
- *Circus assimilis* (Spotted Harrier) - nest trees only
- *Santalum murrayanum* (Bitter Quandong)

Consultation with OEH (attached in Appendix E) has determined that only species that have been detected on site require further consideration under Section 9.2 of the FBA. As no species were detected, the species listed above are not considered to require further consideration.

Three threatened species listed under the TSC Act were recorded during surveys of the proposal area. These included the Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis subsp. temporalis*, Major Mitchells Cockatoo *Lophochroa leadbeateri*, and Regent Parrot (eastern subspecies) *Polytelis anthopeplus subsp. monarchoides*. All three of these species have been previously recorded within the IBRA Subregion according to the OEH Bionet Atlas, therefore do not require further consideration under Section 9.2 of the FBA, and have been assessed as requiring offsets, as detailed in Section 6.3.2.

#### 6.4.4 Impacts to EPBC Listed Species

Two EPBC Act listed species were detected within the proposal area, including the Regent Parrot (eastern subspecies) *Polytelis anthopeplus subsp. Monarchoides* and the Rainbow Bee-eater *Merops ornatus*, listed as Vulnerable and Marine/Migratory consecutively under the EPBC Act. In order to assess the significance of impacts to these species, Assessments of Significance were prepared and are provided in Appendix C of this report. These assessments found that the population of the Regent Parrot did not constitute an 'important population' (as defined within the Significant Impact Assessment Guidelines), therefore impacts to the species were not considered to substantially interfere with the recovery of the species. Similarly, the proposal area is not considered to constitute 'important habitat' (as defined within the Significant Impact Assessment Guidelines), therefore it was considered unlikely that the Rainbow Bee-eater would decline as a result of the proposal. As such, a Referral under the EPBC Act is not considered necessary.

## 6.5 ECOSYSTEMS AND SPECIES CREDITS

A total of 391 ecosystem credits have been generated for the proposal area (BCC Major Project 205/2016/4042MP Version 1). The BCC full credit report is provided in Appendix A.

### Ecosystem credits

Ecosystem credits are required for the following PCTs:

- PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – 291 Credits
- PCT 23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones – 47 Credits
- PCT 58 - Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – 53 Credits
- PCT 16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) – 0 Credits

Further detail is provided in Table 6-3 below.

### Species credits

No species credits are required according to the BCC.



Table 6-5 Credit requirements

Assessment Circle Name	Landscape Score	Vegetation Zone Name	Vegetation Type Name	Condition	Red Flag Status	Management Zone Name	Management Zone Area	Current Site Value	Future Site Value	Loss in Site Value	Credit Required for Biodiversity	Credit Required for TS	TS with Highest Credit Requirement	Average Species Loss	Species TG Value	Final Credit Requirement for Management Zone
1	12.6	MU534_Moderate/Good	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate/Good	Yes	1	9.59	51.85	0	51.85	0	291	Corben's Long-eared Bat	40	2.1	291
1	12.6	MU609_Moderate/Good	Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Moderate/Good	Yes	1	1.29	44.62	0	44.62	47	41	Australian Bustard	61.11	2.6	47

Assessment Circle Name	Landscape Score	Vegetation Zone Name	Vegetation Type Name	Condition	Red Flag Status	Management Zone Name	Management Zone Area	Current Site Value	Future Site Value	Loss in Site Value	Credit Required for Biodiversity	Credit Required for TS	TS with Highest Credit Requirement	Average Species Loss	Species TG Value	Final Credit Requirement for Management Zone
1	12.6	MU517_Murray Darling Depression Bioregion	Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate / Good	Yes	1	1.23	61.46	0	61.46	0	53	Australian Bustard	83.33	2.6	53
1	12.6	MU514_Murray Darling Depression Bioregion	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW	Moderate / Good	Yes	1	0	40	0	40	0	0	Barking Owl	0	3	0

Assessment Circle Name	Landscape Score	Vegetation Zone Name	Vegetation Type Name	Condition	Red Flag Status	Management Zone Name	Management Zone Area	Current Site Value	Future Site Value	Loss in Site Value	Credit Required for Biodiversity	Credit Required for TS	TS with Highest Credit Requirement	Average Species Loss	Species TG Value	Final Credit Requirement for Management Zone
			(mainly Riverina Bioregion and Murray Darling Depression Bioregion)													

## **7 BIODIVERSITY CREDIT REPORT**

The credit report produced by the BCC is provided overleaf. The report includes the requirement for 391 ecosystem credits, and no species credits.

Limitations that should be understood when interpreting these credit results include:

- Assessment methodology – a ‘site-based development’ best addresses this type of pattern of clearing and follows Appendix 4 of the FBA.
- Surveys have been used to identify which species would be impacted by the proposal and offset. However, surveys provide a snapshot in time and do not definitively assess species presence/absence and potential impacts. It is accepted that the threatened species determined unlikely to be impacted by the proposal may use the site on occasion. However, the site is not considered important habitat for these species and no areas of impact have been entered for them. This is justified in Section 4.3.1 – 4.3.3.



## BioBanking Credit Calculator

### Ecosystem credits



Proposal ID : 205/2016/4042MP  
 Proposal name : Sunraysia Solar Farm  
 Assessor name : Matthew Hingee  
 Assessor accreditation number : 205  
 Tool version : v4.0  
 Report created : 24/01/2017 11:42

Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for biodiversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
1	12.60	MU534_Moderate/Good	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate/Good	Yes	1	9.59	51.85	0.00	51.85	0	291	Corben's Long-eared Bat	40.00	2.10	291
1	12.60	MU609_Moderate/Good	Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Moderate/Good	Yes	1	1.29	44.62	0.00	44.62	47	41	Australian Bustard	61.11	2.60	47
1	12.60	MU517_Moderate/Good	Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate/Good	Yes	1	1.23	61.46	0.00	61.46	0	53	Australian Bustard	83.33	2.60	53
1	12.60	MU514_Moderate/Good	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate/Good	Yes	1	0.00	40.00	0.00	40.00	0	0	Barking Owl	0.00	3.00	0

## BioBanking Credit Calculator

### Species credits



Proposal ID :  
Proposal name :  
Assessor name :  
Assessor accreditation number :  
Tool version : v4.0  
Report created : 24/01/2017 11:42

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
No								

## 8 OTHER OFFSET CONSIDERATIONS

### 8.1 EPBC OFFSETS

Two species listed on the *Environment Protection Biodiversity Conservation* (EPBC Act) have been identified as occurring within the proposal area. The Regent Parrot is listed as Vulnerable under the act, while the Rainbow Bee-eater is listed as Migratory. The EPBC Offsets Policy principles state that:

Suitable offsets must:

1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action
2. be built around direct offsets but may include other compensatory measures
3. be in proportion to the level of statutory protection that applies to the protected matter
4. be of a size and scale proportionate to the residual impacts on the protected matter
5. effectively account for and manage the risks of the offset not succeeding
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)
7. be efficient, effective, timely, transparent, scientifically robust and reasonable
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

The offset area proposed for the proposal conforms to the principles of offsetting under the EPBC Offsets policy as the BioBanking Scheme will lead to a conservation outcome that will improve and maintain the viability of vegetation within the offset through ongoing management, will comprise primarily direct offsets, will have offset multipliers applied for the threatened species known and predicted to occur within the offsets, be of an adequate size and scale so as to provide a suitable area and ratio of impacted to conserved area, includes in-perpetuity funding to ensure success, is additional to any existing conservation agreements for vegetation within the site, is scientifically robust, and will be monitored and audited to ensure success.

The proposal is not considered likely to significantly impact an important population of the Regent Parrot, or important habitat of the Rainbow Bee-eater. Nonetheless, individuals occurring within the site may be impacted by the proposal. It is considered likely that the proposed offsets will constitute an adequate offset for the long-term conservation of the Regent Parrot and Rainbow Bee-eater within the site and broader locality.

## 9 CONCLUSIONS

NGH Environmental has prepared this BAR on behalf of Maoneng Australia Pty. Ltd. For the Sunraysia SF in Balranald, 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
- The identification of three threatened species, one migratory species and one EEC within the proposal area and adjacent vegetation, the impacts to which have been thoroughly and adequately assessed
- The generation of 391 Ecosystem Credit within the proposal area, and no Species credits
- Mitigation measures which have been outlined in Table 5-2, Table 5-3, Table 5-5 and Table 5-7 to reduce the impacts to biodiversity
- The proposal to generate and retire Ecosystem credits through the implementation of a formal BioBanking Agreement within retained vegetation owned by the proponent, including an on-site offset containing *Acacia melvillei* shrubland EEC

A Biodiversity Offset Strategy (BOS) will be developed and implemented as part of the approval of the proposal. The BOS will likely include approximately 58.5 ha of EEC and non-EEC vegetation, and known threatened fauna species habitat, avoided and retained within the broader lot boundary. This offset will be managed in perpetuity to ensure that the EEC and threatened species habitats continue to exist within the site, and are enhanced in the future.

It is proposed that an offset will be established subject to consent conditions within 2 years of the commencement of construction, through the retirement of biodiversity credits of a number and class specified in Table 6-5.

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.



## 10 REFERENCES

- Atlas of Living Australia 2016 Atlas of Living Australia Database, webpage, <http://www.ala.org.au/>
- Baker-Gabb, D. and Hurley, V.G. 2011 *National Recovery Plan for the Regent Parrot (eastern subspecies) *Polytelis anthopeplus monarchoides**. Department of Sustainability and Environment, Melbourne.
- CSIRO 2016 Australian Soil Resource Information System, webpage, <http://www.asris.csiro.au/>
- Cunningham G.M., Mulham W.E., Milthorpe P.L., Leigh J.H. 2011 *Plants of Western New South Wales*. CSIRO Publishing, Collingwood, Victoria.
- Debus, S. 2012 *Birds of Prey of Australia – A Field Guide*. CSIRO Publishing, Collingwood, Victoria.
- Department of the Environment 2016 SPRAT Species Profiles and Threats Database, webpage, <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*.
- EMM Consulting 2016 *Limondale Sun Farm Preliminary Environmental Impact Assessment*
- Environment Australia 2001 *A Directory of Important Wetlands in Australia*. 3rd Edition. Environment Australia, Canberra.
- NGH Environmental 2016 *Draft Sunraysia Solar Farm Environmental Impact Statement*
- NSW Office of Environment and Heritage (OEH) 2014 *Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects*
- NSW Office of Environment and Heritage (OEH) 2007 *Mitchell Landscapes with per cent cleared estimates*.
- NSW Office of Environment and Heritage (OEH) 2016 BioBanking credit calculator, webpage, <http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>
- NSW Office of Environment and Heritage (OEH) 2016 BioNet Atlas of NSW Wildlife and Threatened Species Profile Database, webpage, <http://www.bionet.nsw.gov.au/>
- NSW Scientific Committee 2001 *Final Determination - Clearing of native vegetation - key threatening process* listing, webpage, <http://www.environment.nsw.gov.au/determinations/ClearingNativeVegKTPListing.htm>
- NSW Scientific Committee 2011 *Final Determination – Acacia *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression Bioregion – Endangered Ecological Community*, webpage, <http://www.environment.nsw.gov.au/determinations/acacamelvilleiFD.htm>
- Royal Botanic Gardens, Sydney 2016 PlantNET – NSW Flora Online, webpage, <http://plantnet.rbgsyd.nsw.gov.au/>

## **APPENDIX A CREDIT PROFILE**

As of 24/01/2017.

Proposal ID for the assessment: 205/2016/2421MP Version 1

Assessment type: 'Major Proposal'.

## ***Biodiversity credit report***



**This report identifies the number and type of biodiversity credits required for a major project.**

Date of report: 24/01/2017

Time: 11:42:03AM

Calculator version: v4.0

### **Major Project details**

<b>Proposal ID:</b>	205/2016/4042MP
<b>Proposal name:</b>	Sunraysia Solar Farm
<b>Proposal address:</b>	The Cut Line Balranald NSW 2715
<b>Proponent name:</b>	Maoneng Australia
<b>Proponent address:</b>	level 4 Talavera Rd Macquarie park NSW 2113
<b>Proponent phone:</b>	9199 8599
<b>Assessor name:</b>	Matthew Hingee
<b>Assessor address:</b>	18/21 MARY ST Surrey Hills NSW 2010
<b>Assessor phone:</b>	(02) 8202 8333
<b>Assessor accreditation:</b>	205

### 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)	0.00	0.00
Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	1.23	53.00
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	9.59	291.00
Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	1.29	47.23
<b>Total</b>	<b>12.11</b>	<b>391</b>

### Credit profiles





**2. Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion, (MU517)**

Number of ecosystem credits created

53

IBRA sub-region

South Olary Plain, MU Basin Sands (Part A) - Murray

Offset options - Plant Community types	Offset options - IBRA sub-regions
Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion, (MU517)	South Olary Plain, MU Basin Sands (Part A) - and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

**3. Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones, (MU534)**

Number of ecosystem credits created

291

IBRA sub-region

South Olary Plain, MU Basin Sands (Part A) - Murray

Offset options - Plant Community types	Offset options - IBRA sub-regions
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones, (MU534)  Sandplain mallee of central NSW, (MU591)	South Olary Plain, MU Basin Sands (Part A) - and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

**4. Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, (MU609)**

Number of ecosystem credits created

47

IBRA sub-region

South Olary Plain, MU Basin Sands (Part A) - Murray

Offset options - Plant Community types	Offset options - IBRA sub-regions
<p>Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, (MU609)</p> <p>Buloke - Moonah - Black Box open woodland on sandy rises of semi arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion), (MU530)</p> <p>Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains, (MU541)</p> <p>White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, (MU607)</p> <p>White Cypress Pine - Drooping Sheoak grassy open woodland of the Riverine Plain, (MU608)</p> <p>Yellow Box - White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion, (MU611)</p> <p>Yellow Gum tall woodland of the Murray River floodplain, Riverina Bioregion, (MU613)</p> <p>Slender Cypress Pine - Sugarwood - Western Rosewood open woodland on sandy rises mainly in the Riverina Bioregion and Murray Darling Depression Bioregion, (MU628)</p>	<p>South Olary Plain, MU Basin Sands (Part A) - and any IBRA subregion that adjoins the IBRA subregion in which the development occurs</p>



## **Summary of species credits required**

No species credits required.

## **APPENDIX B 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 3<sup>rd</sup> February 2016.



Office of  
Environment  
& Heritage

Your reference: SSD 7680  
Our reference: DOC 16/196688  
Contact: Michael Todd  
Ph. 03 50218915

Ms Rose-Anne Hawkeswood  
Planner - Resource Assessments  
Department of Planning and Environment  
GPO Box 39  
SYDNEY NSW 2001

Dear Ms Hawkeswood

**RE: SEARs for proposed Sunraysia Solar Farm (SSD 7680)**

I refer to your email dated 27 May 2016 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 Sunraysia Solar Farm (SSD 7680).

OEHL 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 and new vehicle tracks, access from Yanga Way and the proposed transmission lines which partially traverse Crown Lands.

OEHL recommends the EIS needs to appropriately address the following:

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

Please note that the NSW Biodiversity Offsets Policy for Major Projects [www.environment.nsw.gov.au/resources/biodiversity/140672biopolicy.pdf](http://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](http://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 appears to contain scattered trees with some remnant patches of vegetation. It is important to ascertain whether areas with scattered trees meet the definition of woodland or open woodland communities. Trees in an open woodland may be up to 100 metres apart, and still meet the definition of native vegetation that can be allocated to a NSW Plant Community Type (PCT). PCT boundaries mapped for this assessment must include the understorey and trees. Maps containing separate polygons for trees and understoreys (e.g. Figure 5-1) may not be correct. The categorisation of some vegetation as "Mulga woodland" (Figure 5-1) needs to be considered as this community is not known to occur in this area.

At this point in time, there is no appropriate regional-scale map that shows all vegetation communities within the area of the proposal. Some of the area is covered by the 'Native Vegetation of the Murray Catchment Management Authority Area'. The M305 (VIS 917) dataset maps woody vegetation while not considering shrublands, grasslands or wetlands, and so may give some indication of vegetation present. Vegetation

<sup>1</sup> Roff, A., Sivertsen, D., and Denholm, B. (2010) The Native Vegetation of the Murray Catchment Management Authority Area, NSW Department of Environment, Climate Change and Water, Sydney, Australia (VIS\_ID 3808, VIS\_ID 3809, VIS\_ID 3810, VIS\_ID 3811)

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data and NPWS estate boundaries suitable for use in geographic information systems can be downloaded from OEH Spatial Data Online <http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home>.

The Scoping Report undertaken by ngh Environmental for the project, identified a number of previously recorded Aboriginal sites near the substation location (also the only location with prior survey coverage). The study also identifies that the areas containing native vegetation are likely to contain previously undisturbed archaeological deposits associated with Aboriginal occupation. Due to these reasons it would be appropriate and expected that an assessment be done in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal objects in NSW* and also be inclusive of consultation with the relevant Aboriginal parties.

We have reviewed the draft SEARs provided with this request, and **Attachment D** lists some recommended minor amendments to this document.

If you have any questions regarding this matter please contact Michael Todd on (03) 5021 8915 or at [michael.todd@environment.nsw.gov.au](mailto:michael.todd@environment.nsw.gov.au).

Yours sincerely

 6/6/16

**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 D – Recommended amendments to draft SEARs

## Attachment A – Standard Environmental Assessment Requirements

<b>Biodiversity</b>
1. Biodiversity impacts related to the proposed Sunraysia Solar Farm are to be assessed and documented in accordance with the <a href="#">Framework for Biodiversity Assessment</a> , unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the <i>Threatened Species Conservation Act 1995</i> .
<b>Aboriginal cultural heritage</b>
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 Sunraysia 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 should be guided by the <a href="#">Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011)</a> 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 <a href="#">Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW)</a> . 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.
<b>Historic heritage</b>
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: <ul style="list-style-type: none"> <li>a. 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),</li> <li>b. 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),</li> <li>c. include a statement of heritage impact for all heritage items (including significance assessment),</li> <li>d. 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</li> </ul>



<p>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.</p>
<p><b>Water and soils</b></p>
<p>6. The EIS must map the following features relevant to water and soils including:</p> <ul style="list-style-type: none"> <li>a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).</li> <li>b. Rivers, streams, wetlands, estuaries (as described in Appendix 2 of the <a href="#">Framework for Biodiversity Assessment</a>).</li> <li>c. Groundwater.</li> <li>d. Groundwater dependent ecosystems.</li> <li>e. Proposed intake and discharge locations.</li> </ul>
<p>7. The EIS must describe background conditions for any water resource likely to be affected by the proposed Sunraysia Solar Farm, including:</p> <ul style="list-style-type: none"> <li>a. Existing surface and groundwater.</li> <li>b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.</li> <li>c. Water Quality Objectives (as endorsed by the NSW Government <a href="http://www.environment.nsw.gov.au/ieo/index.htm">http://www.environment.nsw.gov.au/ieo/index.htm</a>) including groundwater as appropriate that represent the community's uses and values for the receiving waters.</li> <li>d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the <a href="#">ANZECC (2000) Guidelines for Fresh and Marine Water Quality</a> and/or local objectives, criteria or targets endorsed by the NSW Government.</li> </ul>
<p>8. The EIS must assess the impacts of the proposed Sunraysia Solar Farm on water quality, including:</p> <ul style="list-style-type: none"> <li>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.</li> <li>b. Identification of proposed monitoring of water quality.</li> </ul>
<p>9. The EIS must assess the impact of the proposed Sunraysia Solar Farm on hydrology, including:</p> <ul style="list-style-type: none"> <li>a. Water balance including quantity, quality and source.</li> <li>b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.</li> <li>c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.</li> <li>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).</li> </ul>

<ul style="list-style-type: none"> <li>e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.</li> <li>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.</li> <li>g. Identification of proposed monitoring of hydrological attributes.</li> </ul>
<b>Flooding and coastal erosion</b>
<p>10. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:</p> <ul style="list-style-type: none"> <li>a. Flood prone land</li> <li>b. Flood planning area, the area below the flood planning level.</li> <li>c. Hydraulic categorisation (floodways and flood storage areas).</li> </ul>
<p>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.</p>
<p>12. The EIS must model the effect of the proposed Sunraysia Solar Farm (including fill) on the flood behaviour under the following scenarios:</p> <ul style="list-style-type: none"> <li>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.</li> </ul>
<p>13. Modelling in the EIS must consider and document:</p> <ul style="list-style-type: none"> <li>a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.</li> <li>b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affectation of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories.</li> <li>c. Relevant provisions of the NSW Floodplain Development Manual 2005.</li> </ul>
<p>14. The EIS must assess the impacts on the proposed Sunraysia Solar Farm on flood behaviour, including:</p> <ul style="list-style-type: none"> <li>a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.</li> <li>b. Consistency with Council floodplain risk management plans.</li> <li>c. Compatibility with the flood hazard of the land.</li> <li>d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.</li> <li>e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.</li> <li>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.</li> </ul>

- 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:

- *Acacia melvillei* shrubland in the Riverina and Murray-Darling Depression bioregions
- *Austrostipa metatoris* (a Spear Grass)
- *Falco subniger* (Black Falcon) - nest trees only
- *Hieraaetus morphnoides* (Little Eagle) - nest trees only
- *Circus assimilis* (Spotted Harrier) - nest trees only
- *Santalum murrayanum* (Bitter Quandong)

## Attachment C – Guidance material

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



Title	Web address
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW 2010)	<a href="http://www.environment.nsw.gov.au/resources/protectedareas/080290devadjoindecc.pdf">www.environment.nsw.gov.au/resources/protectedareas/080290devadjoindecc.pdf</a>
VIS Classification - NSW Plant Community Type (PCT) database	<a href="http://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm">www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm</a>
Interim Vegetation Mapping Standard and VIS Plot	<a href="http://www.environment.nsw.gov.au/research/VISplot.htm">www.environment.nsw.gov.au/research/VISplot.htm</a>
OEH Spatial Data Online Access	<a href="http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home">http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home</a>
<b>Heritage</b>	
The Burra Charter (The Australia ICOMOS charter for places of cultural significance)	<a href="http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf">australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf</a>
Statements of Heritage Impact 2002 (HO & DUAP)	<a href="http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf">www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf</a>
NSW Heritage Manual (DUAP) (scroll through alphabetical list to 'N')	<a href="http://www.environment.nsw.gov.au/Heritage/publications/index.htm#MQ">www.environment.nsw.gov.au/Heritage/publications/index.htm#MQ</a>
<b>Aboriginal Cultural Heritage</b>	
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)	<a href="http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf">www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf</a>
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)	<a href="http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf">www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf</a>
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	<a href="http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf">www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf</a>
Aboriginal Site Recording Form	<a href="http://www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf">www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf</a>
Aboriginal Site Impact Recording Form	<a href="http://www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf">www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf</a>
Aboriginal Heritage Information Management System (AHIMS) Registrar	<a href="http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm">www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm</a>
Care Agreement Application form	<a href="http://www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf">www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf</a>
<b>Water and Soils</b>	
<b>Acid sulphate soils</b>	
Acid Sulfate Soils Planning Maps via 'The NSW Natural Resource Atlas'	<a href="http://www.nratlas.nsw.gov.au/">www.nratlas.nsw.gov.au/</a>

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

## **Attachment D – Recommended amendments to draft SEARs**

Given the uncertainty around the vegetation present on the site as identified in the Scoping Report, we recommend that biodiversity

**Biodiversity** – including an assessment of the likely biodiversity impacts of the development, particularly in regard to all native vegetation present including isolated trees, and any steps taken to avoid, mitigate or offset any identified impacts, having regard to the *NSW Biodiversity Offsets Policy for Major Projects*, and in accordance with the *Framework for Biodiversity Assessment*, unless otherwise agreed by the Department;

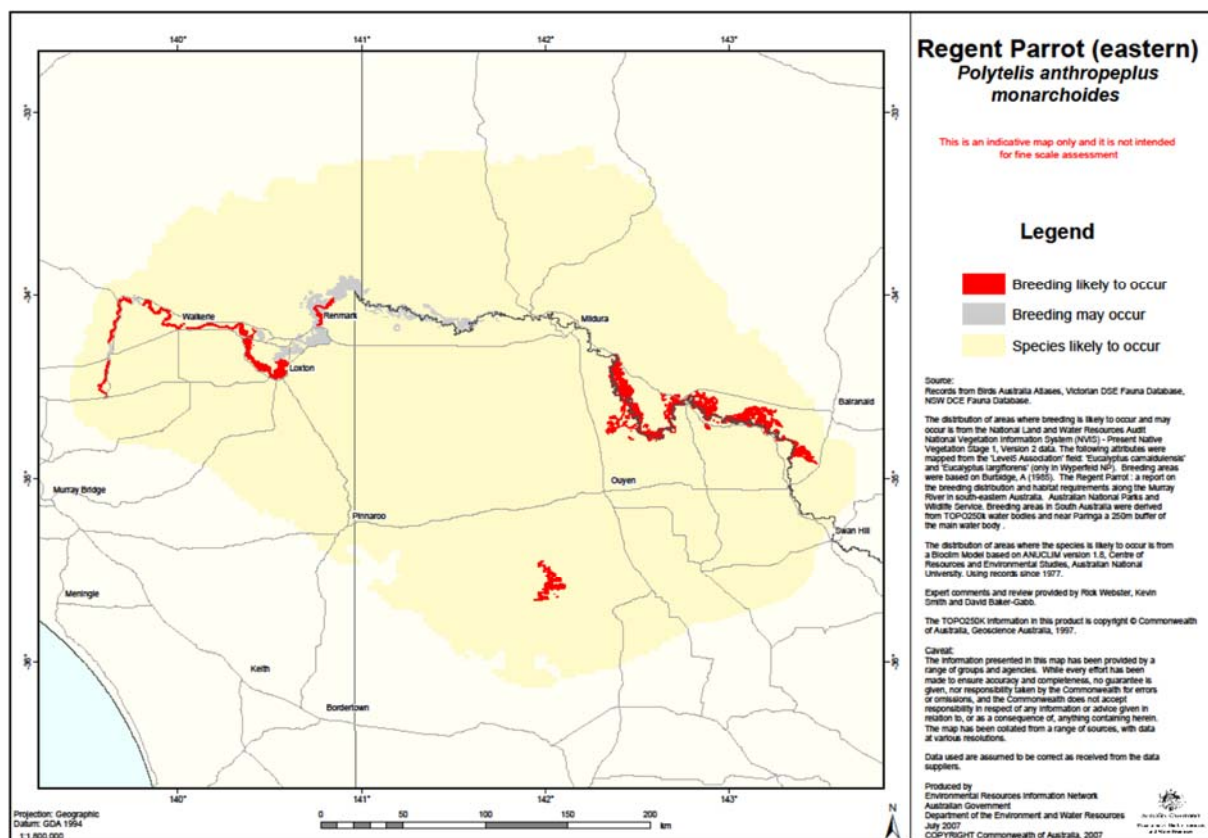
Under Attachment 1 – Heritage we recommend the removal of the document *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH)* as it more appropriate that a full assessment in accordance with the other documents listed be undertaken for this project.

## APPENDIX C ASSESSMENTS OF SIGNIFICANCE

### REGENT PARROT

The individuals of the species observed within the proposal area are not considered an important population, as it does not meet the criteria detailed below. The population of the species within the proposal area is one of several within the bioregion, with numerous records of the species on the OEH Bionet Atlas (OEH, 2016) in floodplains and riparian woodlands associated with the Murrumbidgee and Murray river systems, and within mallee woodlands adjacent. These records exist further north and east of the proposal area, indicating that the population occurring within the proposal area is not at the limit of the species range.

A recovery plan has been prepared for the species (DSE, 2011). The proposal area occurs at the eastern extent of the mapped breeding area in the figure below. Whilst the population is considered important for breeding and dispersal, being located within an area of vegetation connecting species records to the north and south, it is not believed that the population is a key population. Congregations of between 200 and 900 birds are known to occur within the species' core breeding habitat, indicating that these areas of high density breeding are a likely source for dispersal of the species. It is considered likely that the population occurring within the proposal area would be ecologically considered a 'sink' population.



All populations of a species are important for the maintenance of genetic diversity to a degree. Threatened species are typically geographically restricted due to large-scale habitat removal. This leaves individual populations more vulnerable to the impact of stochastic events such as fire, predation or disease. Numerous records of the species occur within the locality and more broadly within the region. The species

is highly mobile, and typically utilizes foraging habitat within 20 km of breeding habitat (DSE, 2011). It is considered likely that the population detected within the proposal area would interbreed with other populations of the species, in breeding habitat outside the proposal area. As such, the population is not considered necessary for maintaining genetic diversity, as it is not likely to be genetically isolated or disjunct from other populations of the species.

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

*lead to a long-term decrease in the size of an important population of a species*

The population of the species occurring within the proposal area is not considered an important population. Nonetheless, there will be a reduction of approximately 12 ha of foraging and roosting habitat for the species in the form of native vegetation, with additional foraging habitat lost in the form of removal of wheat fields (in which the species was detected foraging immediately north of the proposal area). The population utilising the proposal area is considered likely to forage widely within cultivated paddocks in the broader locality and is therefore not considered reliant on the proposal area as a core foraging resource. Additionally, as the population utilising the proposal area is considered to be acting as a sink population (i.e. individuals move from breeding areas into the population from a core area), it is considered likely that this ingress of individuals would continue in the future through the retention of habitat corridors and foraging resources within the proposed offset area.

*reduce the area of occupancy of an important population, fragment an existing important population into two or more populations adversely affect habitat critical to the survival of a species disrupt the breeding cycle of an important population*

The population of the species occurring within the proposal area is not considered an important population of the species. The proposal will lead to a net decrease in the area of occupancy available to the Regent Parrot, with the removal of approximately 12 ha of suitable foraging habitat. This is not considered likely to fragment an existing population into two populations, as the retained vegetation within the proposed offset and within adjacent Crown Lands will ensure that foraging resources and movement corridors continue to occur within the immediate vicinity of the proposal area. Though no critical habitat has been listed for this species, the proposal is not considered likely to adversely affect habitat critical to the breeding cycle of an important population, through avoidance of clearing during breeding periods and not clearing breeding habitat.

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

The proposal is not considered likely to impact the extent, availability and quality of habitat to the extent that the species is likely to decline. Some areas of the vegetation to be removed constitute small, isolated habitat patches, on which the species is unlikely to be reliant. Additionally, significant areas of suitable foraging habitat will remain within the travelling stock reserve, and within the proposed on-site offset area. The species has been detected within the proposed offset area, thus is considered likely to remain viable within the proposal area and locality.



*result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposal is not considered likely to result in invasive species becoming established within the Regent Parrot's habitat. The proposal will modify the current landuse, potentially creating additional shelter habitat for predatory invasive species such as foxes and cats, which are considered likely to be locally prevalent regardless of the proposal, and a management plan will be prepared and implemented which will monitor and manage these species within the proposal area and offset area. Management actions are proposed to include baiting, fencing and monitoring of feral populations.

*introduce disease that may cause the species to decline, or*

It is unclear whether Psittacine Beak and Feather Disease impacts the Regent Parrot (DSE, 2011), however the proposal is not considered likely to act as a vector for the disease.

*Interfere substantially with the recovery of the species.*

The proposal is not considered likely to interfere substantially with the recovery of the species. Though some areas of suitable foraging habitat will be removed by the proposal, a significant proportion of vegetation within the property will be conserved through the implementation of a formal BioBanking Agreement. This will ensure the long term protection and in-perpetuity funding for management of the offset area. As the species has been detected within the proposed offset area, it is considered likely that the species will remain viable within the immediate vicinity of the proposal in the long-term.

#### What is an important population of a species?

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

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

#### Conclusion:

As the species is not considered to constitute an important population of the species, an important population is not considered likely to be impacted significantly as a result of the proposal, thus a Referral under the EPBC Act is not considered necessary.

## RAINBOW BEE-EATER

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

*substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*

The proposal is not considered likely to substantially modify an area of important habitat for the Rainbow Bee-eater. The majority of habitat within the proposal area constitutes sub-optimal habitat, being rendered unsuitable for breeding, foraging and roosting through regular disturbance in the form of cropping.

The proposal area is not considered to support an ecologically significant proportion of the population, with only two individuals being recorded during extensive site surveys. Further, eight records of the species occur within the locality, indicating that additional areas of suitable habitat exist within the locality.

The habitat within the site is not at the limit of the species range, with the species being widely distributed throughout the Australian continent.

Comment cannot be made as to whether the species is declining within the area. Bird surveys have been undertaken within the locality since 1977 as part of the Birdlife Australia (previously Royal Australian Ornithologists Union) bird atlas survey scheme. Records appear to have declined since the 1977 survey, however it is unclear whether the surveys were undertaken in the same location, or whether they include additional survey cells.

*result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,*

It is considered unlikely that the proposal would result in an invasive species becoming established within an area of important habitat for the species. The proposal will involve the removal of some vegetation, however is not considered likely to increase fragmentation or modify landuse to the degree that invasive species not already present within the proposal area would become established. The proposal does have the potential to increase shelter habitat for predatory species such as foxes (*Vulpes vulpes*) or cats (*Felis catus*). As part of the proposal, a flora and fauna management plan is proposed, which will include mitigation and management measures to monitor and control invasive species within the proposal area and offset area.

*seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

The proposal area is not considered to contain an ecologically significant proportion of the Rainbow Bee-eater population. The species was recorded once on site, and has been recorded at eight locations within the locality. The species population within Australia is not known (DotE, 2016), however the species is widespread, and it is considered unlikely that two individuals would constitute an ecologically significant proportion of the population.

## What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

- a. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- b. habitat that is of critical importance to the species at particular life-cycle stages, and/or
- c. habitat utilised by a migratory species which is at the limit of the species range, and/or
- d. habitat within an area where the species is declining.

**Conclusion:**

As an ecologically significant proportion of the species is not considered to occur within the site, the species is not considered likely to be impacted significantly as a result of the proposal, and a Referral under the EPBC Act is therefore not considered necessary.

## APPENDIX D SPECIES LISTS

Table D-1 Flora Species List

	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Acacia melvillei</i>									1.5	1							10	2	3	2	0.25	1		
<i>Acacia oswaldii</i>							0.25	1					2	1										
<i>Alectryon oleifolius</i>							0.25	2																
<i>Amyema miraculosum</i>											0.01	2												
<i>Asperula conferta</i>																							0.01	500
<i>Atriplex acutibractea</i>																					0.01	200		
<i>Austrodanthonia caespitosa</i>			0.01	50					0.1	200	0.01	10											0.01	1000
<i>Austrostipa scabra</i>	5	300	0.625	500	0.175	350	0.25	200	5	2000	0.1	500	2	10000	0.1	200	1	3000			10	10000	0.25	2000
<i>Brachyscome dentata</i>			0.01	3					0.01	100							0.1	5000	0.01	30				
<i>Bromus rubens</i>							0.01	1			0.01	3									0.01	2	0.1	200



	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance	Cover (%)	Abundance
<i>Bulbine semibarbat a</i>					0.01	1																		
<i>Calandrinia eremaea</i>			0.01	1000			0.01	50			0.01	10000	0.1	5000										
<i>Carrichtera annua</i>									15	1000	0.01	20	0.025	1000	1	10000							1	50000
<i>Carthamus lanatus</i>															0.01	25							0.01	10
<i>Casuarina pauper</i>											5	6			5	8								
<i>Chloris truncata</i>											0.1	20	4	400					0.01	4	10	1	0.01	3
<i>Choretrum glomeratum</i>																					0.01	2		
<i>Chrysocephalum apiculatum</i>			0.01	2					3	500													0.1	200
<i>Chthonocephalus pseudevax</i>									5	20000	5	50000	5	10000										
<i>Crassula colorata</i>			1	1000			0.01	50			0.25	1000												
<i>Conyza bonariensis</i>			0.01	6																				

	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Dissocarpus paradoxus</i>							0.01	20	0.01	50	0.01	50			0.01	50	0.01	10	0.01	9				
<i>Dodonaea viscosa ssp angustifolia</i>									0.25	1			0.01	20										
<i>Echium plantagineum</i>																							0.01	15
<i>Einadia nutans</i>	1	500	1	50	0.01	2																		
<i>Enchylaena tomentosa</i>			5	500	0.01	3	0.25	5	0.5	30	0.1	100	0.1	40			0.25	30	0.01	40	0.01	10	0.05	25
<i>Eremophila longifolia</i>																							1	11
<i>Erodium ?crinitum</i>	10	3	0.01	1																				
<i>Eucalyptus dumosa</i>			5	7	10	12																		
<i>Eucalyptus largiflorens</i>	5	2																	15	6				
<i>Eucalyptus socialis</i>							10	2																
<i>Euchiton sphaericus</i>			0.01	50																				
<i>Exocarpos aphyllus</i>							0.25	1																
<i>Goodenia fascicularis</i>									0.01	20	0.01	30			0.01	10			0.01	7	0.01	100	0.01	20

	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Hakea tephrosperma</i>													2	45										
<i>Herniaria cinerea</i>	2	1000	0.5	500													0.1	1000						
<i>Hordeum leporinum</i>					1	2000	0.0	10			0.2	200	0.0	100	0.0	200	0.2	500	0.0	1000	7	500		
<i>Hypochaeris glabra</i>											0.0	1												
<i>Lactuca serriola</i>			0.0	10			0.0	10											0.0	1				
<i>Limonium lobatum</i>	0.1	50	0.0	50					0.0	25	0.0	50	0.1	250					0.0	1	0.0	50	0.0	1
<i>Lolium perenne</i>	1	50	0.0	10															0.0	25	0.1	1000		
<i>Maireana pyramidata</i>	0.0	10			1	200	1	100	0.1	3					0.0	20			0.0	50	0.1	30		
<i>Malva parviflora</i>	0.0	1																						
<i>Marrubium vulgare</i>			0.0	20																				
<i>Medicago minima</i>			0.0	10					1	10000					2	8000	0.5	1000			0.5	500	2	40000
<i>Mesembryanthemum nodiflorum</i>																	0.0	10	0.0	13	0.1	400		

	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Myoporum platycarpum</i>					1	2																		
<i>Nitraria billardierei</i>																	1	10	2	17	3	16		
<i>Oxalis corniculata</i>			0.01	10																				
<i>Papaver hybridum</i>			0.01	1																				
<i>Pittosporum angustifolium</i>							0.25	1																
<i>Plantago cunninghamii</i>			0.01	50																			0.1	8000
<i>Pseudognaphalium luteoalbum</i>	25	5000	0.01	20							0.01	1												
<i>Psilocaulon tenue</i>			0.1	100	40	5000	5	200			0.25	15												
<i>Ptilotus seminudus</i>									0.01	2														
<i>Reichardia tingitana</i>	5	500	0.01	18			0.01	50			0.01	10			0.01	2			0.01	2				
<i>Rhagodia spinescens</i>			0.5	500	0.01	4	0.01	10	1	19	5	40	0.1	7	0.5	10	0.25	20	40	150	0.1	5	0.5	11

	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Rhodanthe floribunda</i>			0.01	1											0.05	1000					0.01	20	0.01	40
<i>Santalum acuminatum</i>	0.01	50									2	1												
<i>Sclerolaena diacantha</i>							0.01	100	1	500	2	400	0.01	10			0.1	150					0.01	80
<i>Scleranthus minusculus</i>			0.01	50			0.01	20	0.01	50					0.01	7	0.01	300	0.01	20	0.01	300	0.01	4
<i>Sclerolaena brachyptera</i>																			0.01	10	0.01	20		
<i>Sclerolaena obliquicuspis</i>											3	150	0.01	50	10	4000	5	12000	0.01	1000				
<i>Sclerolaena sp.</i>																	0.5	1000						
<i>Sida corrugata</i>	10	1000							0.01	10	0.01	2	0.01	100	0.025	30							0.01	30
<i>Sisymbrium erysimoides</i>	0.01	1	20	500	25	1000	20	1000	0.25	200	0.5	50			0.01	40			0.01	40				
<i>Sonchus oleraceus</i>			0.01	17			5	200	0.01	3			0.025	50					0.01	2	0.01	20	0.01	1000
<i>Tetragonia tetragonioides</i>			1	11	0.25	40					0.01	20			0.01	100								



	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		Q12	
Scientific Name	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.	Co ver (%)	A b u n d.
<i>Triodia scariosa</i>			0.01	3																				
<i>Triticum aestivum</i>	0.01	100																						
<i>Wahlenbergia luteola</i>			0.01	10					0.01	200	1000	0.1000	10000	0.01	500							0.01	100	
<i>Xerochrysum bracteatum</i>			0.01	8																				
<i>Zygophyllum apiculatum</i>			0.01	10																		0.01	100	
<i>Zygophyllum crenatum</i>																0.01	20							
<i>Zygophyllum iodocarpum</i>																0.01	10							

Table D-2 Fauna Species List

Scientific Name	Common Name	Status (TSC/EPBC)
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	
<i>Anas gracilis</i>	Grey Teal	
<i>Anthus novaeseelandiae</i>	Australasian Pipit	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Cincloramphus mathewsi</i>	Rufous Songlark	
<i>Corvus mellori</i>	Little Raven	
<i>Coturnix pectoralis</i>	Stubble Quail	
<i>Cracticus nigrogularis</i>	Australian Magpie	
<i>Eolophus roseicapillus</i>	Galah	
<i>Falco cenchroides</i>	Nankeen Kestrel	
<i>Gavicalis virescens</i>	Singing Honeyeater	
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable/-
<i>Malurus lamberti</i>	Variegated Fairy-wren	
<i>Manorina melanocephala</i>	Noisy Miner	
<i>Manorina flavigula</i>	Yellow-throated Miner	
<i>Merops ornatus</i>	Rainbow Bee-eater	-/Marine, Migratory
<i>Milvus migrans</i>	Black Kite	
<i>Northiella haematogaster</i>	Blue Bonnet	
<i>Ocyphaps lophotes</i>	Crested Pigeon	

Scientific Name	Common Name	Status (TSC/EPBC)
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Phaps chalcoptera</i>	Common Bronzewing	
<i>Polytelis anthopeplus monarchoides</i>	Regent parrot	Endangered/ Vulnerable
<i>Pomatostomus ruficeps</i>	Chestnut-crowned Babbler	
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Vulnerable/-
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Struthidea cinerea</i>	Apostlebird	

## **APPENDIX E   OEH CONSULTATION**

**From:** Miranda Kerr  
**To:** [Matthew Hingee](#); [Aleksei Atkin](#)  
**Cc:** [Raphael Morgan](#); [Peter Ewin](#)  
**Subject:** RE: Sunraysia Solar Farm SEARs  
**Date:** Wednesday, November 9, 2016 2:54:26 PM  
**Attachments:** [image001.png](#)

---

Hi Matthew.

If you've mapped PCT 58 Black Oak - Western Rosewood open woodland and separated it from the PCT 23 *Yarran tall open shrubland*, then it's unlikely that the PCT 58 map unit is part of the *Acacia melvillei* EEC. The Final Determination legally defines the EEC.

Cheers  
Miranda

Miranda Kerr  
Biodiversity Conservation Officer  
OEH Regional Operations, South West  
02 6022 0607

---

**From:** Matthew Hingee [mailto:[matthew.h@nghenvironmental.com.au](mailto:matthew.h@nghenvironmental.com.au)]  
**Sent:** Wednesday, 9 November 2016 2:42 PM  
**To:** Miranda Kerr <[Miranda.Kerr@environment.nsw.gov.au](mailto:Miranda.Kerr@environment.nsw.gov.au)>; Aleksei Atkin <[aleksei.a@nghenvironmental.com.au](mailto:aleksei.a@nghenvironmental.com.au)>  
**Cc:** Raphael Morgan <[raphael.m@nghenvironmental.com.au](mailto:raphael.m@nghenvironmental.com.au)>; Peter Ewin <[Peter.Ewin@environment.nsw.gov.au](mailto:Peter.Ewin@environment.nsw.gov.au)>  
**Subject:** RE: Sunraysia Solar Farm SEARs

Hi Miranda,

Thanks for the clarification. We have also mapped PCT 58 *Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion* as occurring within the development footprint which also appears to conform in part to the *Acacia melvillei* EEC, according to VIS. Again the species composition matches the PCT, but not the Final Determination of the EEC.

Are you able to also to offer any advice on differentiating which portions of this PCT conform to the EEC?

Kind regards,

Matt

Matthew Hingee | Ecologist  
BSc (EnvBio), AssocDip. AppSc (Hort)



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**From:** Miranda Kerr [<mailto:Miranda.Kerr@environment.nsw.gov.au>]

**Sent:** Wednesday, 9 November 2016 2:28 PM

**To:** Aleksei Atkin <[aleksei.a@nghenvironmental.com.au](mailto:aleksei.a@nghenvironmental.com.au)>

**Cc:** Matthew Hingee <[matthew.h@nghenvironmental.com.au](mailto:matthew.h@nghenvironmental.com.au)>; Raphael Morgan <[raphael.m@nghenvironmental.com.au](mailto:raphael.m@nghenvironmental.com.au)>; Peter Ewin <[Peter.Ewin@environment.nsw.gov.au](mailto:Peter.Ewin@environment.nsw.gov.au)>

**Subject:** RE: Sunraysia Solar Farm SEARs

Hi Aleksei

Regarding the EEC, if you have mapped PCT 23 Yarran tall open shrubland (*Acacia melvillei*) separately to PCT 170 *Chenopod sandplain mallee woodland/shrubland*, then it is unlikely that any areas of PCT 170 fall within the *Acacia melvillei* EEC definition.

The VIS allocations stem from a historic anomaly in the database relating to broad-scale mapping products - *Acacia melvillei* shrubland was included as part of a chenopod mallee map unit. The original EEC field was intended as a flag when using those particular regional veg map units.

Please let me know if you need more details

Cheers

Miranda

Miranda Kerr

Regional Biodiversity Conservation Officer, South West

Regional Operations Group (South Branch)

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---

**From:** Aleksei Atkin [<mailto:aleksei.a@nghenvironmental.com.au>]

**Sent:** Tuesday, 8 November 2016 11:39 AM

**To:** Peter Ewin <[Peter.Ewin@environment.nsw.gov.au](mailto:Peter.Ewin@environment.nsw.gov.au)>

**Cc:** Miranda Kerr <[Miranda.Kerr@environment.nsw.gov.au](mailto:Miranda.Kerr@environment.nsw.gov.au)>; Matthew Hingee <[matthew.h@nghenvironmental.com.au](mailto:matthew.h@nghenvironmental.com.au)>; Raphael Morgan <[raphael.m@nghenvironmental.com.au](mailto:raphael.m@nghenvironmental.com.au)>

**Subject:** RE: Sunraysia Solar Farm SEARs

Hi Peter,

Thanks very much for the quick response. That was my thinking as well, I'm confident that if they were breeding on site, I would have detected them.

Separately, we have conducted targeted surveys for *Austrostipa metatoris*, *Santalum murrayanum* and *Lepidium monoplacoides* using 10 m spaced walked transects within the impact areas, in accordance with the Threatened Flora Survey Guidelines. These species were not detected during the surveys, thus won't be considered further in the BAR.

We have confirmed the presence of the *Acacia melvillei* shrubland on site, and will assess the impacts to the EEC in accordance with the FBA methodology. One question I had regarding this EEC is that one of the PCTs we've identified on site (PCT 170 [MR542] - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones) conforms in part to the *Acacia melvillei* EEC, according to VIS. Do you have any advice on differentiating which portions of this PCT conform to the EEC? I would imagine that the only way to definitively rule portions of the PCT out of the EEC would be to conduct plots in which species composition matches the PCT, but not the Final Determination of the EEC. In any case, we are taking a precautionary approach and treating the PCT as the EEC unless advised otherwise.

Kind Regards,


Aleksei Atkin | Ecologist

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**From:** Peter Ewin [<mailto:Peter.Ewin@environment.nsw.gov.au>]

**Sent:** Tuesday, November 8, 2016 10:36

**To:** Aleksei Atkin <[aleksei.a@nghenvironmental.com.au](mailto:aleksei.a@nghenvironmental.com.au)>

**Cc:** Miranda Kerr <[Miranda.Kerr@environment.nsw.gov.au](mailto:Miranda.Kerr@environment.nsw.gov.au)>; Matthew Hingee <[matthew.h@nghenvironmental.com.au](mailto:matthew.h@nghenvironmental.com.au)>; Raphael Morgan <[raphael.m@nghenvironmental.com.au](mailto:raphael.m@nghenvironmental.com.au)>

**Subject:** RE: Sunraysia Solar Farm SEARs

Thanks Aleksei.

They would only need to be addressed further if nest trees were confirmed on site. Given the timing

of the survey (both time of year and season) if you didn't find them at the moment then they are unlikely to be using the site. If you are confident these species are unlikely to occur (as a breeding species – they may occur as foraging habitat but the proposal is unlikely to impact on this) then that should be sufficient within the EIS.

Happy to discuss if you need anything further.

Thanks,

Peter

**Peter Ewin**

Senior Team Leader Planning, South West  
Regional Operations Group (South Branch)  
Office of Environment and Heritage  
Ph: 02 6022 0606  
Fax: 02 6022 0610  
Mob: 0427 433 937

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**From:** Aleksei Atkin [<mailto:aleksei.a@nghenvironmental.com.au>]

**Sent:** Tuesday, 8 November 2016 10:30 AM

**To:** Peter Ewin <[Peter.Ewin@environment.nsw.gov.au](mailto:Peter.Ewin@environment.nsw.gov.au)>

**Cc:** Miranda Kerr <[Miranda.Kerr@environment.nsw.gov.au](mailto:Miranda.Kerr@environment.nsw.gov.au)>; Matthew Hingee <[matthew.h@nghenvironmental.com.au](mailto:matthew.h@nghenvironmental.com.au)>; Raphael Morgan <[raphael.m@nghenvironmental.com.au](mailto:raphael.m@nghenvironmental.com.au)>

**Subject:** RE: Sunraysia Solar Farm SEARs

Hi Peter,

I'm currently working on the BAR for this project. Appendix B of the response letter to DP&E identifies several species and communities requiring further assessment under Section 9.2 of the Framework for Biodiversity Assessment. My question relates specifically to the following species:

- Falco subniger (Black Falcon) - nest trees only
- Hieraaetus morphnoides (Little Eagle) - nest trees only
- Circus assimilis (Spotted Harrier) - nest trees only

Targeted surveys have been conducted for nest trees of these species, and did not detect the species within the site. Several stick nests were recorded across the site, however these were typically smaller, Corvid-sized nests. Do these species require further assessment under section 9.2 if not detected on site?

Kind Regards,

Aleksei Atkin | Ecologist

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**From:** Peter Ewin [<mailto:Peter.Ewin@environment.nsw.gov.au>]  
**Sent:** Tuesday, October 18, 2016 15:25  
**To:** Aleksei Atkin <[aleksei.a@nghenvironmental.com.au](mailto:aleksei.a@nghenvironmental.com.au)>  
**Cc:** Miranda Kerr <[Miranda.Kerr@environment.nsw.gov.au](mailto:Miranda.Kerr@environment.nsw.gov.au)>  
**Subject:** Sunraysia Solar Farm SEARs

Aleksei,

As promised attached is the response we sent DP&E when providing input on SEARs. Main concern was the mapping of mulga woodland (which you have addressed) and the species for further consideration in Attachment B).

Note that Mick Todd has changed jobs so I will be the best contact initially – Miranda probably will run with this one but might depend on timeframes (recruiting at the moment) and workloads.

Let me know if any questions or concerns.

Thanks,

Peter

**Peter Ewin**  
Senior Team Leader Planning, South West  
Regional Operations Group (South Branch)  
Office of Environment and Heritage  
Ph: 02 6022 0606  
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