GEOLYSE

Biodiversity Assessment

NORTH WAGGA SOLAR FARM

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ACRONYMS AND ABBREVIATIONS

ASL	Above sea level
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
Cwth	Commonwealth
DECCW	Refer to OEH
DP&I	(NSW) Department of Planning and Infrastructure
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIA	Environmental impact assessment
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares
km	kilometres
LEP	Local Environment Plan
LGA	Local Government Area
LLS	Local Land Services
NES	Matters of National environmental significance under the EPBC Act (*c.f.*)
Noxious Weeds Act	*Noxious Weeds Act 1993* (NSW)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
SEPP	State Environmental Planning Policy (NSW)
SIS	Species Impact Statement
sp/spp	Species/multiple species
TSC Act	*Threatened Species Conservation Act 1995* (NSW)

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This Biodiversity Assessment (BA) has been prepared by NGH Environmental for Geolyse who is preparing an environmental assessment for the construction, operation and decommissioning of the North Wagga Solar Farm.

1.2 LOCATION OF THE ACTIVITY

The proposal is located about 8km north east of Wagga Wagga and 2.5km east of Bomen in NSW, in the Wagga Wagga Local Government Area (LGA) (Figure 1-1).

For the purpose of this report the following definitions apply:

- **Proposal Area:** defined as the footprint of the works
- **Study Area:** encompasses the proposal area and includes all areas surveyed for the purposes of this assessment
- **Locality:** defined as the proposal area plus a 10km radius.

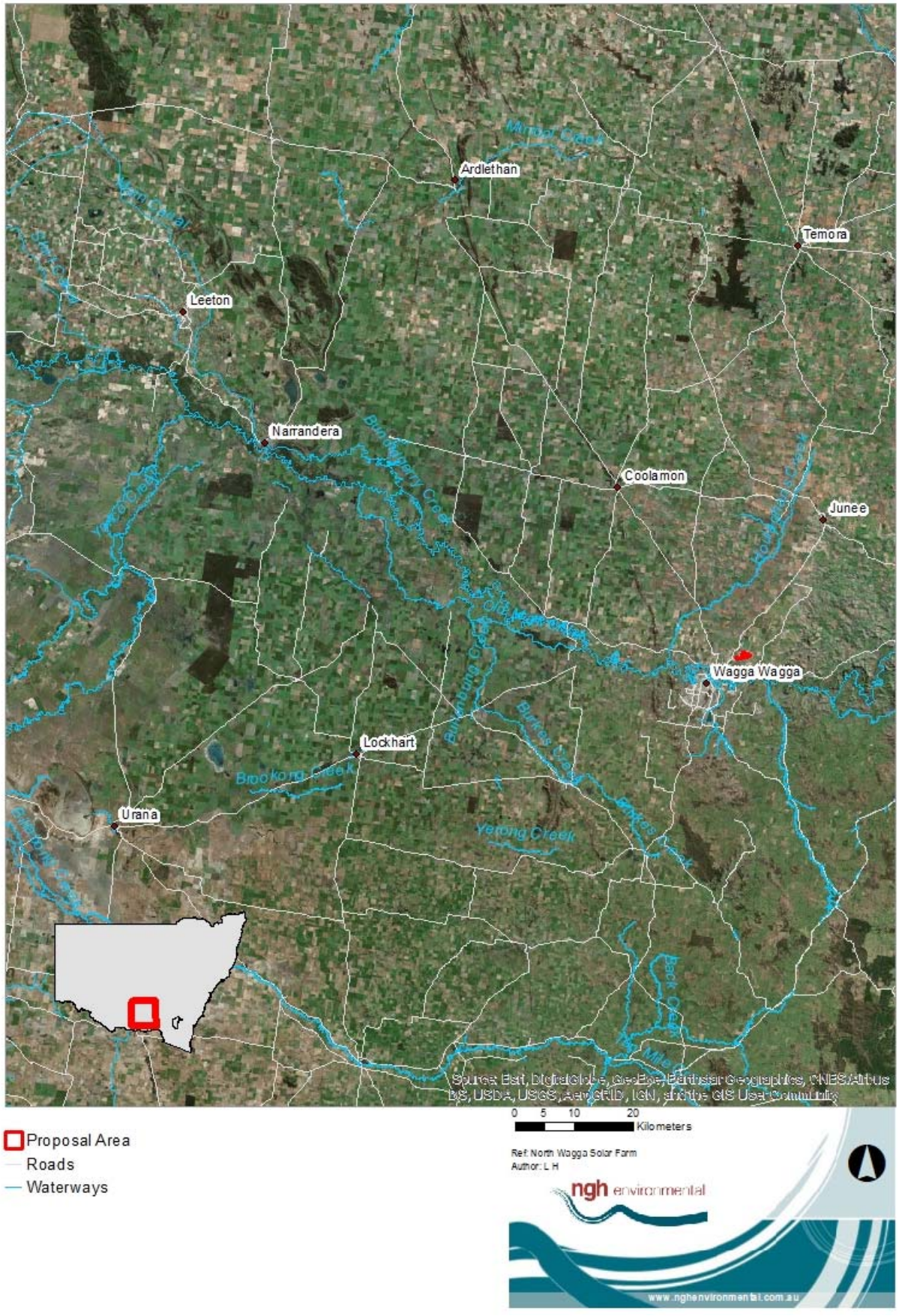

Figure 1-1 Proposal Location

1.3 SCOPE OF THE REPORT

This Biodiversity Assessment has been prepared by NGH Environmental on behalf of Geolyse. For the purposes of these works, Terrain Solar Pty Ltd is the proponent and Wagga Wagga City Council (WWCC) is the consent authority under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The *State Environmental Planning Policy (Infrastructure)* (SEPP) states under Clause 34(7) that' *Except as provided by subclause (8)*, development for the purpose of a solar energy system may be carried out by any person with consent on any land. Clause 34(8) excludes certain solar energy systems in residential zones. Given the proposal area is not located in a residential zone and would produce more than 100kw, clause 34(7) applies to the proposal.

The scope and aims of this report are to:

- Address the requirements of the relevant legislation including the EP&A Act, the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Determine the biodiversity values of the study area including identifying protected and threatened flora and fauna species, populations and ecological communities and their habitats.
- Identify the ecological constraints of the proposal.
- Identify the potential impacts of the proposed activity on threatened flora and fauna species, populations, ecological communities and critical habitat.
- Assess the significance of the impact of the proposed activities on species, ecological communities and populations listed under the TSC Act and EPBC Act.
- Propose environmental management measures to minimise, mitigate and, if necessary, offset residual impacts.

2 STATUTORY CONSIDERATIONS

2.1 BIODIVERSITY CONSERVATION ACT 2016

The NSW government introduced new biodiversity legislation for the consideration and assessment of biodiversity impacts. The *Biodiversity Conservation Act 2016* (BC Act) and *Local Land Services Act 2013* (LLS Act) commenced on the 25th August 2017 and has replaced the *Threatened Species Conservation Act 1995*. Under Part 7 (1 e) of the *Biodiversity Conservation (Savings and transitional) Regulation 2017*, projects assessed under Part 4 of the EPA Act are permitted to be assessed under the old legislation if a development application is lodged within 3 months of the commencement of the new Act. This report has been prepared under the assessment of the old legislation with the intention to be lodged by the 25th November 2017. The field work was conducted prior to 25th August and the biodiversity assessment is deemed to be substantially commenced as of that date.

2.2 NSW ENVIRONMENT AND PLANNING AND ASSESSMENT ACT 1979

The EP&A Act provides the framework for the assessment of development activities. The proposal is being assessed and determined under Part 4 of EP&A Act. A Statement of Environmental Effects (SEE) is being prepared to assess the environmental impacts of the project prior to commencing works.

Clause 5A and 5C of the EP&A Act requires that the significance of the impact of the proposal on terrestrial and aquatic threatened species, populations and endangered ecological communities is assessed. If works are likely to impact on a listed (threatened) species or ecological community, Section 5A of the EP&A Act contains seven factors that can be used to make a determination of whether the impact on the entity will be significant or not. This is known as a seven-part test.

This Biodiversity Assessment has been prepared in accordance with the requirements of the EP&A Act.

2.3 NSW THREATENED SPECIES CONSERVATION ACT 1995

The TSC Act aims to conserve biological diversity, promote ecologically sustainable development, prevent extinctions and promote recovery of threatened entities, protect critical habitat, assess the impacts of actions on, and encourage the conservation of threatened entities. The TSC Act contains lists of critically endangered, endangered, and vulnerable species, populations and ecological communities, as well as a list of key threatening processes in NSW.

The TSC Act also directs the preparation and implementation of recovery plans, threat abatement plans, priority action statements, and other conservation measures to assist with managing threatened entities.

Where a significant impact is likely to occur a Species Impact Statement (SIS) must be prepared for projects assessed under Part 4 and Part 5 of the EP&A Act.

This Biodiversity Assessment has discussed impacts to threatened biota.

2.4 NSW NATIONAL PARKS AND WILDLIFE (NPW) ACT 1974

The National Parks and Wildlife (NP&W) Act 1974 aims to conserve nature, habitat, ecosystems, ecosystem processes and biological diversity at the community, species and genetic levels. Under this Act all native

fauna is protected, threatened or otherwise. Schedule 13 of the act lists protected plants which shall not be harmed or picked on any land either on or off National Park estate.

With regard to threatened species a person must not:

(a) harm any animal that is of, or is part of, a threatened species, an endangered population or an endangered ecological community, or

(b) use any substance, animal, firearm, explosive, net, trap, hunting device or instrument or means whatever for the purpose of harming any such animal.

No National Parks estate adjoins the proposal area.

2.5 NSW NATIVE VEGETATION ACT 2003

The Native Vegetation Act 2003 (NV Act) aims to regulate the clearing of native vegetation on all land in NSW. Exemption from obtaining Consent under the NV Act is achieved through Clause 25 of the Act. The proposal is not considered exempt from requiring consent for the removal of vegetation.

Part 3 Section 12 1 states that native vegetation must not be cleared except in accordance with

a) a development consent granted in accordance with this Act, or
b) a property vegetation plan.

The Native Vegetation Act 2003 was repealed as of the 25th of August 2017. Part 4 development applications no longer require dual consent irrespective of the savings and transitional arrangements. The removal of vegetation for the proposal does not require consent from the Murrumbidgee Local Land Services (LLS).

2.6 NSW BIOSECURITY ACT 2015

The *Biosecurity Act 2015* repealed the *Noxious Weeds Act 1993* from the 1st July 2017. The *Biosecurity Act* provides a streamlined statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds. It guides the management of priority weeds based on LLS regions. A duty is assigned to weeds based on their distributions and the level of threat that each species poses to the environment, human health, or primary production. This information is drawn from the Regional Strategic Weed Management Plan (RSWMP) with the relevant LLS regions. All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Duty categories are described in Table 2 1. Two priority weeds were identified in the proposal area and are discussed in section 4.1.2.

Table 2-1 Priority weed categories and their characteristics as listed under the *Biosecurity Act 2015*.

Category	Duty
Mandatory Measure	Must not be imported into the State or sold.
Regional recommended measure	Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Category	Duty
Biosecurity Zone	Biosecurity zones have been identified for weed species. If a weed is identified within the associated Biosecurity Zone, this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone.
Prohibited Matter	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.
Biosecurity Control Order	Owners and occupiers of land on which there is 'control zone for that weed' must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

2.7 STATE ENVIRONMENTAL PLANNING POLICY NO. 44 – KOALA HABITAT PROTECTION

SEPP 44 encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free living populations will be maintained over their present range. Wagga Wagga LGA (Wagga LGA) is listed as a Local Government Area to which the SEPP applies.

SEPP 44 aims to identify areas of potential and core Koala Habitat. These are described as follows:

- Core Koala Habitat is defined as an area of land with a resident population of Koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.
- Potential Koala Habitat is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Within Schedule 2 of SEPP 44 White Box (*Eucalyptus albens*), and River Red Gum (*Eucalyptus camaldulensis*) are listed as feed tree species. Under the NSW Koala Management Plan (Department of Environment and Climate Change NSW 2008) under the section Koala Management Area 6: Western Slopes and Plains Eucalyptus species are prescribed as Koala feed trees. River Red Gum is considered a primary feed tree. Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*), and Apple Box (*Eucalyptus bridgesiana*) are considered secondary feed trees. This Biodiversity Assessment has considered the presence of core and potential Koala habitat at the site.

2.8 ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION (EPBC) ACT 1999 (CWTH)

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. Matters of national environmental significance relevant to biodiversity are:

- Wetlands of international importance.
- Nationally threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.

Significance of impacts is determined in accordance with the Significance impact guidelines 1.1 – matters of national environmental significance (DoE 2013).

Where a proposal is likely to have a significant impact on a matter of national environmental significance, the proposal is referred to the Commonwealth Environment Minister via the Department of the Environment (DoE). The Minister then determines whether the proposal is a 'controlled action'. If a proposal is declared a controlled action, an assessment of the action is carried out and the Minister makes a decision to approve, approve with conditions, or not approve the proposed action.

This assessment considers the potential for the proposal to impact on matters of national environmental significance relevant to biodiversity.

3 METHODOLOGY

3.1 BACKGROUND REVIEW

3.1.1 Database searches

Database searches undertaken for the purposes of this assessment included threatened species databases and priority weed databases (Table 3 1). The results of the database searches for threatened species, populations and communities are provided in Appendix C. Weeds declared as a priority within the Riverina LLS Region are provided in Appendix D. An evaluation of presence of habitat and likelihood of occurrence of threatened flora and fauna species and ecological communities are provided in Appendix D, with an explanation of categories used.

Table 3-1: Database searches undertaken for the biodiversity assessment.

Resource	Target	Search area	Date
NSW OEH Wildlife Atlas Data	Threatened flora and fauna and populations.	10 km radius of proposal area.	05/06/17
EPBC Act Protected Matters Search Tool	Threatened flora and fauna, endangered populations and ecological communities and migratory species.	10 km radius of proposal area.	05/06/17
DPI Priority Weeds declarations	Priority weeds declared in the relevant Local Land Services (LLS) Region.	Riverina LLS.	06/07/17

3.1.2 Literature review

Documentation and literature relevant to this assessment was reviewed, including:

- NSW Office of Environment and Heritage (OEH) Threatened Species Profiles.
- Department of the Environment (DoE) EPBC Act Species Profiles and Threats Database (SPRAT).
- NSW OEH Vegetation Information System (VIS) Map Catalogue.
- Biobanking Assessment Methodology guidelines (DECC 2008a).
- Threatened species assessment guidelines: The assessment of significance (DECC 2007).
- Satellite imagery.

3.2 FIELD SURVEY- FLORA

3.2.1 Survey timing and conditions

Field surveys were undertaken on the 7th and 8th of June and 28th August 2017. Weather recorded at Wagga Wagga (the nearest Bureau of Meteorology station) for those days are shown in Table 3 2. Specific flora and fauna survey methodologies are discussed in more detail in Sections 3.2.2 and 3.2.3 below.

Table 3-2 Weather conditions during field surveys in 2017 (BOM, 2017)

Dates	Temperature (min °C)	Temperature (max °C)	Rainfall (mm)	Wind speed (9am km/h)	Cloud (9am)
7th June	-1.0	16.1	0	31	0/8
8th June	-0.06	16.1	0	26	0/8
28th August	-3.0	12.3	0.4	6	0/8

3.2.2 Flora survey methods

The aims of the flora surveys were to:

- Determine all vegetation communities present within the study area, their condition and extent.
- Identify potential Endangered Ecological Communities (EECs) within the study area and determine their condition and extent.
- Identify whether threatened flora species are present within the study area, and whether it is likely that any have the potential to occur within the habitats present.

Species and vegetation communities identified from the background research as potentially occurring in the study area were targeted during the surveys.

Random meanders

The entire length of the study area was surveyed using a random meander method (informal transects) in accordance with Cropper (1993). Observed vascular plant species were identified to species level or otherwise as accurately as possible. The random meander method provides comprehensiveness in terms of the number of species recorded and variation within vegetation types. It is used to maximise the coverage of threatened species habitat and the encounter rate of different species (SoQ, 2014). During the random meander, dominant tree species, physical structure of the vegetation, and species composition were also recorded and used to identify vegetation types. A comprehensive species list is provided in Appendix F.

Vegetation condition assessment

All vegetation communities in the study area were assigned a vegetation condition as per the OEH Biobanking Assessment Methodology. Under the methodology, native woody vegetation is in low condition if:

- The over-storey per cent foliage is <25% of the lower value of the over-storey per cent foliage cover benchmark for that vegetation type, AND

- <50% of vegetation in the ground layer is indigenous species or >90% ploughed or fallow (cleared).

Native grassland or herb field is in low condition if:

- <50% of vegetation in the ground layer is indigenous species or >90% ploughed or fallow (cleared).

If native vegetation is not in low condition, then it is considered to be in moderate to good condition. Hence, for some open woodland communities, treeless native pasture derived from woodland and dominated by native grasses would be classed in 'moderate to good' condition under this categorisation. Similarly, areas where the groundcover is exotic but suitable overstorey cover is present would also be classed as being in 'moderate to good condition'.

Plant and community nomenclature

Vegetation communities in the study area have been categorised on the basis of their structure and formation with reference to vegetation descriptions from OEH Vegetation Types Database (VIS classification). These classifications reflect the floristic composition and physiognomic features of the site.

Botanical nomenclature follows Harden (1990-2002), with recent name changes provided by the Australian Plant Name Index of the Australian National Herbarium. In the body of this report, flora species are referred to by both their common and scientific names when first mentioned. Subsequent references to these species cite the common name only. Where a species does not have a generally accepted common name, the scientific name is used throughout the body of the report. Common and scientific names are included in the appendices.

Priority weeds identified are those declared for the Riverina LLS region under the *Biosecurity Act 2015*.

3.2.3 Limitations

There is potential for flora species to not be recorded during the survey due to the timing of the survey in winter. Some ephemeral or short-lived species such as grasses, orchids and lilies, have a limited growing season and tend to grow during spring and early summer.

3.3 FIELD SURVEY – FAUNA

3.3.1 Fauna survey methods

The aims of the terrestrial fauna surveys were to:

- Assess the fauna habitat types available and their quality and suitability as threatened species habitat (e.g. trees with hollows, ground cover, vegetation structural complexity).
- Determine which fauna are present or likely to be present within the study area using appropriate survey techniques.
- Collect data on the habitat usage and abundance of threatened fauna observed in the study area, in order to determine the potential impacts of the proposal on these species.
- Habitat assessment.

Habitat assessment - Terrestrial

An assessment of habitat types present and their quality and suitability as threatened species habitat was conducted across the study area. Factors such as coarse woody debris, rocky outcrops, leaf litter, vegetation structure, connectivity and disturbance were noted.

Hollow-bearing tree inventory

A hollow-bearing tree assessment was also undertaken, in which every tree within the study area was assessed for the presence, number and size of hollows. The location of each hollow-bearing tree was recorded using GIS PRO on a tablet device, and the diameter of the tree at breast height, the height of the tree, and the species of tree were noted. Hollows were categorised as small (< 10 cm), medium (10 – 20 cm), and large (> 20 cm).

Koala

An assessment of the study area for potential Koala habitat or core Koala habitat was also undertaken, taking into account primary (e.g. River Red Gum), and secondary (e.g. Yellow Box, Apple Box), feed tree densities and incidentally observed evidence of use including presence of scats and scratches. Feed tree preferences were taken from the Koala Recovery Plan (DECC 2008b). Formal Spot Assessment Technique (SAT) surveys were not undertaken during this project as a habitat assessment and analysis of historical records was considered sufficient to assess potential impacts on Koalas.

Mammals general and nocturnal

Incidental sightings of other fauna and their traces (e.g. scats, tracks, scratches) were also recorded.

Bird surveys

Two fifteen minute active surveys were undertaken on the 7th June during am and pm. A large proportion of the proposal area was traversed on foot and observed from the car, and all opportunistic bird sightings during the field surveys were recorded.

Fauna nomenclature

Field guides and standard texts used as a reference are provided in the reference list. The naming of species recorded or known for the region follows the nomenclature present in these texts. The conservation significance of fauna species recorded is made with reference to the EPBC Act and the TSC Act.

3.3.2 Limitations

The calculation of hollow-bearing trees, in particular the size and number of hollows, is as accurate as could be determined from ground level. There is potential for some hollows to be present that were not visible from ground level, which may result in underestimates of the number of hollows (Gibbons and Lindermayer, 2000). Where it was deemed likely for hollows to be present but not visible from ground level, these were noted.

3.4 FIELD SURVEY- AQUATIC

The initial field assessment identified potential Sloane's Froglet (*Crinia sloanei*) habitat (Figure 4-4). This habitat contained evidence of a previously inundated chain of ponds wetland. In response to the

identification of the habitat, a targeted Sloane's Froglet survey was undertaken to determine the presence of the species. The methodology of these surveys is provided below.

3.4.1 Survey timing and conditions

Targeted amphibian surveys were undertaken by two ecologists, on the 11th July at 5.30pm and the 8th August at 6pm, following periods of rainfall. Weather recorded at Wagga Wagga (the nearest Bureau of Meteorology station) for those days and the week prior are shown in Table 3-3.

Table 3-3 Weather conditions for the aquatic surveys (BOM,2017).

Dates	Temperature (min °C)	Temperature (max °C)	Rainfall (mm)	Wind speed (9am km/h)	Cloud (9am)
6th July	7.8	13.6	13.4	19	7/8
7th July	4.6	11.3	5.8	31	0/8
8th July	5.8	11.6	0.8	31	8/8
9th July	2.5	11.8	2.8	26	8/8
10th July	2.1	12.8	0.8	35	8/8
11th July	0.8	-	0.2	_	8/8
4th August	7.8	9.7	11.8	24	8/8
5th August	6.1	13.1	3.2	19	7/8
6th August	3.3	15.7	0	13	1/8
7th August	4.3	9.8	4.6	26	8/8
8th August	0.9	12.9	3.0	7	8/8

3.4.2 Aquatic fauna survey methods

The aims of the amphibian surveys were to:

- Assess the amphibian habitat types available and their quality and suitability as threatened species habitat (e.g. trees with hollows, ground cover, vegetation structural complexity).
- Determine which amphibians are present or likely to be present within the study area using appropriate survey techniques.
- Collect data on the habitat usage and approximate abundance of amphibians observed in the study area.
- Habitat assessment.

Habitat assessment – Aquatic Habitat

All drainage lines and wetlands within the study area were inspected visually to determine whether they contained habitat that could potentially support populations of threatened fauna such as the Growling Grass Frog (*Litoria raniformis)* or Sloane's Froglet (*Crinia sloanei*). The habitat evaluation table was used to assess the potential for all aquatic species to occur within the proposal area (Appendix D.2).

Amphibian Surveys

The amphibian survey was undertaken in accordance with OEH *Threatened Species Survey and assessment guidelines: Amphibians.*

Active nocturnal searches were undertaken for 50 minutes per survey effort. Call playbacks were undertaken for a total of 10 minutes in three locations. No tadpole surveys were undertaken for this species due to the unreliability of identification (OEH, 2009).

3.4.3 Limitations

Surveys were undertaken in response to rainfall events. Despite the rainfall received, wetland conditions were very dry making detectability difficult. It has been acknowledged that weather conditions are likely to be more important than the time of the year for Sloane's Froglet (*Crinia Sloanei*). The survey conditions for each attempt were dry with only a minor amount of surface pooling occurring in the second survey.

The dry conditions experienced in June resulted in no accumulation of water in the pools. Despite being in the optimum breeding window for the species, the conditions for the surveys were not favourable for detection as breeding would not be attempted.

4 RESULTS

4.1 FLORA

4.1.1 Existing environment

Remnant vegetation remaining in the locality is comprised of scattered paddock trees and disturbed grasslands. Narrow linear plantings occur along paddock boundaries, ridge lines, creek lines and areas with a history of erosion. The native vegetation communities remaining are isolated patches of open grassy woodlands. This vegetation type largely reflects the underlying geology and land use of the region. Open, grassy woodlands occur across a diversity of geologies however are usually found on the slopes or valleys of more deep and fertile soils.

The study area occurs in an undulating terrain which has been heavily cleared for agricultural purposes. Generally, native vegetation has been retained in the largely inaccessible and unproductive areas.

The proposal area has been largely cultivated or has experienced pasture improvement (Figure 4-1 and Figure 4-2). The dominant vegetation is exotic pastures with planted vegetation occurring along the central drainage line, rocky ridge line, around the wetland area and along the eastern boundary. No remnant native vegetation communities remain in the proposal area.

Figure 4-1 Cultivated paddocks in the proposal area looking in an easterly direction.

Figure 4-2 Heavily grazed exotic pastures with planted vegetation in the background looking in a southerly direction.

Figure 4-3 Planted vegetation in the northern part of the study area, looking in a north easterly direction.

4.1.2 Species recorded

A total of 72 flora species were recorded during the flora surveys comprising 29 native and 43 exotic species. 12 of the native species are shrubs occurring in the planted vegetation areas. A complete list of all species recorded according to specific plot location is provided in Appendix F.

4.1.3 Weeds and disturbance

The proposal area has been subject to historical disturbance, mostly associated with large scale clearing, cultivation and pasture improvement for agriculture. The groundcover within the study area is predominantly exotic.

Of the exotic species recorded two 'Priority Weeds' were identified. These include Silver Leaf Nightshade (*Solanum elaeagnifolium*) and African Boxthorn (*Lyceum ferocissimum*). Both these species are classed as Mandatory Measure and 'must not be imported into the State or sold'.

4.2 VEGETATION COMMUNITIES

4.2.1 Current survey

No remnant native vegetation communities were identified within the study area. 14 isolated paddock trees occur in the proposal area. The trees were identified as White box (*Eucalyptus albens*), Yellow box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Grey Box (*Eucalyptus microcarpa*). The presence of these species suggests that historically *White Box Yellow Box Blakely Red Gum Woodland* (Box Gum Woodland) would have occurred naturally in the study area. The only native vegetation remaining in the study area is the planted vegetation in Areas A, B and C (Figure 4-4). A wide variety of native species (locally occurring and not) occupy the planting areas. This vegetation would be avoided by the development footprint.

Due to the historic clearing of native understorey and groundcover in the proposal area, the vegetation types within the proposal area were determined to be 'Exotic Vegetation' and 'Planted Vegetation'. The extent of these vegetation types can be seen in Figure 4-4.

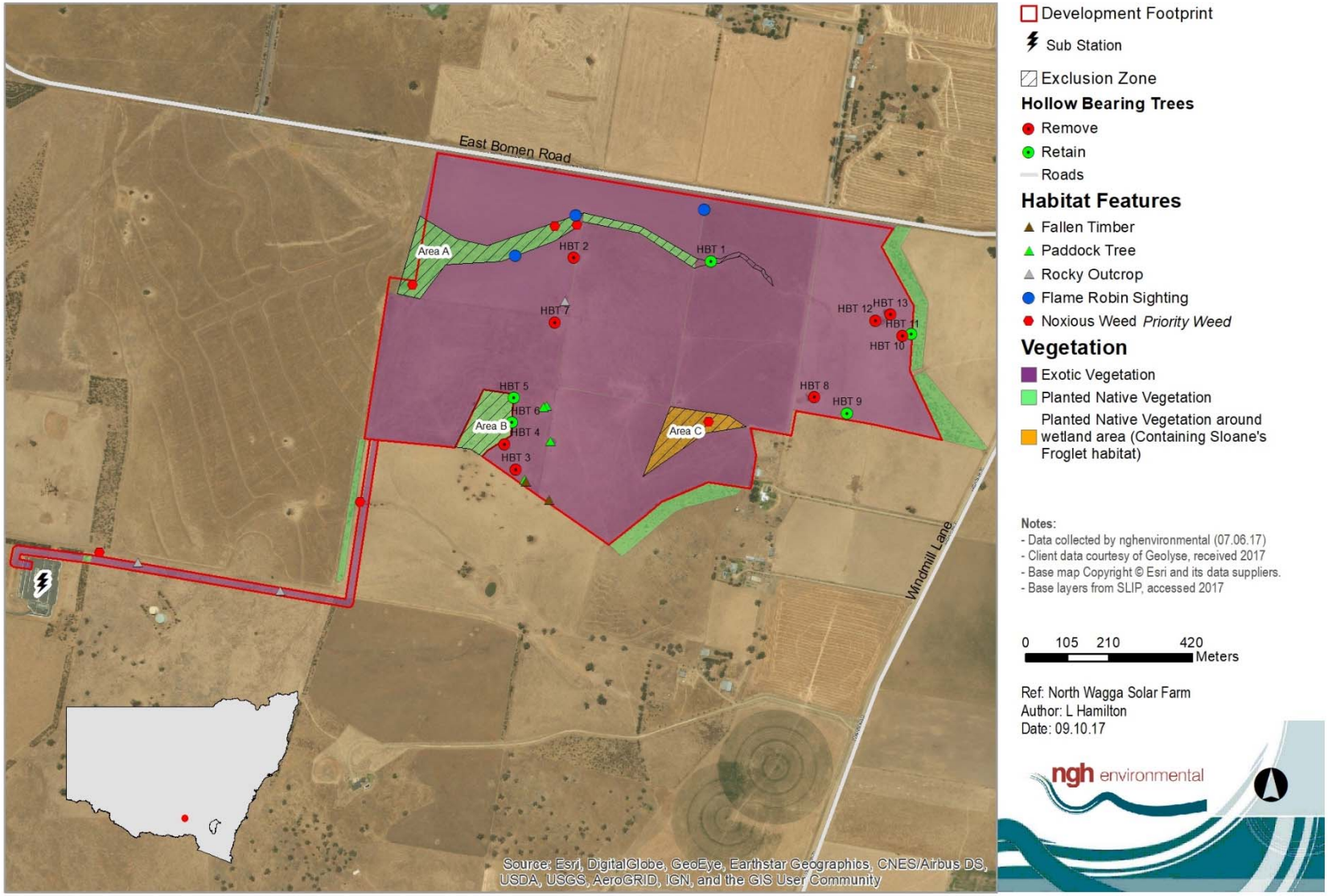

Figure 4-4 Biodiversity constraints map for North Wagga Solar Farm

4.3 PLANT SPECIES AND COMMUNITIES OF CONSERVATION SIGNIFICANCE

4.3.1 Endangered ecological communities

No endangered ecological communities were identified within the proposal area, or are considered likely to occur.

4.3.2 Endangered populations

No endangered fauna populations were identified within the proposal area, or are considered likely to occur.

4.3.3 Listed threatened species

No listed threatened flora species were observed during the field surveys or are known to occur in the study area.

The Atlas of NSW Wildlife database search produced no identified records of threatened plant species within 10km of the proposal area. A threatened species profile search was also undertaken (OEH) which indicated that 7 species could occur within the locality. A search of the EPBC Act Protected Matters Search Tool highlighted 1 flora species with the potential to occur within a 10km radius of the proposal area (refer to Appendix B). Based on the habitat evaluation in Appendix D habitat within the study area was considered to be suitable for:

- Yass Daisy (*Ammobium craspedioides*)
- Small Scurf-pea (*Cullen parvum*)
- Austral Pillwort (*Pilularia novae-hollandiae*)
- Cotoneaster pomaderris (*Pomaderris cotoneaster*)
- Green comb spider orchid (*Caledenia tensa*)
- Crimson Spider orchid (*Caledenia concolor*)
- Tumut grevillea (*Grevillea wilkinsonii*)
- Woolly Ragwort (*Senecio garlandii)*

Targeted searches failed to detect any of these species in the study area, although it is acknowledged that some of these species would not have been detectable at the time of the surveys. Notwithstanding this, these species are unlikely to be present due to the high disturbance and cultivation of the proposal area.

4.4 FAUNA

4.4.1 Species recorded

21 bird species, 1 reptile, and 3 mammals were recorded during the field surveys. A complete fauna list is proved in Appendix F.

4.4.2 Fauna habitat

Terrestrial

The majority of the study area consists of exotic pastures dominated by rye grass, clover and bromes and fescue. A number of paddocks have been sown with cereal crops or pastures. The proposal area has been highly modified and minimal native groundcover is present. These habitat types provide limited resources for fauna. However, Red capped robins (*Petrioca goodenovii*) and the Flame robins (*Petroica phoenicea*) were seen utilising the open areas of the agricultural pastures. These species often sally from fence-posts or thistles and other prominent perches in open habitats in their autumn and winter ranges (OEH,2017). Black Shouldered kites *(Elanus axillaris)* and nankeen kestrels (*Falco cenchroides*) were recorded in mature Eucalypts in the study area.

The planted vegetation in the study area provides moderate to good habitat quality. The plantings are approximately 10 years old and provide a dense shrub layer for protection, food and breeding habitat for birds. The plantings have limited connectivity values due to the heavily cleared landscape and have likely been undertaken to control erosion.

The lone paddock trees identified within the proposal area also provide moderate to good quality habitat in a heavily cleared landscape. These trees provide roosting, foraging and breeding habitat for a number of fauna.

Fallen timber is uncommon in the proposal area. As a routine agricultural activity, timber which accumulates under paddock trees is placed into large piles. One pile of timber exists in the proposal area (Figure 4-6). Timber which is stockpiled can be a haven for pest species including foxes and rabbits. There was evidence that livestock have used the timber for shelter resulting in soil disturbance and weed encroachment. This has significantly reduced the habitat value of the timber pile. Fallen timber also exists in Planting Area B which has a number of remnant trees (Figure 4-4). This timber provides habitat for a range of fauna, including skinks, snakes, birds, and ground-dwelling mammals.

A rocky outcrop exists in the centre of the proposal area (Figure 4-5). The exposed rocks experience high disturbance from livestock and are surrounded by heavily grazed exotic pasture. It is unlikely that these rocks provide suitable habitat for threatened reptiles. No species were identified during the survey.

Figure 4-5 Rocky outcrop within proposal area.

Figure 4-6 Fallen timber in the proposal area.

In general, fauna habitat in the planting areas are considered moderate to good quality. The cleared pasture and cropping paddocks, while providing opportunistic foraging habitat for a number of species, provide only limited habitat value due to the ongoing agricultural activities.

Hollow bearing trees

13 hollow-bearing trees were identified within the study area which provide an important roosting, nesting and sheltering habitat for birds and a range of nocturnal species. The results of the hollow-bearing tree inventory are provided in full in Appendix J.

Declared critical habitat

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

4.4.3 Threatened species

The EPBC Act Protected Matters Search Tool listed 9 birds, 2 reptiles, 3 mammals, 1 frog, 3 fish, and 10 migratory bird species with the potential to occur within 10km of the study area (Appendix B).

The NSW Wildlife Atlas database search for threatened species revealed 9 species of birds and 2 mammals recorded as occurring within 10km of the study area.

All threatened species were evaluated for their potential to occur in the study area (Appendix D). Species considered to have the potential to occur are discussed further below.

Woodland birds

The Flame Robin (*Petroica phoenicea*) was observed in the study area (Appendix F). This species is listed as vulnerable under the *NSW TSC Act*. The Flame Robin breeds in upland areas and tends to move inland to the slopes and plains during the winter months. It prefers open habitat where it will sally from fence posts or thistles and other prominent perches when foraging. The species is wide ranging and occupies cleared and disturbed land around Wagga Wagga in winter. It is highly mobile.

No other threatened bird species were observed during the survey. Based on the threatened species evaluation (Appendix D) the following birds have potential to occur in the study area:

- Spotted Harrier (*Circus assimilis*)
- Superb Parrot (*Polytelis swainsonii*)
- Turquoise Parrot (*Neophema pulchella)*
- Little Lorikeet (*Glossopsitta pusilla*)
- Barking Owl (*Ninox connivens*)
- Hooded Robin (*Melanodryas cucullate*)
- Flame robin (*Petroica phoenicea*)
- Scarlet Robin (*Petroica boodang*)
- Dusky Woodswallow (*Artamus cyanopterus*)

There are 13 recorded sightings of the Superb Parrot (*Polytelis swainsonii*) within 10km of the proposal area. The closest sighting was recorded 460m from the substation. It is likely that the Superb Parrot is a vagrant visitor within the proposal area, however due to its high mobility it was not detected during the field surveys. The proposal site supports only limited foraging habitat for this species, which is abundant in the locality.

The proposal area provides foraging habitat for the listed woodland birds in the form of open grasslands, flowering tree canopies and understorey vegetation in the planted habitats. Breeding and roosting habitat for non-hollow bearing dependant species exists in the planted vegetation. These habitats are abundant in the study area and locality. Raptors including the Spotted Harrier and Barking Owl would forage on pest and native prey species in the proposal area. All these species are highly mobile and the proposal area does not support habitat critical to their survival.

The assessment of impacts on these species is provided in Section 5 and Appendix E of this report.

Koala

The Koala was not observed during the field surveys and has not been recorded within 10km of the study area.

White Box (*Eucalyptus albens*) is a primary feed tree however minimal White Box trees occur in the study area. The dominant eucalypt in the proposal area was Yellow Box (*Eucalyptus melliodora*) which is considered a secondary feed tree for Koalas. Given the Koala was not recorded during the field survey, and no records occur within 10km of the study area, it can be concluded that due to the highly fragmented and cleared landscape, the study area does not support a resident population of Koalas.

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 4-1 as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala.

Table 4-1 Koala habitat assessment tool (DoE 2014)

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓ Not recorded from study area
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ Three species of food tree occur in the within the study area
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	
	+1 (medium)	Area is part of a **contiguous landscape** < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	✓
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	✓ No Koala mortality observed during the survey
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence	

Attribute	Score	Inland	Applicable to the proposal?
		and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Study area is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	**4**	**Decision: Habitat is not critical to the survival of the Koala—assessment of significance is not required**	

Microbats

The database searches indicated that 3 threatened bat species have the potential to occur in the study area. These include Corbens Long-eared bat (*Nyctophilus corbeni*), Yellow-bellied Sheath-tail bat (*Saccolaimus flaviventris*) and the Eastern Bentwing-bat (*Miniopterus schreibersii*). The Eastern Bentwing-bat has been recorded 3.8km south of the study area near the Murrumbidgee River.

The threatened species evaluations determined that Yellow-bellied Sheathtail bat could potentially occur in the study area. This species forages in most habitats across its very wide range, occurring in landscapes with and without trees. In treeless landscapes it is known to utilise mammal burrows for roosting. The study area supports foraging habitat for this species. Impacts to this species is considered in section 5.2 and Appendix E.

The other two species may, from time to time, traverse the study area. However, no habitat important to their lifecycle is present.

4.5 AQUATIC HABITAT

4.5.1 Existing environment

Aquatic habitat was identified within Planting Area C (Figure 4-7 & Figure 4-8). The area was identified as potential Sloane's Froglet (*Crinia sloanei*) habitat. Sloane's Froglet is listed as *Vulnerable* under the NSW TSC Act. The species is known to occur in periodically inundated grasslands, woodlands and disturbed habitats. It shelters in any vegetation, ground debris or cracks in the soil. Aerial images from 2016 showed the aquatic habitat inundated with water. During the field surveys, no pooling water was present and vegetation was identified as predominantly exotic with minimal aquatic flora present.

The aquatic habitat identified was not deemed suitable for the Southern Bell Frog (*Litoria raniformis*) which has potential to occur in the locality. This species requires vegetation such as Typha, Phragmites and Eleocharis. This species also requires more permanent water bodies including, lagoons, swamps, ponds and dams. The Southern Bell Frog is considered unlikely to occur in the proposal area, therefore was not targeted in the surveys.

The drainage line which runs through Planting Area A is ephemeral. This landscape feature is dominated by exotic pasture species, does not support aquatic vegetation or experience regular inundation of water. Hence, for the purpose of this report the drainage line is not considered aquatic habitat.

Figure 4-7 Habitat identified as potential Sloane's Froglet habitat, looking in a westerly direction from the lowest water pooling area.

Figure 4-8 One of the two depressions which lead to the lowest pooling area of Sloane's Froglet habitat looking in a south westerly direction.

4.5.2 Species recorded

No amphibian species were identified during the surveys. Recent surveys in the Wagga Wagga area have been unsuccessful in detecting Sloane's Froglet (*Crinia sloanie*). The low number of sites where the population exists, low recorded individuals per site, and low proportion of records suggest a low number of mature individuals exist. Despite the survey conditions being relatively dry, it is unlikely that Sloane's Froglet occurs in the study area.

4.6 EPBC MATTERS OF NATIONAL SIGNIFICANCE

The following matters of national significance relevant to biodiversity are considered to apply to the proposal. These matters are assessed further in this report.

4.6.1 Endangered Ecological Communities

No endangered ecological communities were identified within the proposal area, or are considered likely to occur.

4.6.2 Threatened Species

The Koala (*Phascolarctos cinereus*) is listed as Vulnerable under the EPBC Act. The EPBC Act assessment tool has determined that no further assessment of this species is required.

Yellow-bellied sheathtail- bat (*Saccolaimus flaviventris*) is listed as Vulnerable under the TSC Act. There is potential for this species to be found within the proposal area.

No threatened flora species were identified within the proposal area, or are considered likely to occur.

4.6.3 Migratory Species

10 species listed as Migratory under the EPBC Act are considered to have potential to occur within the study area. Based on a habitat assessment (Appendix D), none of these species are considered likely to be impacted by the proposal.

5 ASSESSMENT OF IMPACTS

5.1 FLORA IMPACTS

5.1.1 Vegetation loss

No native vegetation communities were identified in the study area and therefore none would be impacted by the proposal. The proposed works would involve the removal of up to 8 hollow bearing trees (HBTs) and 3 mature non-hollow bearing trees. All areas of planted vegetation (Area A, B, & C) would be retained and avoided by the proposal.

5.1.2 Threatened species

No threatened flora species were identified within the proposal area, or are considered likely to occur. No impact to threatened flora species is likely to occur as a result of the proposal.

5.1.3 Weeds

The spread of priority weeds may occur during the construction of the proposal. Two priority weeds were identified during the field surveys including Silverleaf Nightshade (*Solanum elaeagnifolium*) and African Boxthorn (*Lyceum ferocissimum*) (Figure 4-4). African boxthorn was identified in Planting Area C and would not be disturbed as a result of the proposal. Silverleaf nightshade has the potential to be spread through moving plant and equipment. Each species requires particular treatment to be successfully managed, and detailed information on managing each species can be sought from the Noxious and Environmental Weed Control Handbook (DPI 2011).

5.2 FAUNA IMPACTS

5.2.1 Construction impacts

During construction, the proposal has potential to impact on fauna in the study area. An assessment of these impacts is provided below.

Removal of fauna habitat

The proposal would remove fauna habitat including grassland foraging habitat, one pile of fallen timber and a rocky outcrop (refer-Section 4.4.2). Grassland foraging habitat is abundant in the locality. Following the installation of the solar farm, grasses would re-establish across the proposal area and continue to provide foraging habitat.

The fallen timber and rocky outcrops have limited habitat value. The removal of this habitat is not expected to impact any native species. Planting areas A B & C provide medium to good quality habitat including fallen timer and rocky outcrops for birds and reptiles. Given this habitat would not be impacted by the proposal, fauna would be able to utilise these areas of habitat and the adjoining agricultural matrix.

Removal of hollow bearing trees

The proposal would involve the removal of up to 8 hollow-bearing trees and 3 mature non-hollow bearing tree. 5 hollow-bearing trees would be retained within the proposal area. The number of hollows which would be removed by size class is documented in Appendix G.

The removal of up to 8 hollow-bearing trees represents the loss of habitat for arboreal mammals, reptiles, birds and microbats. These are expected to be common and widespread species such as Common Brushtail Possum (*Trichosurus vulpecula*), Rosellas (*Platycercus spp*.) and Galahs (*Eolophus roseicapilla*). Threatened species which have the potential to utilise hollows within the proposal area include the Superb Parrot (*Polytelis swainsonii),* Turquoise Parrot *(Neophema pulchella),* Little Lorikeet *(Glossopsitta pusilla*) and Barking Owl *(Ninox connivens).* The loss of hollows for these species has been considered in the assessment of significance (Appendix E).

The distribution and abundance of hollow bearing trees has been reduced and fragmented by extensive clearing during the past two centuries, primarily for agriculture. This is the case for the study area with only scattered paddock trees remaining. In this context, hollow bearing trees are considered a valuable resource in the locality. The proposal has aimed to minimise impact by reducing the felling of as many hollow bearing trees as possible. Due to the highly fragmented nature of the study area, and its isolation from major watercourses, it is unlikely that any native species are reliant on these hollow bearing trees.

The loss of hollow-bearing trees is listed as a Key Threatening Process under the TSC Act. The proposal contributes to this process which is discussed further in Appendix E.

5.2.2 Impacts to threatened species

Detailed assessments of significance for species with the potential to occur and be impacted by the proposal are provided in Appendix E and Appendix F. These assessments are summarised below.

Threatened ground/understory birds (Flame Robin and Scarlet Robin)

Potential impacts to threatened ground/understory birds including the Flame Robin and Scarlet Robin may occur as the result of the proposal including construction disturbance, habitat removal and land use change. Both these species utilise open pastures for foraging in areas close to dense vegetation for protection. Both species are likely to continue to forage in the proposal area once grasses re-establish in between the solar panels.

An Assessment of Significance was carried out to determine if any potential impacts are likely to be significant (Appendix E). The assessment concluded that there is unlikely to be a significant impact on the Flame Robin and Scarlet Robin because:

- Similar quality habitat (agricultural matrix) is widespread in the locality.
- Important habitat (Planted vegetation) for these species would be retained.
- The solar panels are likely to provide similar groundcover foraging habitat from beneath the panels once operational.

Threatened canopy birds (Superb Parrot, Turquoise Parrot, Little Lorikeet, and Barking Owl,)

Impacts to threatened canopy birds including the Superb Parrot, Turquoise Parrot, Little Lorikeet, and Barking Owl may occur as the result of the proposal including construction disturbance, habitat removal and land use change. These birds utilise tree hollows for breeding and canopy for foraging.

An Assessment of Significance was carried out to determine if any potential impacts are likely to be significant (Appendix E). The assessment concluded that there is unlikely to be a significant impact on the Superb Parrot, Turquoise Parrot, Little Lorikeet, and Barking Owl because:

- The habitat quality is poor in the proposal area.
- The species are highly mobile and would utilise surrounding habitat of similar quality.
- At least 5 hollow bearing trees would be retained in the proposal area.
- Habitat is heavily fragmented, with no woodland patches or watercourses within 2km.

Threatened Bats (Yellow- bellied Sheathtail- bat)

There are potential impacts to microbats due to the loss of potential nesting and foraging resources. Approximately 8 hollow bearing trees that may provide suitable roosting sites for the microbats would be removed as a result of the proposal, although 5 would be retained.

An Assessment of Significance was carried out for this species and concluded that there is unlikely to be a significant impact on the Yellow- bellied Sheathtail- bat because:

- Breeding resources would be retained in the study area and similar habitats are widespread in the locality.
- A significant area of foraging resources would be retained within the study area (Planted vegetation) (approximately 18ha).
- This species is highly mobile and occupies a large range of habitat types over large areas, therefore would not be restricted to the habitats in the proposal area.

5.2.3 Operational impacts

No impacts to threatened species are expected to occur as a result of the operational phase of the proposal. Fauna in the study area are expected to utilise remaining habitat. Groundcover would be maintained beneath the solar panels which would provide foraging habitat for a number of woodland bird species including the Flame Robin (*Petroica phoenicea*) and Hooded robin (*Melanodryas cucullate*).

5.3 AQUATIC IMPACTS

5.3.1 Construction impacts

No impacts to threatened aquatic species is expected to occur as a result of the construction phase of the proposal. The proposal would not impact on the aquatic habitat identified in Planting Area C.

The proposal would involve the construction of a crossing over the central drainage line. The drainage line does not constitute aquatic habitat, therefore no impacts to aquatic habitat are expected as a result of these works.

There is potential for sediment laden run off to impact Planting Area A and C during construction. Groundcover in these areas is predominantly exotic however could have the potential to be smothered with sediment laden run off. These impacts can be avoided with the implementation of appropriate erosion and sediment controls and standard construction safeguards.

Threatened amphibians (Sloane's Froglet)

No impacts to threatened frog species would occur as a result of the proposal. Field surveys were unsuccessful in detecting the presence of Sloane's Froglet (*Crinia sloanei*). The habitat identified as potential Sloane's froglet habitat in Planting Area C would be retained and other common species of frogs would utilise this habitat during seasonal episodes of inundation.

5.3.2 Operational impacts

No impacts to threatened aquatic species is expected to occur as a result of the operational phase of the proposal. The proposal would not impact on any aquatic habitat, reducing any potential risks of erosion in the gully areas and retaining threatened species habitat. Fauna including potential amphibian species are expected to utilise the remaining habitat.

5.4 REGIONAL AND CUMULATIVE IMPACTS

The loss of large habitat trees or hollow-bearing trees is a long-term cost of projects such as these, because these features of the environment can take well over 100 years to form (Mackowski 1984; Wormington & Lamb 1999). The landscape surrounding the proposal area is largely cleared and already contains a reduced density of mature trees that may be hollow-bearing. Many of the mature trees occur as scattered paddock trees which are susceptible to dieback and occur in actively grazed or cropped situations where ongoing recruitment of trees is inhibited. Despite this, there are still likely to be a number of hollows present in the vegetation within the locality of similar overstorey composition to that within the project area.

The proposal would not reduce the overall landscape connectivity at the local or regional scale, as connectivity is already poor in the study area.

6 MITIGATION MEASURES

These safeguards are a tool to assist with minimising the impacts on biodiversity during vegetation removal and maintenance works (Table 6-1).

Table 6-1 Safeguards for Protection of Flora and Fauna

Impact	Environmental safeguards	Responsibility	Timing
Disruption to the breeding cycle of threatened birds	• Pre-clearing surveys should be undertaken for hollow-bearing trees and would include surveys for threatened birds and the presence of active nests in the proposal area. • If nests for any of these species are detected the host tree should be avoided and no works should occur within 100 metres until the eggs have hatched and the chicks fledged. If this cannot be achieved it may be appropriate for species other than threatened species for an ecologist or wildlife carer to remove the nest and to take the eggs/chicks to a wildlife care facility. Whether or not this is appropriate should be at the discretion of the project ecologist.	Proponent	Pre-construction & Clearing
Loss of hollow-bearing trees	• Pre-clearing surveys should be undertaken for the presence of bats that are likely to occur in the area. • Staged removal of hollow-bearing trees should be adopted as described in Guides 1 and 4 of the Roads and Maritime *Biodiversity Guidelines* (RTA 2011) (Appendix H). • Details of local WIRES contact to be kept readily available in the case of fauna being discovered or injured during tree felling. • Hollow bearing trees to be retained will be protected by a physical barrier or fence or similar in accordance with AS 4970-2009. • 10 nest boxes for displaced fauna (including non-threatened species) should be installed within the planted vegetation (Area A,B and C) on site. The type of nest boxes and final location would be selected in consultation with an ecologist. • Nest boxes should be installed up to one month before the start of any tree removal to provide alternative shelter for hollow-dependent fauna displaced during clearing.	Contractor	Pre-construction & Clearing

Impact	Environmental safeguards	Responsibility	Timing
	• Nest box monitoring and maintenance, including replacement, would be carried out for the life of the solar farm, in consultation with an ecologist. Damaged nest boxes would be replaced. Pests, such as non-native bees, would be eradicated. • Where practical, hollowed limbs removed from trees being felled will be placed in areas outside the proposal footprint or in the planted areas where they will in time form habitat for ground dwelling fauna. They should not be stacked into windrows, but scattered sparsely.		
Introduction and spread of priority weeds	• Declared priority weeds should be managed according to the requirements stipulated by the Biosecurity Act, and recommendations made by the local control authority (MLLS) and the Noxious and Environmental Weed Handbook (DPI, 2011), which contains details as to the management of specific noxious weeds. • Regular targeted control of priority weeds should take place for at least 24 months following rehabilitation of disturbed areas. • All weed material containing seed heads, weeds that contain toxins, and weeds that are able to reproduce vegetatively should be disposed of at an appropriate waste management facility or otherwise properly treated to prevent weed growth. • All herbicides should be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application should be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.	Contractor	Construction & post-construction
Disturbance to fallen timber, dead wood and bush rock	• Any fallen timber, dead wood and bush rock encountered in the impact area should be relocated to within the planted vegetation areas (Areas A, B, and C).	Contractor	Construction
Unexpected threatened species finds	• The site induction should include measures to make employees aware of potential threatened flora and fauna during works and understand the procedures if threatened fauna are	Contractor	Construction and post-construction

Impact	Environmental safeguards	Responsibility	Timing
	detected, this will be recorded as a part of the induction procedure and toolbox talks: o Stop work, o Alert Ecologist for assessment and possible re-location during works.		

7 SUMMARY OF LICENSES AND APPROVALS

Table 7-1 Summary of Licenses and als Required

Legal Instrument	License or Approval
No licenses or approvals required.	

8 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Precautionary principle

Namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This Biodiversity assessment has been prepared utilising the precautionary principle. That is, if threats are perceived as possibly leading to serious or irreversible environmental damage, then either the non-development of the proposal would occur, or the development modified to ensure that such threats do not exist. This has been the approach in relation to recommendations itemised in Section 6.

Intergenerational equity

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The proposed works would not impact on natural features to a level that would compromise the health, diversity or productivity of the environment to a level that would impact on future generations.

Conservation of biological diversity and ecological integrity

The proposed works would potentially disturb fauna habitat including the removal of 8 hollow bearing trees and 3 non-hollow bearing trees. The quality of potential habitat is low, being largely cleared, dominated by exotic grasses, lacking structural complexity, and disturbed by agricultural activities. The planted vegetation contains moderate to good quality habitat which would be retained. The assessment has identified that the works would not impact significantly on the biological diversity and ecological integrity of the locality. Furthermore, safeguards have been developed that would assist in protecting valuable habitat resources.

Improved valuation, pricing and incentive mechanisms

This principle relates to giving monetary values to environmental resources. The proposal involves the generation of renewable energy an important sustainable resource. With minimal environmental impact this factor ensures that the development would conform to the principles of “ecologically sustainable development”.

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APPENDIX E THREATENED SPECIES ASSESSMENTS OF SIGNIFICANCE

E.1 THREATENED SPECIES CONSERVATION ACT SEVEN-PART TEST

Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) specifies seven factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, listed at the state level under the *Threatened Species Conservation Act 1995*.

This *Seven-part Test* characterises the significance of likely impacts associated with the proposal on the following species:

- Threatened Ground/Understorey Birds
  - Flame Robin
  - Scarlet Robin
- Threatened Canopy Birds
  - Superb Parrot
  - Turquoise Parrot
  - Little Lorikeet
  - Barking Owl
- Threatened Bat
  - Yellow-bellied Sheathtail-bat

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
Threatened Ground/Understorey Birds (Flame Robin, Scarlet Robin)
These species are known or considered likely to occur in the study area. However, the quality of potential habitat is low, being largely cleared, dominated by exotic grasses, lacking structural complexity, and disturbed by agricultural activities. The proposal would involve the clearing of eight hollow-bearing trees and three mature trees, but the remaining paddock trees and areas of planted vegetation would be retained and continue to provide habitat. Grasses will re-establish within the solar farm after construction is completed. The proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction.
Threatened Canopy Birds (Superb Parrot, Turquoise Parrot, Little Lorikeet, Barking Owl,)
These species are known or considered likely to occur in the study area. However, the quality of potential habitat is low, being largely cleared, dominated by exotic grasses, lacking structural complexity, and disturbed by agricultural activities. Superb Parrot, Turquoise Parrot, Little Lorikeet and Barking Owl nest in tree hollows. The study area supports thirteen hollow-bearing trees, eight of which would be removed. Notwithstanding this, these trees are present in isolation from other woodland vegetation and would provide poor breeding habitat for these species. The proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction.
Threatened Bat (Yellow-bellied Sheathtail-bat)
This species is considered likely to occur in the locality, and could potentially occur within the study area. The species uses both forested and cleared habitats for foraging. However, the quality of potential habitat in the proposal area is low, being largely cleared, dominated by exotic grasses, lacking structural complexity, and

disturbed by agricultural activities. The proposal would involve the clearing of eight hollow-bearing trees and three mature trees, but the remaining paddock trees and areas of planted vegetation would be retained and continue to provide habitat. The proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
Threatened Ground/Understorey Birds (Flame Robin, Scarlet Robin)
Not applicable
Threatened Canopy Birds (Superb Parrot, Turquoise Parrot, Little Lorikeet, Barking Owl)
Not applicable
Threatened Bat (Yellow-bellied Sheathtail-bat)
Not applicable

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: **i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or** **ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**
Threatened Ground/Understorey Birds (Flame Robin, Scarlet Robin)
Not applicable
Threatened Canopy Birds (Superb Parrot, Turquoise Parrot, Little Lorikeet, Barking Owl)
Not applicable
Threatened Bat (Yellow-bellied Sheathtail-bat)
Not applicable

d) In relation to the habitat of a threatened species, population or ecological community: **i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and** **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and** **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
Threatened Ground/Understorey Birds (Flame Robin, Scarlet Robin)
i. No native vegetation communities would be removed as part of the proposal. The proposal would involve the clearing of eight hollow-bearing trees and three mature trees, but the remaining paddock trees and areas of planted vegetation would be retained and continue to provide habitat.

ii. Existing habitat in the locality is heavily isolated and fragmented. The proposal would not further isolate the existing habitat due to the planted vegetation which will be retained and continue to provide local connectivity.

iii. The quality of potential habitat in the proposal area is low. The trees to be cleared are not within a core area of woodland, and would not fragment or isolate any areas of habitat. The habitat within the proposal area is not critical for any of these species given the highly degraded and modified condition. With the recommended mitigation measures, the likelihood of significant habitat loss, modification, or fragmentation in an important area of habitat for these species is minimal.

Threatened Canopy Birds (Superb Parrot, Turquoise Parrot, Little Lorikeet, Barking Owl)

The quality of potential habitat in the proposal area is low. The proposal would involve the clearing of eight hollow-bearing trees, which provide potential nesting habitat for hollow-nesting species, and three mature trees, but the remaining paddock trees and areas of planted vegetation would be retained and continue to provide habitat. A minimum of 5 hollow bearing trees would be retained. The vegetation to be cleared is not within a core area of woodland, and would not fragment or isolate any areas of habitat. The habitat is already heavily fragmented. With the recommended mitigation measures, the likelihood of significant habitat loss, modification, or fragmentation in an important area of habitat is minimal.

Threatened Bat (Yellow-bellied Sheathtail-bat)

The quality of potential habitat in the proposal area is low. The proposal would involve the clearing of eight hollow-bearing trees and three mature trees, but the remaining paddock trees and areas of planted vegetation would be retained and continue to provide habitat. The vegetation to be cleared is not within a core area of woodland, and would not fragment or isolate any areas of habitat. With the recommended mitigation measures, the likelihood of significant habitat loss, modification, or fragmentation in an important area of habitat for this species is minimal.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No areas of critical habitat have been declared in or near the study area.

f) Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

No Recovery Plan has been prepared for these species. The proposed work is consistent with general recovery plan principles.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Clearing of native vegetation, loss of hollow-bearing trees, removal of dead wood and dead trees, and invasion by various weeds, pests, and pathogens are all listed as key threatening processes under the TSC Act. These processes are potential impacts of the construction and operation of the proposal, and may impact on these species. However, the degree of impact would be minor, due to the existing poor quality of habitat. With the recommended mitigation measures, the likelihood of the proposal increasing the impact of a key threatening process on these species is minimal.

Conclusion

The assessment has concluded that the proposal is not likely to significantly affect the threatened species that occur or are likely to occur in the study area, either directly or indirectly. A Species Impact Statement is therefore not required for the proposal.