VAST SOLAR

Biodiversity Assessment

JEMALONG HYBRID SOLAR PARK: 50MW PHOTOVOLTAIC PROJECT

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ACRONYMS AND ABBREVIATIONS

AoS	Assessment of Significance
BOM	Australian Bureau of Meteorology
BC Act	*Biodiversity Conservation Act 2016* (NSW)
Cwth	Commonwealth
DECCW	Refer to OEH
DEE	Department of the Environment and Energy
DPE	NSW Department of Planning and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares
IGBW	Inland Grey Box Woodland
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
km	kilometres
LEP	Local Environment Plan
LLSA	*Local Land Services Act 2013* (NSW)
m	Metres
NES	Matters of National environmental significance under the EPBC Act
NPW Act	*National Parks And Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	NSW Office of Environment and Heritage, formerly DECCW
SEPP 44	State Environmental Planning Policy (NSW) *No. 44 – Koala Habitat Protection* (NSW)
SEWPaC	Cwth Department of Sustainability, Environment, Water, Population and Communities (now DoE)
SIS	Species Impact Statement
SISD	Safe Intersection Sight Distance
sp./spp.	Singular species / plural species
SRZ	Structural root zone
TPZ	Tree protection zone
TSC Act	*Threatened Species Conservation Act 1995* (NSW)

EXECUTIVE SUMMARY

Vast Solar have proposed to construct and operate the Jemalong Hybrid Solar Park at Jemalong, 35 kms west of Forbes, NSW.

This proposal comprises the construction, operation and eventual decommissioning of a 50 MW solar photovoltaic (PV) plant (PV Plant).

The purpose of this Biodiversity Assessment is to describe the biodiversity characteristics of the Study Area, determine the ecological constraints of the PV Plant, assess the potential ecological impacts of the PV Plant, assess the significance of the impact of the proposed activities on species, ecological communities and populations listed under the *Biodiversity Conservation Act 2016* (BC Act), *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act), and to propose environmental management measures to minimise, mitigate and, if necessary, offset residual impacts.

One site assessment was undertaken by NGH Environmental field staff; from the 17 to 21 November 2014. A further site assessment was undertaken by Ambecol in February 2015.

Three moderate to good condition native vegetation communities were observed within the Study Area, including Western Grey Box – Poplar Box – White Cypress Pine open woodland (PCT 82), Poplar Box grassy woodland (PCT 244) and River Red Gum swampy woodland wetland (PCT 249). Western Grey Box – Poplar Box – White Cypress Pine open woodland is listed as an Endangered Ecological Community (EEC) under the TSC Act, however this EEC would not be impacted due to the proposed works. **A total of 0.84 hectares of moderate to good condition native vegetation is proposed for removal**, and a further 101.31 hectares of exotic-dominated vegetation would be impacted.

Flora

No threatened flora species were observed during the field survey, and threatened species evaluations determined that the Study Area is unlikely to provide important habitat for any of the flora species detected in background searches. Of the 17 exotic flora species observed in the Study Area, one (African Boxthorn) is declared as a Priority Weed by the Forbes Shire Council.

Fauna

Five threatened bird species were recorded during field surveys; the Superb Parrot (*Polytelis swainsonii)*, Grey-crowned Babbler *(Pomatostomus temporalis temporalis)*, Spotted Harrier (*Circus assimilis*), Brown Treecreeper (Eastern Sub-species) (*Climacteris picumnus victoriae*) and the Turquoise Parrot (*Neophema pulchella*). One of these species, the Grey-crowned Babbler was not recorded within the Proposal Site but is considered likely to occur there occasionally. Four threatened microbats are considered to potentially occur in the Study Area based on possible to probable identifications from Anabat recordings. These are the Little Pied Bat (*Chalinolobus picatus*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Inland Forest Bat (*Vespadelus baverstocki*) and Corben's Long-eared Bat (*Nyctophilus corbeni*).

Within the Study Area, potential habitat exists for threatened aquatic birds, shorebirds and other wading birds, raptors, parrots and cockatoos, woodland birds, grassland and shrubland birds, microbats, and the Koala (*Phascolarctos cinereus*). **Assessments of significance under the TSC Act determined that the proposal is not likely to have a significant impact on any of the state-listed fauna species likely to occur in the Study Area**

A total of 205 hollow-bearing trees were identified within the Study Area, ten of which are proposed to be cleared; seven due to the proposed PV project and three due to the proposed transmission line. These ten hollow-bearing trees account for approximately 4.8% of the hollow-bearing trees within the Study Area.

Due to the minimal amount of woodland and hollow-bearing trees proposed to be cleared and the relative abundance of contiguous habitat within the Study Area, the clearing and disturbance of 0.84 hectares of moderate-good condition woodland, including ten hollow-bearing trees, is considered a negligible loss and hence is not considered to be a significant impact on any EECs, or threatened flora and fauna occurring or likely to occur within the Study Area.

1 INTRODUCTION

1.1 BACKGROUND

Vast Solar Pty Limited ('Vast Solar') is proposing to develop the Jemalong Hybrid Solar Park at Jemalong in central New South Wales (NSW). The proposed Jemalong Hybrid Solar Park will comprise a 50 megawatt (MW) solar PV Plant and a 30 MW Concentrating Solar Thermal Power Plant (CSP Plant) within the Forbes Local Government Area (LGA).

This Biodiversity Assessment (BA) has been prepared for the purposes of the PV Plant component of the Jemalong Hybrid Solar Park only.

This BA identifies and assesses the biodiversity issues associated with the construction, operation and decommissioning of the proposed PV Plant. The facility would be developed on the site of the existing Development Application (DA) (SSD 14_6588) for the originally proposed CSP Plant. As such the results and observations of the baseline and specialist studies prepared for the CSP Plant have been referenced in the preparation of this BA. The proponent is seeking approval to operate the PV Plant for up to 30 years.

The Proposal Site is subject to an existing application for the development of the CSP Plant and associated infrastructure. The application (SSD 14_6588) which was submitted to Department of Planning and Environment (DPE) in September 2016.Vast Solar expects to lodge an amendment to SSD 14_6588, which will seek to amend the proposed location of the CSP Plant immediately south of Hallidays. Development of the PV Plant, combined with the CSP Plant (which are subject to separate development applications) will result in the development of the Jemalong Hybrid Solar Park.

1.2 DEFINITIONS

Study Area

The Study Area is defined as the area surveyed for the purposes of this biodiversity assessment. The Study Area includes the Development Envelope and the surrounding landscape approximately one kilometre from the Development Envelope's boundary around the PV plant proposal and all the vegetation within the proposed transmission line including adjacent patches of remnant bushland (Figure 1-1).

Development Envelope

The Development Envelope is defined as the land that will be directly impacted by the construction and operation of the proposal and its associated facilties. This comprises the land required to construct the substation, the PV array, the proposed access road, and the corridor for the 66kV power line (Figure 1-1). The Site has been defined in a precautionary manner, in that it is a 'worst case' area; some areas within it may not be required to be impacted during construction. This is to ensure this assessment is robust to any minor changes that may occur to the layout during the detailed design phase.

Proposal Site

This is defined as the area surveyed for the purposes of this biodiversity assessment and includes the Development Envelope, immediate surrounds and the area assessed for the 66kV indicative transmission line with a 45m buffer where the 66kV line will be overhead, and 15m in sections that would be underground (Figure 1-1).

Indicative transmission line

This is defined as the new overhead 66kV transmission line to be constructed to connect the proposal to the existing West Jemalong Substation at the junction of Whispering Pines Lane and Lachlan Valley Way, located approximately 3.2 km to the north of the site (Figure 1-1). The length of the transmission line will be approximately 5 km. A 45m buffer has been added to allow for the 30 m easement to be cleared surrounding the indicative transmission line following the TransGrid Easement Guidelines where it is overhead. Where this line would be underground and buffer of 15m has been applied.

The alignment has been selected to avoid impacts to native vegetation, irrigation channels and land uses as much as possible. The line will be run underground for the section from the Solar PV substation to the diversion point from the existing fence line as shown in the attached map.

1.3 THE PROPOSAL

1.3.1 Proposal location

The PV Plant is located approximately 36 kilometres southwest of Forbes in central NSW. The Proposal Site is contained within the Jemalong Station in the Forbes Shire LGA The Proposal Site is bounded by Lachlan valley way to the north, Wilbertroy lane and Naroo lane (Figure 1-1).

The landforms of the locality are an assortment of mountain ranges, dissected plateaus (tablelands), hills and ridges, and plains. As part of the Lower Slopes Sub-region, the locality of the Studay Area is dominated by alluvial soils due to the abundance of flood plains, alluvial plains, and terrace plains (Benson 2008). Wilbertroy State Forest is located approximately 2.5 kilometres to the southwest of the Study Area. It is a relatively small remnant of woodland, covering an area of 996 hectares. The State Forest has important remnants of riverine woodland of River Red Gum, Grey Box and Belah, being part of the floodplain from Lachlan River to Lake Cowal. The State Forest is a 1319 hectare forest approximately 15 kilometres to the south-east of the Study Area.

1.3.2 Proposal site description

The Jemalong PV Plant would be located on Lot 13 of DP 753118. The Proposal Site covers 165 ha part of the 15 478 ha rural property that makes up Jemalong Station. The Proposal site is mostly cleared and relatively flat farmland with a long history of cropping with small remnants of Poplar Box woodland (ranging from 0.1 to 0.5 ha) remaining (Figure 1-11)

The study area is zoned as Primary Production (RU1), and has a history of cropping. Thurumbidgee Lagoon is the closest waterway on the Site, approximately 400m from the proposed PV Plant and runs east to west on the northern part of the Site filling intermittently following good rain. The Lachlan River is located approximately 3.7 km to the north (Figure 1-1).

1.3.3 Project description

The proposal involves the construction of a ground-mounted photovoltaic solar array which will generate 50 MW of renewable energy. The PV Plant will include a 66kV transmission network which will connect into the existing western Jemalong Essential Energy substation.

The proposal will consist of the following infrastructure components:

- Approximately 170,000 solar panels mounted on either a fixed or single axis tracking system
- A single access point to the Site via Lachlan valley way to the north, Wilbertroy lane and Naroo lane
- Internal access tracks
- Operations and maintenance building with associated car parking
- An electrical substation and switching yard
- Overhead and underground electrical cable reticulation
- Security fencing and CCTV
- Native vegetation plantings to provide visual screening for specific receivers, if required
- Subdivision for the project Site for the electrical substation (and switching yard) and transmission line
- A 5 km (approx.) 66kV overhead power line with a 30 metre (approximate) easement
- An unsealed all weather access track, within Jemalong Station, along the route of the existing farm gravel road access (Naroo Lane). This existing road was constructed and is maintained to carry large grain trucks during harvest, and would need only minimal upgrading.
- Ancillary facilities including:
    - Material laydown areas
    - Temporary construction site offices
    - Temporary car and bus parking areas for construction workers transportation.
    - Basic staff amenities

The layout of the infrastructure components is shown in Figure 1-1. A 'worst case' infrastructure footprint has been used to ensure all potential impacts are assessed and offset appropriately (Figure 3-5). The construction phase is expected to last approximately 12 months. The PV Plant is expected to operate for around 30 years. After this period the PV Plant would either be upgraded or decommissioned. The PV plant would be monitored and operated remotely and would require a small number of maintenance personnel (3-4 full time equivalent staff) to be present at the Site. Decommissioning would see the Site returned to its pre-works land capability. All above ground infrastructure would be removed to a depth of 500mm. All areas of soil disturbed during decommissioning would be rehabilitated in consultation with the landowner consistent with post-solar plant land use requirements.

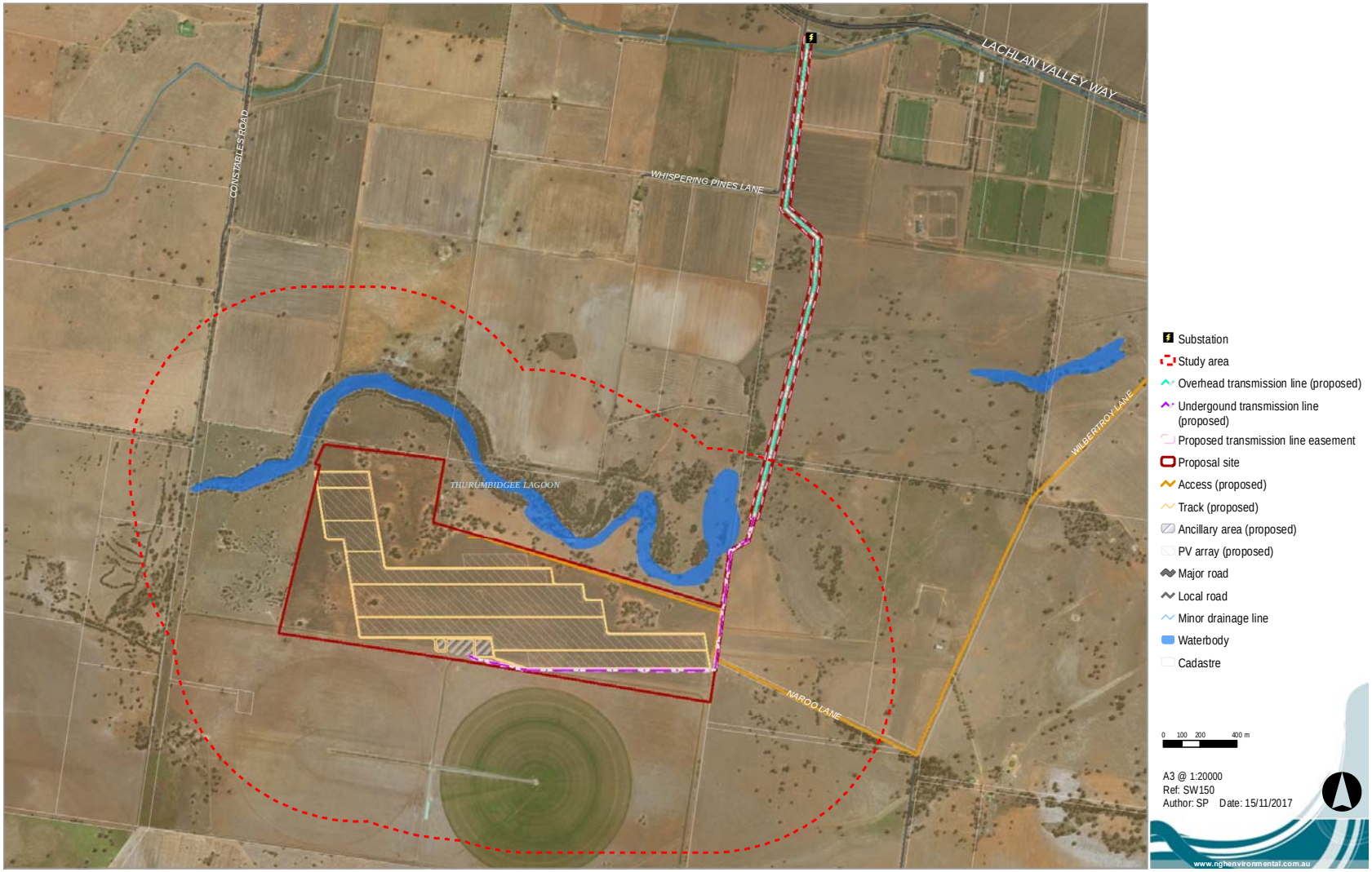

Figure 1-1 Jemalong PV Plant biodiversity assessment Study Area.

1.4 STUDY AIMS

The aim of this BA is to address the requirements as set out in the Secretary's Environmental Assessment Requirements (SEARs) and summarised below.

Secretary's Environmental Assessment Requirement	Where addressed
The EIS must address the following specific issues: • **Biodiversity** – including an assessment of the likely biodiversity values and likely biodiversity impacts of the development, a detailed description of the proposed regeime for minimising, managing and reporting on the biodiversity impacts for the development over time, and a strategy to offset any residual impacts of the development.	**Sections 3-8.**

The SEARs identified a number of Environmental Planning Instruments, Policies, Guidelines and Plans. These are listed below, and their relevance is noted. Relevant instruments are addressed further in this BA.

Table 1-1 Policies, and Guidlines identified in the SEARs as requiring consideration

Secretary's Environmental Assessment Requirements	BA reference
The following guidelines and policies may be relevant to the environmental assessment of this development	
• Biodiversity Assessment Method (OEH)	Not relevant, assessed under the *Threatened Species Conservation Act 1995*
• Threatened Species Assessment Guidelines – Assessment of Significance (OEH)	**Section 7**
• Biosecurity Act 2015	**Section 8**
• Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI)	Not relevant, no road crossing of fish habitat proposed
• Policy and Guidelines for Fish Habitat Conservation and Management (DPI)	Not relevant, fish habitat would not be impacted

The NSW Office of Environment and Heritage (OEH) provided response to the request for input on the preparation of SEARs to DPE on the 26th of October, 2017. This input identified no additional comments on the proposed SEARs for the PV Plant.

1.5 SCOPE OF THE REPORT

This BA has been prepared by NGH Environmental on behalf of Vast Solar Pty Ltd. It assesses impacts associated with construction of the PV Plant, and operation impacts on biodiversity.

The purpose of this BA is to determine the terrestrial biodiversity values of the Proposal Site and surrounding area and the ecological constraints of the PV Project.

The scope and aims of this BA are to:

- Determine the biodiversity values of the Proposal Site including identifying protected and threatened flora and fauna species, populations and ecological communities and their habitats.
- Identify the ecological constraints of the PV Project.

- Identify the potential impacts of the PV Project on threatened flora and fauna species, populations, ecological communities and critical habitat.
- Address the requirements of the relevant legislation including the BC Act, the EP&A Act, the TSC Act and the EPBC Act.
- 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 including a strategy to offset any residual impacts to the development.

1.6 LEGISLATIVE REQUIREMENTS

1.6.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act provides an assessment and approval process for actions likely to cause a significant impact on Matters of National Environmental Significance (MNES). The nine MNES are:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Nuclear actions (including uranium mines)
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

Approval by the Commonwealth Environment Minister is required if an action is likely to have a significant impact on a MNES. Assessments of significance based on criteria listed in Significant Impact Guidelines 1.1 issued by the Commonwealth (Commonwealth of Australia 2013) are used to determine whether the proposed action is likely to have a significant impact (ie is likely to be considered a 'controlled action').

A search of matters protected by the EPBC Act was undertaken in October 2017 using the EPBC Act Protected Matters Search Tool (PMST)). A search radius of 10km was applied. The results of the search are summarised in Table 1-2.

Table 1-2 Summary of EPBC Act Protected Matters Report search results

Matters of National Environmental Significance	
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance (Ramsar)	4
Great Barrier Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	3
Listed Threatened Species	20
Listed Migratory Species	12
Other Matters Protected by the EPBC Act	
Commonwealth land	None
Commonwealth Heritage places	None
Listed Marine Species	18
Whale and Other Cetaceans	None
Critical habitats	None
Commonwealth reserves Terrestrial	None
Commonwealth reserves Marine	None

If further investigations identify that the PV Project is likely to have a significant impact on a MNES, a referral will be submitted to the Commonwealth Department of the Environment and Energy (DEE). DEE will then determine whether the PV Project is a 'controlled action' requiring approval from the Commonwealth Environment Minister or their delegate.

1.6.2 NSW Threatened Species Conservation Act 1995 (TSC Act)

The Act has been repealed by the *Biodiversity Conservation Act 2016* (see below) in the aim of conserving biodiversity at bioregional and State scales. The Threatened Species Conservation Act 1995 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.

DPE has confirmed that, because substantial biodiversity assessment was undertaken on the Site prior to the commencement of the BC Act, further assessment in accordance with the BC Act is not required and the application can be assessed under the *Threatened Species Conservation Act 1995*.

Significance of impact

If works are likely to impact on a listed (threatened) species or ecological community, section 94 of the TSC Act contains seven factors that can be used to determine whether the impact on the entity will be significant or not. 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. The content of a SIS is outlined in Sections 110 – 112 of the TSC Act and includes requesting Director-General's requirements.

Clause 50 of the TSC Act requires public authorities to have regard to critical habitat when exercising their functions on land to which a critical habitat declaration applies.

1.6.3 NSW Biodiversity Conservation Act 2016 (BC Act)

The BC Act establishes a new regulatory framework for assessing and offsetting the biodiversity impacts of proposed developments and activities. The Act contains provisions relating to flora and fauna protection (repealing parts of the *National Parks and Wildlife Act 1974*), threatened species and ecological communities listing and assessment (repealing the *Threatened Species Conservation Act 1995* and section 5A of the EP&A Act), a Biodiversity Offsets Scheme (BOS), a single biodiversity assessment method (BAM), calculation and retirement of biodiversity credits and biodiversity assessment and planning approvals. The Act is supported by the Biodiversity Conservation Regulation 2017.

Under the Biodiversity Conservation (Savings and Transitional) Regulation 2017, the former planning and assessment framework continues to apply in certain circumstances. DPE has confirmed that, because substantial biodiversity assessment was undertaken on the Site prior to the commencement of the BC Act, further assessment in accordance with the BC Act is not required and the application can be assessed under the Threatened Species Conservation Act 1995. Accordingly, the Jemalong PV Plant is being assessed under the former framework.

1.6.4 NSW Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) repeals the *Noxious Weeds Act 1993*. It streamlines and modernises the way all biosecurity risks (feral animals, plant and animal diseases, and weeds) are managed in NSW. In relation to weeds, the Biosecurity Act:

- embeds the principle of shared responsibility for weed risk across government, community and industry;
- applies equally to all land and waterways in the state, regardless of whether ownership is public or private;
- is premised on the concept of risk, so that weed management investment and response is commensurate with the risk posed; and
- supports regional planning and management for weeds.

The Biosecurity Act includes a number of mechanisms (regulatory tools) that can be used to manage weed risks. The Biosecurity Act and Regulations provide specific legal requirements for high risk activities and state level priority weeds. The Biosecurity Act introduces a General Biosecurity Duty (GBD): that all plants are regulated with a GBD 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 reasonably practicable.

Priority weeds identified at the Proposal Site include * African Boxthorn (**Lycium ferocissimum).* Their occurrence and requirements for management are described in further detail in Section 6.1.2of this BA.

1.6.5 NSW Fisheries Management Act 1994

This Act aims to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities.

Key fish habitat is defined as aquatic habitat important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. No creeks and/or river systems that enter the

Development Envelope are classified as key fish habitats, however Lachlan River, located to the north of the is Development Envelope and within the Study Area is key fish habitat. Key fish habitat must be considered carefully and impacts on aquatic habitat and pollution risks mitigated. This is particularly important considering the steepness of the Proposal Site and requirement for clearing and extensive excavation.

1.6.6 NSW Environmental Planning & Assessment Act 1979

Development in NSW is subject to the requirements of the EP&A Act and its associated regulations. Environmental planning instruments prepared under the EP&A Act set the framework for development approval in NSW.

The Project would be assessed under Part 4.1 of the EP&A Act. The relevant objects of the EP&A Act are:

a) to encourage:

i. The proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.

ii. The promotion and coordination of the orderly and economic use and development of land.

iii. The protection, provision and coordination of communication and utility services.

vi. The protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.

vii. Ecologically sustainable development.

The objects of the EP&A Act have been considered throughout this assessment which addresses Secretary's Environmental Assessment Requirements (SEARs), provided by NSW Department of Planning and Environment (DPE) on 26 October 2017.

The recommendations of this assessment have been formulated to avoid impacts where possible, minimise where avoidance is not possible and offset residual impacts to ensure the 'improve or maintain' environmental outcome for the project is met.

1.6.7 NSW National Parks and Wildlife Act 1974 (NP&W Act)

Under the *National Parks and Wildlife Act 1974*, the Director-General of the National Parks and Wildlife Service is responsible for the care, control and management of all national parks, historic sites, nature reserves, Aboriginal areas and state game reserves. The Director-General is also responsible under this legislation for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW. Under Section 89J of the EP&A Act, an Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974* would not be required for a State Significant Development.

The closest nature reserve is the Lachlan Valley National Park. The Lachlan Valley National Park is comprised of multiple land parcels, of which the closest to the Proposal Site is approximately 2.2 km to the south. Another parcel of the Lachlan Valley National Park is located approximately 5km north of the Proposal Site. No impacts to the Lachlan Valley National Park are expected.

1.6.8 SEPP 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) encourages the conservation and management of natural vegetation that provides habitat for Koalas. Koalas are listed under the TSC Act as a vulnerable species. The Forbes LGA is subject to this SEPP and cannot approve development in an area affected by the policy without an investigation of core koala habitat. SEPP 44 aims to identify areas of potential and core Koala Habitat. These are described as follows:

- Potential Koala Habitat: 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; and
- Core Koala Habitat: 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.

This report considers whether any part of the Proposal Site could be described as potential or core koala habitat under SEPP 44.

1.6.9 Local Land Services Act 2013

Approval may be required for the clearing of native vegetation under the *Local Land Services Act 2013* (LLSA). Section 60O provides that, the clearing of native vegetation is authorised where it is permitted by a development consent under Part 4 of the EP&A Act.

As such, separate approval under the LLSA is not require for the Project.

2 METHODOLOGY

2.1 DATABASE SEARCHES AND LITERATURE REVIEW

Database searches undertaken for the purposes of this assessment included threatened species threatened and migratory flora and fauna species and endangered ecological communities (EECs) and priority weed that have the potential to occur within the Study Area. The following database searches were carried out on the 30th of October 2017 and include:

- OEH BioNet Atlas database for threatened flora and fauna species and populations recorded within proximity to the Proposal Site (in selected area coordinates North: -33.38 West: 147.76 East: 147.86 South: -33.48 and for the Forbes LGA).
- OEH Protected Matters search tool was used to search an area with a 10km radius from the centre of the Proposal Site. This search identified species listed as threatened or migratory under the EPBC Act.
- Department of Primary Industries (DPI) priority weed declarations. This search identified priority weeds declared in the Forbes LGA.
- DPI Key Fish Habitat for Forbes LGA.
- Bureau of Meteorology National Atlas of Groundwater Dependant Ecosystems used to search an area with a 10km radius from the centre of the proposed works. This search vegetation communities that are likely to reply on groundwater.

The results of the database searches are provided in Appendix E. An evaluation of presence of habitat and likelihood of occurrence of threatened flora and fauna species and ecological communities are provided in Appendix B.

2.2 SOURCES OF INFORMATION

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

- Aerial maps, proposal layers and environmental layers provided by NGH Environmental.
- Australian Government's Species Profiles and Threats database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
- Department of the Environment and Energy (DoEE) EPBC Act Species Profiles and Threats Database (SPRAT).
- Department of the Environment Protected Matters Search Tool (PMST)
- NSW OEH's threatened species database http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
- Biobanking Assessment Methodology guidelines (OEH 2014).
- New South Wales Vegetation Classification and Assessment: Part 2 Plant communities in the NSW South-western Slopes Bioregion and update of the NSW Western Plains plant communities (Benson 2008).
- Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004).
- Threatened species assessment guidelines: The assessment of significance (DECC 2007a).

- Ambecol (2015). Jemalong Solar Station: Potential Impacts on Bird Populations and Recommendations for Bird Hazard Risk Management. Ambrose Ecological Services, Sydney.

2.3 TARGETED SURVEY METHODOLOGIES

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 Site.

Flora and fauna field surveys were undertaken between the 17 and 21 November 2014. The entire Proposal Site was traversed by two ecologists (Appendix G), and inspected by car when able.

The aims of the surveys were as follows:

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

Weather conditions during the field surveys

Daytime temperatures were hot with limited cloud cover (Table 2-1). Conditions were relatively dry for the duration of the surveys.

Table 2-1 Weather conditions during the field survey.

Date	Temperature min (°C)	Temperature max (°C)	Rain (mm)	Wind speed 9am (km/h)	Moon Phase
17/11/14	8.3	25.7	0	17	Waxing crescent
18/11/14	8.5	28.5	0	11	Waxing crescent
19/11/14	9.2	31.7	0	2	Waxing crescent
20/11/14	10.5	36.0	0	30	Waxing crescent
21/11/14	15.1	35.5	0	22	Waxing crescent

2.3.2 Terrestrial Flora

Five BioMetric vegetation plots were undertaken during the survey period in suitable representative vegetation zones under the BioBanking Assessment Methodology guidelines (OEH 2014). Furthermore, the entire PV Plant Proposal Site was traversed in vehicle and on foot, as was the transmission traversed on foot. Traversing surveys were undertaken in the form of informal transects. Approximately 17 hours was spent inspecting the vegetation of the Proposal Site and the surrounding landscape, with additional time taken to confirm species identifications and the condition and extent/boundaries of vegetation communities.

A list of all flora species recorded during the surveys along with estimates of their relative abundance in each identified vegetation community is provided in Appendix C

BioMetric Vegetation Plots

A suitable number of vegetation plots were established in each area/zone of homogenous vegetation type and condition, as defined by the OEH BioBanking Assessment Methodology (Figure 2-1). The plots were placed using a stratified approach to ensure that all native vegetation types were adequately surveyed. In total five plots were surveyed within the Proposal Site. These vegetation plots were undertaken utilising the methodology presented in the relevant documents, such as the BioBanking Assessment Methodology (OEH 2014). Each vegetation plot was assigned to a suitable BioMetric Vegetation Type, as per the OEH database and a suitable Plant Community Type (PCT) as per the Vegetation Information System (VIS) Plant Community Identification Tool (OEH 2015).

Table 2-2 BioMetric Vegetation Plots conducted during the survey by vegetation type.

BioMetric vegetation type	Plant Community Type (PCT) ID	Biometric Vegetation Type (BVT) ID	# of plots within Proposal Site
Western Grey Box – Poplar Box – White Cypress Pine open woodland on red loams mainly of the eastern Cobar Peneplain Bioregion	82	LA152	1
Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	244	LA178	2
River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	249	LA191	1
Exotic (non-indigenous)	-	-	1

Random meanders

Formal random meanders (after Cropper 1993) within each vegetation type were undertaken throughout the Study Area, recording floristic, structural and physical data. This included one random meander within floodplain woodland outside the Proposal Site, but within the Study Area. Dominant tree species, physical structure of the vegetation, and species composition were used to identify vegetation types as particular communities. This method provides comprehensiveness in terms of the number of species and variation within vegetation types, and improves opportunities for detecting significant or sparsely distributed plant species, and assists in validation of vegetation boundaries.

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 overstorey percentage foliage is <25% of the lower value of the overstorey percentage foliage cover benchmark for that vegetation type, AND
- <50% of vegetation in the ground layer is indigenous species
- >90% ploughed or fallow.

Native grassland or herbfield is in low condition if:

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

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 (depending on the overstorey benchmark). Similarly, areas where the groundcover is exotic but suitable overstorey cover is present would also be classed in 'moderate to good condition'.

Native vegetation within the local area

Random meanders were conducted within the Study Area to assess the vegetation communities within the surrounding local area to determine the extent of vegetation communities throughout the Study Area, and to assess the contiguous nature of adjoining vegetation types to that of those within the Study Area. In particular, the area of vegetation in the floodplain to the north of the Proposal Site and the woodland surrounding the Proposal Site was assessed.

BioMetric Vegetation Plots were established in each area/zone of homogenous vegetation type and condition within the Study Area, as defined by the 2014 OEH BioBanking Assessment Methodology (BBAM 2014). The plots were placed using a stratified approach to ensure that all native vegetation types were adequately surveyed. In total, five plots and transects were surveyed within the Study Area. These vegetation plots were undertaken utilising the methodology presented in BBAM 2014. Each vegetation plot was assigned to a suitable PCT as per the VIS Plant Community Identification Tool (OEH 2011) (see below).

Plant and community nomenclature

Vegetation communities in the Study Area have been categorised on the basis of their structure and formation using the VIS Plant Community Identification Tool (OEH 2011). The PCT ID Tool classifies vegetation according to the standard NSW operational classification hierarchy used in the NSW Vegetation Information System (VIS), including vegetation formations, vegetation classes and PCTs. The NSW PCT classification was developed in 2011 to establish an unambiguous master community-level classification for use in vegetation mapping programs, BioMetric-based regulatory decisions, and as a standard typology for other planning and data gathering programs.

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 Forbes Shire Council control area under the *Biosecurity Act 2015.*

2.3.3 Terrestrial Fauna

The aims of the terrestrial fauna surveys were to:

- Assess the habitat types available and their quality and suitability as threatened species habitat (e.g. trees with abundance of hollows, ground cover, vegetation structure). Surveys

in the surrounding Study Area were also undertaken to assess the relative importance of the habitat in the Proposal Site to that available in the Study Area.

- Determine which birds, mammals, bats, and other animals are present within the Study Area using a variety of nocturnal and diurnal 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 and hollow-bearing tree surveys

An assessment of habitat types available and their quality and suitability as threatened species habitat was conducted across the Study Area. Factors such as coarse woody debris, leaf litter, vegetation structure, connectivity and disturbance were noted. Five habitat assessments were carried out in total. These were conducted in remnant woodland, aquatic, open crop and flood plain areas. Length of fallen logs, number of hollows, and the maturity of trees (using tree diameter at breast height as an index of age) were quantified through the use of vegetation plots, which helped to clarify habitat value of each vegetation community in the Study Area.

A standalone hollow-bearing tree survey 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 a handheld Garmin GPS 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 into small (< 10 cm), medium (10 – 20 cm), and large (> 20 cm).

An assessment of the Study Area for potential Koala habitat or core Koala habitat was also undertaken, taking into account feed tree (Western Grey Box, Poplar Box, and River Red Gum) densities and incidentally observed evidence of use including presence of scats and scratches. Formal Spot Assessment Technique (SAT) surveys were not undertaken, as these were not within the scope of works of the surveys. Habitat assessment and analysis of historical records was considered sufficient to determine any potential impacts on Koalas.

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

Bird surveys

The assessment of impacts to bird populations was considered for the initial proposal of a CSP plant at the Site. Although the risk of bird collisions is likely neglibible with the use of PV panels, the study methodology and baseline results are discussed in this BA, and the assessment of impacts has been modified to take into account the decreased likelihood of impacts with a PV Plant.

Design for bird survey transects was developed in consultation with specialist ornithologist, Dr Stephen Ambrose. Bird surveys were undertaken at 32 sites throughout the Study Area, approximately 1000 metres away from the Proposal Site (Figure 2-1). In the Proposal Site, bird point survey sites were approximately 400 metres apart. Bird survey locations were randomly assigned numbers and either morning, noon or afternoon time periods for survey times. The survey locations were also standardised for timing and location so that any bias for these variables were accounted for. Each bird survey involved a 30 minute point count of bird species detected. For each species identified, abundance counts, behaviour, flight height and direction, the microhabitat, observation type (observed or heard), and whether the bird was within 50 metres, 150 metres or further than 150 metres (counted as opportunistic) from the survey

location. Furthermore, bird species were recorded opportunistically throughout the survey period, including the details if the bird species was of particular note (such as threatened and aquatic species).

Microbat surveys

One single Anabat detector was set up to record bats in the Study Area over three nights. The Anabat detector was placed in varying habitat types to cover the range of microbat species likely to occur in the Study Area. Locations are shown in Figure 2-1, and were located near likely flyways or foraging spots for microbats. Calls were analysed by fauna specialist Narawan Williams.

Spotlighting

Spotlighting was undertaken over four nights, within the Proposal Site and immediate surrounds. Spotlighting was carried out by vehicle through spotlight transects, and on foot where feasible (e.g. in larger vegetation patches), by two observers each using 50-watt spotlights. Spotlighting was undertaken on foot or by vehicle for approximately 1 person-hour, preceded by a 10-minute listening period to detect any threatened species that may have been calling. Four spotlighting surveys were conducted over four nights totalling approximately 8 person hours.

Call playback

Call playback for the Masked Owl and Barking Owl was undertaken on one night in the centre of the Proposal Site. Call playback was undertaken after spotlighting. Each call was transmitted with a megaphone for five minutes, followed by a listening period of 10 minutes. Ten minutes of spotlighting was then undertaken to determine whether owls had flown into the vicinity without vocalising. This technique is in accordance with the *Threatened Species Survey and Assessment: Guidelines for developments and activities* (DEC 2004), however the 5-8 nights of survey effort proposed under the guidelines was not achievable within the scope of our field work.

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.

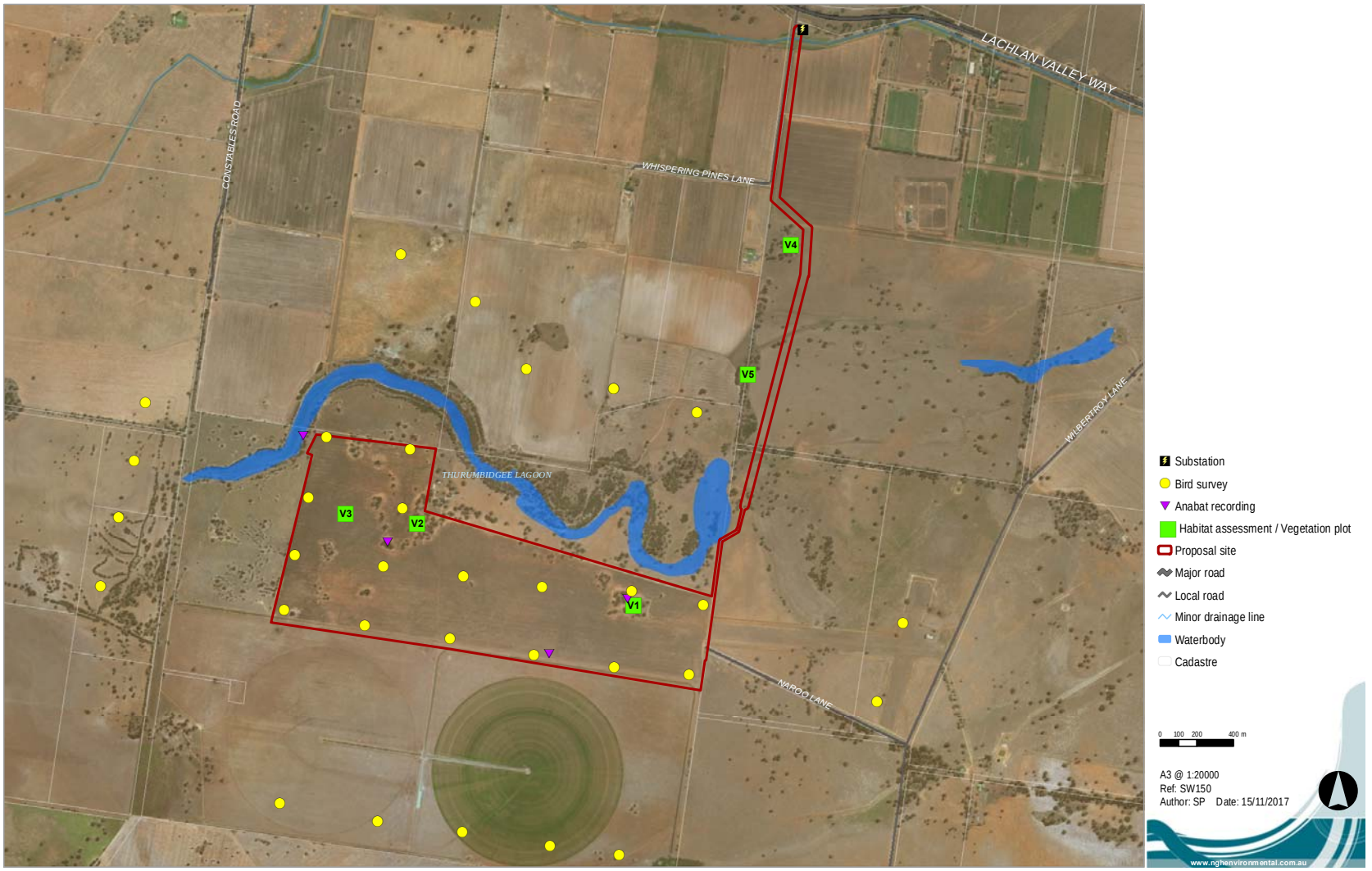

Figure 2-1 Flora and fauna survey effort

2.4 LIMITATIONS

2.4.1 Flora

As all field survey work was undertaken in November, the flora species list reflects plant species detectable during spring when the majority of plant species are detected based on flowering times. There is potential for some grasses and forbs that flower in summer to have gone undetected, however these are likely to be a minority. As such, the list is considered sufficient to indicate the nature of the vegetation communities within the Study Area, and thus to evaluate the probability of threatened flora species to occur. A precautionary approach has been employed with regard to the presence of threatened species, where suitable habitat exists.

2.4.2 Fauna

The bird surveys were carried out during peak bird activity time (spring), however, some species will only be present during other seasons (such as winter for the Swift Parrot). Furthermore, non-sedentary birds may only be present when food resources are available and bird species with large home ranges may not have been detected during the survey period. However, due to the robustness of the survey effort over time and space, it is likely that all species occurring within the Study Area were detected.

The calculation of hollow-bearing trees, in particular the size and number of hollows, is as accurate as could be determined from ground level. However, there is potential for some hollows to be present but not visible from ground level, which may result in underestimates of the number of hollows. Where it was deemed likely for hollows to be present but not discernible from ground level, these were noted. The GPS locations for trees are only accurate to within a few metres, which means that all calculations of numbers of trees proposed for removal should be treated as estimates only.

3 NATIVE VEGETATION

3.1 PLANT COMMUNITY TYPES

Three Plant Community Types (PCTs) were identified as being within and adjacent to the Proposal Site:

- **Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions (PCT 82)**
- **Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt) (PCT 244)**
- **River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW (PCT 249)**

The four vegetation communities, of which three are native and one is dominated by introduced species that were identified within the Proposal Site (Figure 3-5) are described in detail below. One native vegetation community recorded as occurring within the Study Area was listed as an endangered ecological community (EEC) under the TSC Act.

3.1.1 Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions (PCT 82)

This community, in which Western Grey Box (*Eucalyptus microcarpa*) is the most characteristic species, grows on red-brown earths soils in central western NSW mostly in the eastern section of the Cobar Peneplain Bioregion near Nymagee, Tottenham and Boona and extending south. Temperate eucalypt woodlands have been extensively cleared since European colonisation of Australia, with most of the Western Grey Box dominated woodlands currently existing as fragments or degraded remnants in Travelling Stock Routes, cemeteries, along roadsides and railway embankments, small remnants on private property and scattered conservation reserves (Threatened Species Scientific Committee 2010). Approximately 2.62 hectares of this community is adjacent to the Proposal Site, which occurs in one remnant patch about half way down the north-south proposed transmission line. The community is dominated by Western Grey Box with scattered individuals of White Cypress Pine (*Callitris glaucophylla*), and Poplar Box (*Eucalyptus conica*) (Figure 3-1). The understorey contains a moderately sparse layer of shrubs, mainly consisting of the priority weed African Boxthorn (*Lycium ferocissimum*) but also containing Narrow-leaved Hopbush (*Dodonaea viscosa* ssp. *angustissima*). A number of the characteristic groundcover and grass species are also present in the Study Area, including Glycine (*Glycine clandestina*), Corrugated Sida (*Sida corrugate*), Speargrass (*Austrostipa scabra* ssp. *scabra*) and Wallaby Grass (*Rytidosperma* sp.). However, the groundcover is mainly dominated by crop grasses including Ryegrass (*Lolium perenne*) and Barley Grass (*Hordeum* sp.). As the community has been largely cleared, the vegetation is fairly disturbed and native diversity in the groundcover has been reduced as a result.

A summary of the key details is provided in Table 3-1.

Table 3-1 Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions

Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions.		
Vegetation formation	Grassy Woodlands	
Vegetation class	Floodplain Transition Woodlands	
Vegetation type	**Plant Community Type (PCT) ID**	82
	Biometric Vegetation Type ID	LA 152
	Common Community Name	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion
Approximate extent within the proposal	Approximately 2.62 ha of this community occurs adjacent, tothe Proposal Site, but outside of the Development Envelope (impact area).	
Condition	Moderate to good	
Conservation Status	This vegetation community forms part of the listed endangered ecological community (EEC) under the NSW Threatened Species Conservation Act 1995: *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*. This community meets the condition threshold for the EPBC listed Grey Box (*E. macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia. However, this community does not qualify for the CEEC EPBC Act-listed *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*.	
Threatened plant species habitat	This community can provide potential habitat for: • A Spear-grass - *Austrostipa metatoris* • A Spear-grass - *Austrostipa wakoolica* • Narrow-leafed Bumble - *Capparis loranthifolia var. loranthifolia* • Pine Donkey Orchid - *Diuris tricolor* • Narrow Goddenia - *Goodenia macbarronii* • Lanky Buttons - *Leptorhynchos orientalis* • Shrub Sida - *Sida rohlenae* • Slender Darling Pea - *Swainsona murrayana* • Silky Swainson-pea - *Swainsona sericea*	
Fauna habitat	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. 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.	

Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions.	
Example	 Figure 3-1 An example Inland Grey Box Woodland occurring near the proposed transmission line of the Proposal Site (outside of direct impact area).

3.1.2 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt) (PCT 244)

This community in which Bimble Box (*Eucalyptus populnear* subsp. *bimbil*) dominates the canopy occurs on alluvial clay-loam soils, mainly confined to the Darling Riverine Plain, western section of the Brigalow Belt South and northern section of the NSW South Western Slopes Bioregions. Approximately 9.44hectares of this community is found within the Proposal Site (including the proposed transmission line). The understorey contains a number of shrub species, mainly consisting of the priority weed African Boxthorn (*Lycium ferocissimum*) but also containing Acacias (such as *Acacia hakeoides*), Wilga (*Geijera parviflora*) and Saltbush (*Einadia* sp.). A number of the characteristic groundcover and grass species are also present in the Study Area, including Glycine (*Glycine clandestina*), Corrugated Sida (*Sida corrugate*), Speargrass (*Austrostipa scabra* ssp. *scabra*), Windmill Grass (*Chloris truncate*) and Wallaby Grass (*Rytidosperma* sp.). Like the Western Grey Box community in the Proposal Site, this community has been largely cleared, the vegetation is fairly disturbed and native diversity in the groundcover has been reduced as a result.

A summary of the key details is provided in Figure 3-2.

Table 3-2 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)

Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)		
Vegetation formation	Grassy Woodlands	
Vegetation class	Floodplain Transition Woodlands	
Vegetation type	**Plant Community Type (PCT) ID**	244
	Biometric Vegetation Type ID	LA 178
	Common Community Name	Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).
Approximate extent within the proposal	Approximately 9.44 ha of this community occurs within the Proposal Site.	
Condition	Moderate to good	
Conservation Status	This vegetation community is not listed as an endangered ecological community (EEC) under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or the EPBC Act.	
Threatened plant species habitat	This community can provide potential habitat for: • A Spear-grass - *Austrostipa metatoris* • A Spear-grass - *Austrostipa wakoolica* • Narrow Goddenia - *Goodenia macbarronii* • Shrub Sida - *Sida rohlenae* • Slender Darling Pea - *Swainsona murrayana* • Silky Swainson-pea - *Swainsona sericea* • Finger Panic Grass - *Digitaria porrecta* • Spike-Rush - *Eleocharis obicis* • Winged Peppercress - *Lepidium monoplocoides* • Greenhood Orchid - *Pterostylis cobarensis* • Blenson's Panic - *Homopholis belsonii*	
Fauna habitat	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. 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.	

Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	
Example	 Figure 3-2 Poplar Box Woodland within the Proposal Site.

3.1.3 River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW (PCT 249)

This community in which River Red Gum (*Eucalyptus camaldulensis* subsp. *camaldulensis*) is the dominant canopy species occurs in closed (e.g. cowals) and open depressions on floodplains and alluvial plains mainly from central west NSW to Victoria. Belah (*Casuarina cristata*) can sometimes be associated in the canopy and was observed within the Study Area. Approximately 0.63 hectares of this community occurs within the Proposal site, and is found. to the north of the PV project footprint, occurring along the periodically inundated Thurumbidgee Lagoon and associated depressions, and extends to the east into the proposed transmission line (Figure 3-3). Within the Proposal SIte the understory was relatively bare of vegetation in parts likely due to the periodic flooding of the soil. In the proposed transmission line, the understory mainly consisted of introduced crop species such as ryegrass (*Lolium perenne*) and barley Grass (*Hordeum* sp.). Shrub vegetation was virtually non-existent and native ground cover species were sparse and included Corrugated Sida and Weeping Grass (*Microlaena stipoides*).

A summary of the key details is provided in Figure 3-3.

Table 3-3 River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW

River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	
Vegetation formation	Forested Wetlands

River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW		
Vegetation class	Inland Riverine Forests	
Vegetation type	**Plant Community Type (PCT) ID**	249
	Biometric Vegetation Type ID	LA 191
	Common Community Name	River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW
Approximate extent within the proposal	Approximately 0.63 ha of this community occurs within the Proposal Site.	
Condition	Moderate to good	
Conservation Status	This vegetation community is not listed as an endangered ecological community (EEC) under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or the EPBC Act.	
Threatened plant species habitat	This community can provide potential habitat for: • Floating Swamp Wallaby-grass - *Amphibromus fluitans* • Small Scruf-pea - *Cullen parvum* • Austral Pillwort - *Pilularia novae-hollandiae*	
Fauna habitat	This vegetation community provides numerous habitat types for fauna. Canopy trees provide foraging and nesting/resting habitat for birds and arboreal fauna. 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.	
Example	 Figure 3-3 River Red Gum swampy woodland wetland in the Proposal Site(proposed transmission line).	

3.1.4 Exotic (non-indigenous)

Highly disturbed and modified vegetation community occupies the majority of the Proposal Site and is found where there is a prevalence of mostly exotic species, but in some areas has a sparse native overstorey. This includes areas of exotic crop and pasture grasses and forbs (Figure 3-4). In many places this community is too highly modified to determine the pre-European vegetation type, but it is likely that much of the area would have consisted of Poplar Box Woodland in the Development Footprint and either Western Grey Box Woodland or River Red Gum Forest in the proposed transmission line footprint prior to historical clearing. Where the density of the overstorey remains above 25% of the lower value of the over-storey percent foliage cover benchmark for a vegetation type, the vegetation community is considered to be in moderate to good condition, as per the BioBanking Assessment Methodology. Thus, areas that have a wholly exotic-dominated understorey but a native-dominated overstorey are still considered part of the native vegetation communities discussed above.

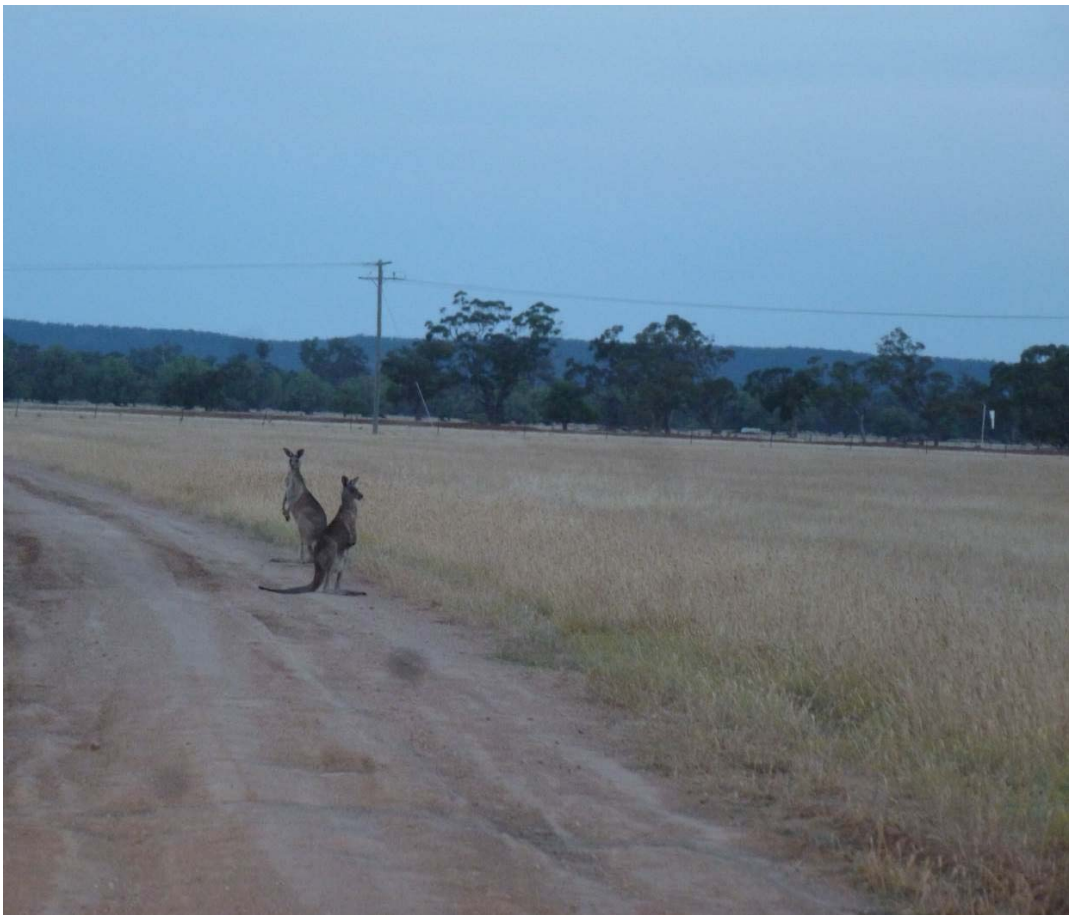

Figure 3-4 Exotic-dominated crop vegetation within the Proposal Site with Eastern Grey Kangaroo (*Macropus giganteus*) in the foreground.

3.2 ENDANGERED ECOLOGICAL COMMUNITIES

Database searches revealed nine Threatened Ecological Communities (TECs) with potential to occur within a 10 kilometre radius of the Proposal Site (Appendix E).

The patches of Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions form part of the listed threatened ecological community; **Inland**

Grey Box Woodland in the Riverina, NSW South-western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. This vegetation community is listed as endangered under the NSW Threatened Species Act.

The vegetation community within the Proposal Site **does not** meet condition requirements of the equivalent listing for EECs and CEECs under the EPBC Act for the ecological community Grey Box (*E. macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. Using the condition threshold guidelines (Dept, Environment, Water, Heritage and the Arts, 2010) this patch is; more than 0.5 ha, has Western Grey Box (*Eucalyptus macrocarpa*) as the dominant tree species and is more than 30% native groundcover. Thus, this zone of Grey Box (*E. macrocarpa*) Grassy Woodlands and Derived Native Grasslands of south-eastern Australia is not listed as the endangered ecological community under the EPBC Act.

No other TECs under the EPBC Act occur within the Study Area

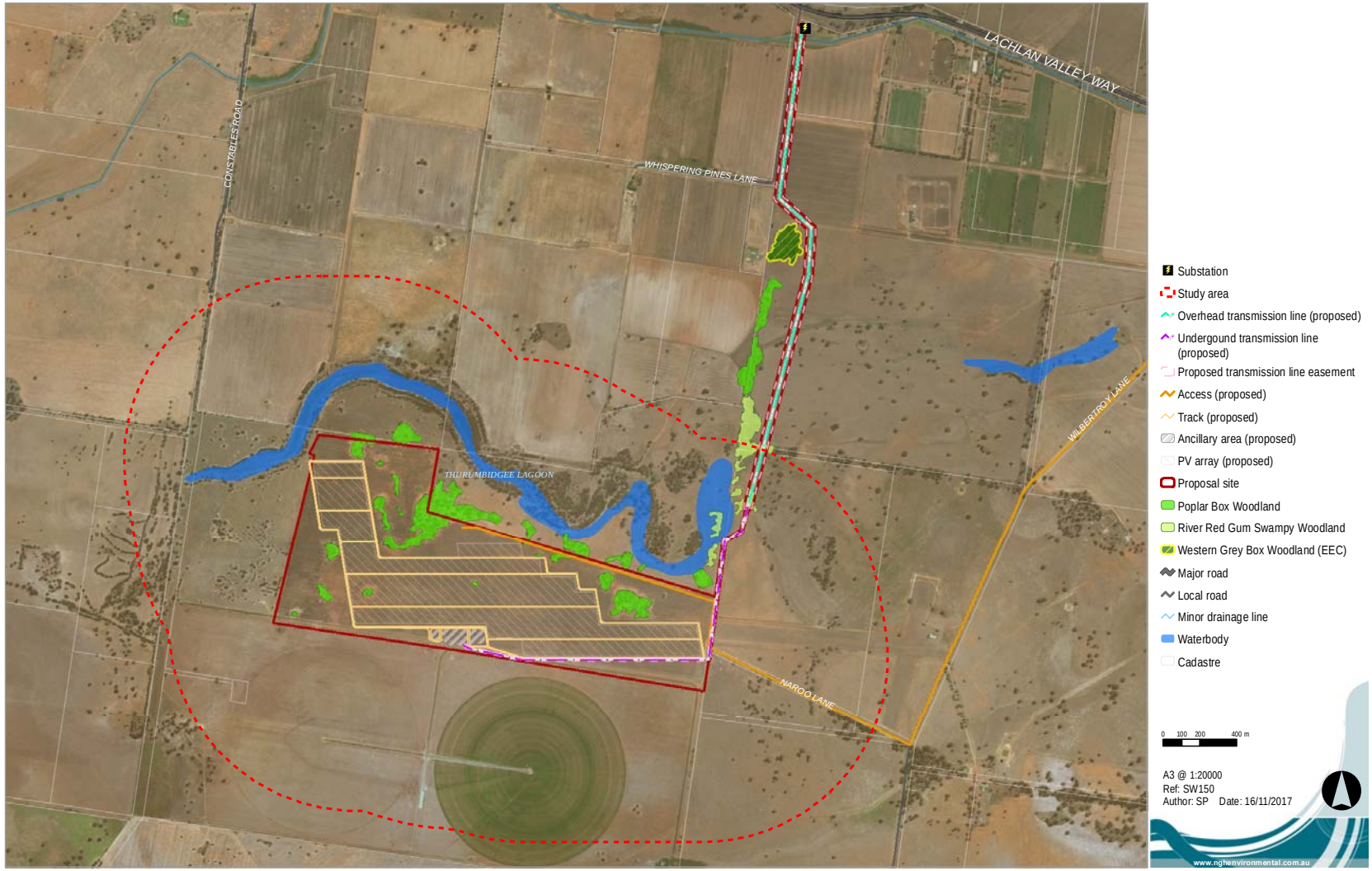

Figure 3-5 Vegetation recorded within the Proposal Site

4 FLORA AND FAUNA

4.1 FLORA

4.1.1 Threatened flora species

Database searches for threatened flora species revealed the potential for 7 species to occur within the Study Area (Appendix E). An assessment of the likelihood of occurrence of all of these species was undertaken and considers the preferred habitat of the species, including vegetation types, soils and species associations, and the current known distributions of the species. This approach provides a risk based assessment for species that may not have been identifiable during the survey. Based on these threatened species evaluations (provided as a table in Appendix B) it was considered unlikely that any threatened flora species occur within the Study Area and that impacts to any threatened flora species are unlikely. In addition, all areas with the potential to be impacted by the proposal were traversed during the survey, targeting habitat that was more likely to support threatened species. No threatened flora species were detected during any of the surveys.

4.1.2 Weeds

The majority of the Study Area has been subject to some degree of disturbance, mostly associated with agricultural activities such as cropping and livestock. Of the 54 species of plants recorded during the surveys, 17 (31%) were not indigenous to the region. Furthermore, exotic plant cover ranged from 50 – 100% within surveyed vegetation plots (Figure 2-1). Of these 17 exotic species, one (African Boxthorn *Lycium ferocissimum*) is declared as a priority weed by the Forbes Shire Council. African Boxthorn is declared as a Weed of National Significance (Table 4-1). Required control actions for these species can be found in the Priority Weed Declarations listed in Appendix F.

Table 4-1 Priority weeds detected within the Proposal Site.

Species	Abundance in PCT's				Weed of National Significance?
Shrubs	WGBW	PBW	RRGW	Exotic	
African Boxthorn **Lycium ferocissimum*	Present	Common	Uncommon	Present	Yes

Notes: WGBW = Western Grey Box Woodland, PBW = Poplar Box Woodland, RRGW = River Red Gum Woodland.

4.1.3 Groundwater dependent ecosystems

A search of the Bureau of Meteorology's National Atlas of Groundwater Dependent Ecosystems returned a number of groundwater dependent ecosystems within the Study Area (Figure 4-1). Vegetation communities observed during the surveys that are considered likely to be dependent on groundwater resources includes the River Red Gum swampy woodland wetland and possibly the Poplar Box woodland to some extent. River Red Gum woodlands are usually associated with aquatic systems including rivers, creeks, drainage lines, and floodplains whilst Poplar Box woodland is usually found in lower parts of the landscape and can be found close to floodplain areas. The River Red Gum swampy woodland wetland

species would rely on water inundations from time to time, as is provided in the nearby Thurumbidgee Lagoon.

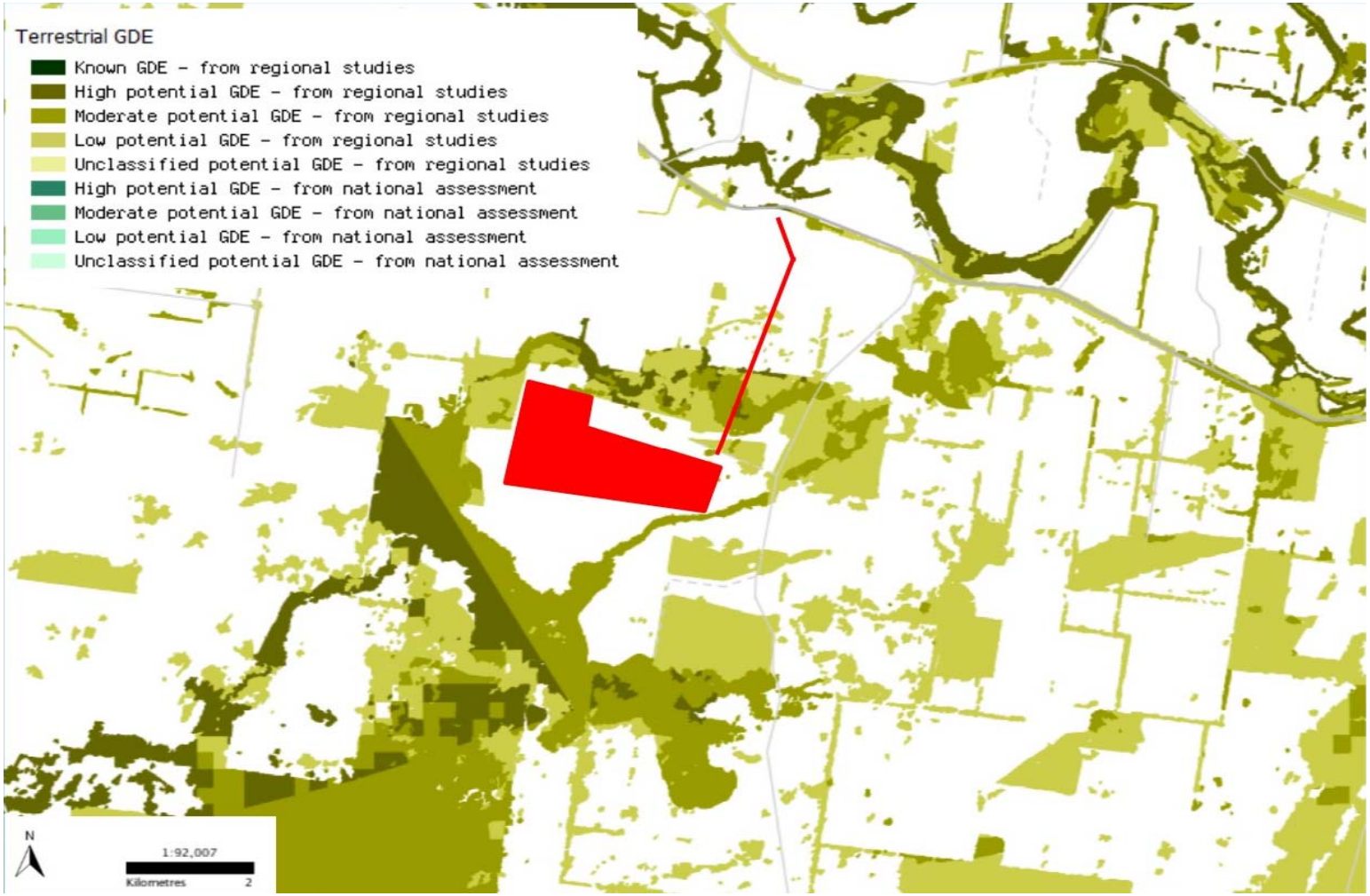

Figure 4-1 Areas with high potential for groundwater interaction (green) in the Study Area (red). The proposed transmission line runs through an area of high potential for groundwater interaction.

4.2 FAUNA AND FAUNA HABITAT

Approximately 84 fauna species were detected during the field survey including 59 birds, three reptiles, 16 bats and six mammal species. No amphibian species were recorded. A complete fauna species list is provided in Appendix D.

The Proposal Site contains a heterogeneous mix of ecosystem types that vary in their habitat value for fauna. Generally, the Proposal Site contains a mixture of woodland and open crop land. Patches of remnant woodland occur throughout the Proposal Site and vary based on elevation and variations in soil moisture. The woodland on dryer soils include Western Grey Box Woodland and Poplar Box Woodland. These woodlands provide nesting, foraging and roosting opportunities for woodland birds and raptors. They may also provide refuge and foraging habitat for reptiles, grazing and refuge habitat for small to large herbivores (including introduced livestock and rabbits and native macropods), and foraging and roosting habitat for arboreal mammals and microbats. These woodlands generally contain the most hollow-bearing trees which are used by woodland birds (especially parrots), owls, arboreal mammals and microbats for roosting and breeding purposes. On lower, moister soils where River Red Gum swampy woodland occurs, similar fauna types are found, however most of the trees in this woodland type are young and hence tree hollows were much less frequent. These woodlands contained a thicker layer of leaf little and logs in which reptiles prefer. These woodlands are also periodically inundated with water and provide habitat for aquatic birds and a valuable drinking resource for all fauna types. The dam to the north-east outside of the Proposal Site was full during surveys and was providing habitat for the before mentioned fauna types. The open crop lands surrounding these woodland and aquatic habitats were only suitable for grazers such as kangaroos and wallabies, and seed eating foragers including small rodents and some parrots.

Further detail is provided in the following sections on specific fauna groups and habitat elements.

4.2.1 Diurnal birds

The intensive bird survey completed within the Study Area resulted in 59 species being identified during the survey period. Birds were most diverse and abundant in the morning before 10am, however different species were captured throughout the three survey periods and within different habitat types. Species recorded abundantly at the site included:

- Galah (*Eolophus roseicapilla*)
- Australian Magpie (*Cracticus tibicen*)
- Eastern Rosella (*Platycercus eximius*)
- Common starling (*Sturnus vulgaris*)
- Australian Raven (*Corvus coronoides*)
- Grey Teal (*Anas gracilis*)
- Yellow-billed Spoonbill (*Platalea flavipes*)
- Blue Bonnet (*Northiella haematogaster*)
- Cockatiel (*Nymphicus hollandicus*)
- Red-rumped Parrot (*Psephotus haematonotus*),
- Short-billed Corella (*Cacatua sanguienea*)
- Sulphur-crested Cockatoo (*Cacatua galerita*)

Threatened species recorded within and around the Proposal Site are displayed in and discussed in the section below. Threatened species recorded included the Brown Treecreeper (*Climacteris picumnus*), Grey-

crowned Babbler (*Pomatostomus temporalis temporalis*), Spotted Harrier (*Circus assimilis*), Turquoise Parrot (*Neophema pulchella*) and Superb Parrot (*Polytelis swainsonii*). The Superb Parrot is listed as endangered under the EPBC Act.

Threatened birds recorded in the Proposal Site

Brown Treecreeper

Suitable habitat for the Brown Treecreeper, in the form of grassy woodland habitat, is present within the Development Envelope. The species has potential to utilise the Development Envelope on occasion as a foraging, roosting and nesting resource during its seasonal movements. Brown Treecreepers are capable of dispersing through sparsely-treed areas (e.g. in paddocks) provided that the distances between trees are not more than 100 m. Therefore, there is potential for Brown Treecreepers to disperse across sparsely-treed paddock areas in the western quarter of the Study Area.

Targeted surveys were undertaken for the Brown Treecreeper, with bird surveys being undertaken across the Proposal Site. The species was detected during these surveys, indicating that the Proposal Site is an ideal habitat for the species. The species are threatened by clearance and the fragmentation of the woodland habitat. Increased isolation decreases treecreeper vagility and increases the vulnerability of populations to extinction as a result of stochastic events. However the paucity of large stands of woody vegetation within the Development Envelope indicate that the development envelope would only be used on occasion when opportune, rather than forming an area of high density core foraging habitat. The proposal is not considered likely to impact the species, as the majority of vegetation within the Study Area has been avoided and any impacted vegetation will be offset.

Grey-crowned Babbler

Suitable habitat for Grey-crowned Babbler exists in the form of *Eucalypt* dominated woodland and croplands which provide foraging resource. Surveys were undertaken for the species recorded the subject during survey periods. The species has the potential to use the woodland habitat for foraging, nesting and roosting at the proposed area. Grey-crowned are capable of dispersing through sparsely-treed areas (e.g. in paddocks) provided that the distances between trees are not more than 200 m. However, it is likely that increased abundance of competitors, such as Noisy Miners, and nest predators, including the Pied Currawong and Australian Raven threaten Babbler foraging efficiency and breeding success. As such, there is potential for Grey-crowned Babblers to disperse across sparsely-treed paddock areas in the western quarter of the Proposal Site, however the proposal is not considered to increase the level of threats to the species.

Spotter Harrier

Targeted surveys for the Spotted Harrier recorded the subject in the Proposal Site. However, the local population is likely to be migratory, dispersing over large distances within south-north migration routes in response to locally favourable conditions. Potential nesting habitat within woodland areas of the Proposal Site would be retained. Nesting territories of Spotted Harriers are at least 5.5 km^2 (Baker-Gabb 1984) and, therefore, there is the potential for up to 30% of the home range of a single breeding pair being impacted by the operation of the solar plant. This is a negligible amount of potential habitat that is available for Spotted Harriers within the locality and broader geographical area. Spotted Harriers using the development envelope are also likely to be a negligible proportion of the local population. Therefore, the potential impacts of the solar plant on part of a single Spotted Harrier territory is unlikely to significantly impact on the status of the species or the availability of suitable habitat.

Turquoise Parrot

Two Turquoise Parrots were observed along the northern edge of Thurumbidgee Lagoon in additional surveys conducted in February 2015 during specialised surveys for the previously proposed CSP Plant. It is probable that this species feeds on the seeds of grasses and shrubs in open habitats within and close to the area's remnant woodland. This species also has the potential to nest in tree hollows within remnant woodland that will be retained on the project area or in River Red Gum woodland along the banks of Thurumbidgee Lagoon. Although the Turquoise Parrots have the ability to fly across open paddocks, they are more likely to move through woodland corridors around the Proposal Site rather than through it. Thus, the status of the species would not be impacted by the proposed operation of the solar farm.

Superb Parrot

One nationally vulnerable bird species, the Superb Parrot, was recorded within the Proposal Site in November 2014. The Superb Parrot flies low over open areas between woodland (mostly riparian woodland) remnants. This species has the potential to nest in tree hollows within remnant woodland that will be retained in the Proposal Site or in River Red Gum woodland along the banks of Thurumbidgee Lagoon and other woodland remnants close to the Proposal Site. The Study Area is located in a region that is particularly important for Superb Parrots, probably comprising winter migrants from Riverina (NSW & Vic) & South-west Slopes region, summer migrants from northern Central NSW and part of the local population likely to be resident in the region throughout the year.

The Proposal Site is likely to be too large an open area of space for Superb Parrots to fly across (Ambecol 2015). They are more likely to move through woodland corridors around the Proposal Site rather than through it. There are no hollow-bearing trees within the development footprint that could potentially be used by Superb Parrots (Ambecol 2015). Therefore, the life-cycle of the Superb Parrot and the national status of its habitats are unlikely to be significantly impacted to the extent that viable local populations would be placed at risk of extinction.

4.2.2 Reptiles and amphibians

Reptile and amphibian diversity and abundance was low throughout the Study Area. Three reptile species were recorded and no amphibians were recorded (although amphibians were not targeted during surveys due to aquatic habitat only occurring outside the Proposal Site). No threatened reptile species were detected during any of the surveys.

Figure 4-2 Ragged Snake-eyed Skink (*Cryptoblepharus pannosus*) foraging within the bark of a tree in the Proposal Site.

4.2.3 Nocturnal fauna species (excluding bats)

Spotlighting surveys within the Study Area detected one arboreal mammal (Common Brushtail Possum *Trichosurus vulpecula*), within the River Red Gum woodland area in the north-western area outside the Proposal Site. Terrestrial fauna identified during the spotlighting surveys included Swamp Wallaby (*Wallabia bicolor*), Red fox (*Vulpes vulpes*) and European rabbit (*Oryctolagus cuniculus*). The red fox and European rabbit are likely to be common throughout the region, as is the Eastern Grey Kangaroo (*Macropus giganteus*) which was recorded opportunistically at dawn and dusk. The feral cat (*Felis catus*) was detected opportunistically during diurnal surveys. Other native nocturnal species detected included the Southern Boobook (*Ninox novaeseelandiae)* and Tawny Frogmouth (*Podargus strigoides)*. Opportunistic call playback and passive listening for Barking Owls and Masked Owls did not detect either of these species, although habitat evaluation determined that the Barking Owl was likely to occur in the Study Area. No threatened Nocturnal fauna species were detected during any of the surveys.

Figure 4-3 Adult and juvenile Common Brushtail Possum in stag tree with hollows (L) and adult Swamp Wallaby in crop field (R).

4.2.4 Microbats

The threatened species habitat evaluation table (Appendix B), indicated the potential for four threatened microbat species to be utilising the Study Area; the Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Corben's Long-eared Bat (*Nyctophilus corbeni*), Inland Forest Bat (*Vespadelus baverstocki*) and the Little Pied Bat (*Chalinolobus picatus*). The Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), which was tentatively identified (but probably due to confusion with *Vespadelus* spp.), is considered unlikely to occur on the site due to the specific nature of the species biology and the very marginal range of this species.

Fifteen species of microbat were identified definitively in the Study Area, including the Chocolate Wattled Bat (*Chalinolobus morio),* Gould's Wattled Bat (*Chalinolobus gouldii),* Little Pied Bat (*Chalinolobus picatus*), Eastern Freetail-bat (*Mormopterus* sp. 2 = *ridei*), Inland Freetail-bat (*Mormopterus* sp. 3 = *petersi*), Little Forest Bat (*Vespadelus vulturnus),* Large Forest Bat (*Vespadelus darlingtoni*), Long-eared Bat (*Mormopterus* sp.), Western Broad-nosed Bat (*Scotorepens balstoni),* Little Broad-nosed Bat (*Scotorepens greyi*), Inland Forest Bat (*Vespadelus baverstocki*), Southern Freetail-bat (*Mormopterus* sp. 4), Southern Forest Bat (*Vespadelus regulus*) Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), and the White-striped Freetail Bat (*Tadarida australis).*

The calls of a number of species could only be tentatively identified, or were unable to be identified to species level. These include the Little Pied Bat, Eastern Freetail-bat (*Mormopterus* sp. 2 = *ridei*), one or more Long-eared Bats (*Nyctophilus* spp.), Large Forest Bat and the Southern Forest Bat. The difficulty in identification of these species came as a result of either poor quality calls or because calls may overlap in frequency and shape between species in the locality. The Little Pied Bat, Corben's Long-eared Bat, Yellow-bellied Sheathtail-bat and Inland Forest Bat are listed as Vulnerable under the TSC Act. These species are discussed below.

Threatened microbats recorded in the Proposal Site

Little Pied Bat

Potential habitat within the Proposal Site for the species includes woodland areas and regions that are nearby open water outlets. These habitats are potential habitats used on occasions as a foraging, roosting and nesting resource. Surveys undertaken recorded six 'possible' calls of Little Pied Bat over two locations. The species has not previously been recorded in the Forbes LGA (BioNet, 2017). The species are threatened by the loss or modification of habitat and the removal of larger trees that contain hollows that they depend on for nesting. However, the paucity of large stands of woody vegetation within the Development Envelope indicates that the Development Envelope would only be used on occasion when opportune. The proposal is not considered likely to impact the species, as the majority of vegetation within the Study Area has been avoided and any impacted vegetation will be offset.

Corben's Long-eared Bat

In addition to being listed as vulnerable under the TSC Act, the Corben's Long-eared Bat is listed as Vulnerable under the EPBC Act. Targeted surveys were undertaken within the Proposal Site for Corben's Long-eared Bat. Species of the Long-eared Bat (*Nyctophilus* sp.) family cannot be differentiated through calls alone, therefore Corben's Long-eared Bat is assumed to be occurring. It was 'definitely' recorded (as *Nyctophilus* sp.) between three locations 57 times. While potential habitat for the species exists where remnant native vegetation is present, the vegetation structure of the Development Envelope is considered unsuitable for the species to utilise as a foraging resource on more than an occasional basis. The vegetation within the Development Envelope exists almost entirely as remnant paddock trees with little to no understory. It is considered likely that invertebrate abundance is suppressed as a result of pesticide spraying, thus resources for the species to forage on within the site are likely limited. The species is considered unlikely to be significantly impacted by the proposal.

Yellow-bellied Sheathtail-bat

Targeted surveys for the Yellow-bellied Sheathtail-bat were undertaken in the Proposal Site. The species presence was identified as 'probable' at one location within the survey site. Habitat within the site is likely to be utilised by the species would include the woodland area, particularly where there are suitable tree hollows to provide roosting and foraging habitat, and may occasionally venture into the more open country adjacent to woodland areas. Given existing records for the species within the Forbes region (BioNet, 2017), and the presence of woodland areas with some trees hollows, it is possible that the species could occur within the Study Area, but limited to within the woodland habitats. This is a negligible amount of potential habitat that is available within the Proposal Site for Yellow-bellied Sheathtail-bats. Therefore, the potential operational impacts of the solar farm is unlikely to significantly impact on the status of the species or the availability of suitable habitat.

Inland Forest Bat

Twenty two 'possible' calls of Inland Forest Bat were recorded at two locations. However, because of the difficulty in identifying this species, no previous records of the species exist in the Forbes LGA (BioNet, 2017). Potential habitat within the Proposal Site the species consists of small hollows in stunted trees and in woodland areas Study Area including River Red Gum. The species has potential to utilise the Development Envelope on occasion as a foraging, roosting and nesting resource. Given the vegetation within the Proposal Site is predominately cleared paddocks and little understory, the vegetation structure is considered negligible potential habitat for the Inland Forest Bat. Therefore, the potential impacts of the PV Plant are considered unlikely to impact the status of the species.

4.2.5 Hollows

A total of 205 hollow-bearing trees were recorded within the Study Area (including the proposed transmission line) (Refer Figure 4-5 and Figure 4-6). Approximately ten hollow-bearing trees were recorded within the Development Envelope, seven within the PV field and three in the transmission alignment. This estimate does not include remnant patches of Poplar Box Woodland, and scattered trees likely to be retained within the Proposal Site. Tree hollow sizes were classified as follows:

- Small - <5 cm
- Medium – 5-20 cm
- Large - >20 cm

The total number of hollows observed in these 205 trees was 532, consisting of 333 small, 134 medium, and 65 large. This represents approximately 2.6 hollows per hollow-bearing tree and demonstrates suitability for a range of species including birds, microbats, and arboreal mammals. The diameter at breast height (DBH) of hollow-bearing trees was also measured and ranged from 50 centimetres to 150 centimetres, with a mean tree height of approximately 12 metres.

Table 4-2 Hollow-bearing trees to be removed

Hollow-bearing tree ID	Hollow size			Diameter at breast height (DBH) (cm)	**Height (m)**	**Location**
	Small	**Medium**	**Large**			
44	3			70	10	Tx Line
69	4	1	1	U	U	Tx Line
77	2	1	2	U	U	Tx Line
107	2	1		100	25	Solar Array
108	2	2		130	20	Solar Array
109	6		1	110	18	Solar Array
110	3			60	15	Solar Array
111	3			120	15	Solar Array
121		1		70	18	Solar Array
122	2	2		100	18	Solar Array
Total	47	8	4	*Average* = 95 cm	17m	

Note: U=Unknown

Figure 4-4 Examples of a hollow-bearing trees in the Study Area including one medium-sized hollow being occupied by a Cockatiel (*Nymphicus hollandicus*).

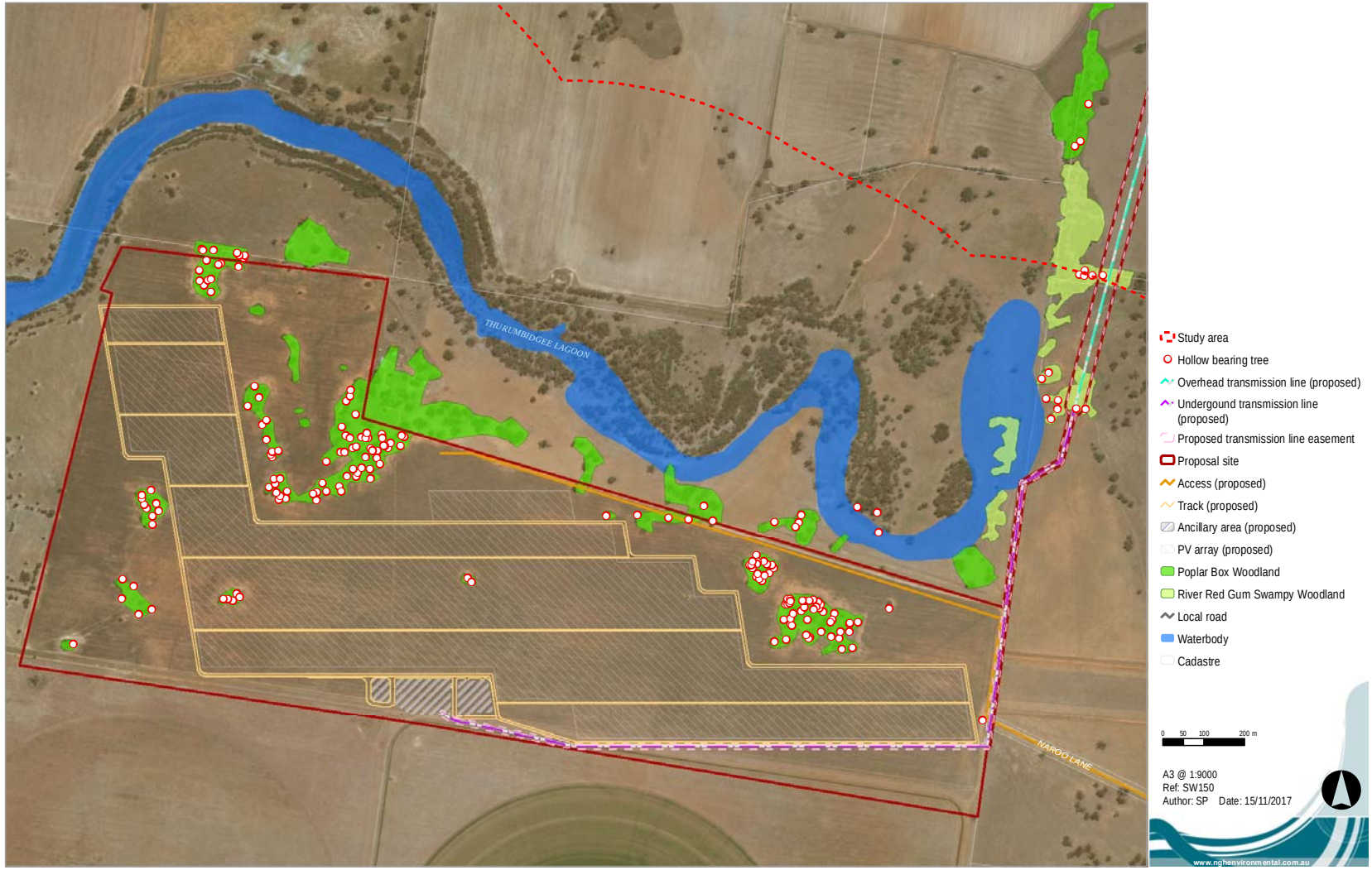

Figure 4-5 Hollow-bearing trees were recorded within the Study Area and adjacent to the transmission line.

Figure 4-6 Hollow-bearing trees were recorded adjacent to the transmission line to the north of the Proposal Site.

4.3 AQUATIC HABITAT

No creeks and/or river systems that enter the Proposal Site are classified as Key fish habitats, however Lachlan river, located to the north of the Proposal Site and within the Study Area is Key fish habitat.

The habitat evaluations for threatened fish and amphibian species determined that it was unlikely for any of these species to be utilising the available habitat at the Study Area. The large aquatic habitat requirements for the Murray Cod (*Maccullochella peelii*) and Macquarie Perch (*Macquaria australasica*), in conjunction with the periodically inundated nature of the floodplains within the Study Area, suggest that there is no risk of an impact to these species as a result of the proposal. The periodically inundated floodplains do, however, provide a marginal habitat for Sloane's Froglet, which is known from this habitat type even in disturbed environments (Sloane's Froglet Profile, NSW OEH). Despite this, the lack of records from the locality, the highly degraded habitats, and the marginally suitable habitat only occurring outside the Proposal Site means that it is unlikely that this species would be occurring within the Proposal Site.

4.4 CRITICAL HABITAT

Neither the Study Area nor the surrounding region contain any areas that have been declared as critical habitat under either the TSC Act or EPBC Act.

4.5 WILDLIFE CONNECTIVITY CORRIDORS

The biological species richness of a given habitat area declines with a reduction in the size of that area (MacArthur & Wilson 1967; Drinnan 2005). Thus the removal of vegetation from remnant patches in the landscape will generally reduce the number of species that utilise that remnant patch. Increasing the fragmentation of habitat patches may also have other effects, including declines in biodiversity values as the result of an increase in the ratio of edges to patch size. The value of vegetation within lineal features such as riparian zones, that occur to the north of the Study Area, is often expressed as a result of its ability to act as a corridor of habitat that connects two habitat patches (Bennett 1990). Such corridors may be used by fauna to traverse generally inhospitable landscapes, allowing for immigration and emigration from populations that may not otherwise occur. This may help to alleviate issues such as inbreeding depression and the effects of demographic stochasticity that can increase the risk of extinction for isolated or small populations. However, it has also been suggested that corridors may also transmit contagious diseases between habitat patches, expose native fauna to predators, exotic and domestic animals and poachers, and produce other negative effects (Simberloff and Cox 1987).

The riparian zone in the Study Area is generally well-vegetated, as is the fence line running north-south along the western side of the proposed transmission line (also running north-south). Remnant patches within the Study Area also generally connect to these corridors. The canopy connectivity in these zones is good, however the ground and mid-stratum vegetation connectivity is poor due to mainly exotic flora species occurring there. All three levels of vegetation generally provide good connectivity for fauna species in a typical woodland setting.

The width of the riparian and road/fence corridors within the Study Area varies, but are generally no wider than 260 metres. Therefore, most of the linkage vegetation is considered 'edge' vegetation and not 'core' vegetation, however it does connect to Wilbertroy State Forest to the south-west and the riparian zone of the Lachlan River to the north-east (Figure 4-7).

Wildlife corridors are generally defined as a link of habitat between two or more larger areas of wildlife habitat. Corridors are critical for the maintenance of ecological processes including allowing for the movement of animals and the continuation of viable populations. Most fauna species in the area are able to traverse this linkage corridor including birds, microbats, arboreal and terrestrial mammals and reptiles. To a lesser degree, they may use it as a 'stepping stone' in between moving to larger tracts of land. Some species, however, will not traverse tracts of cleared land.

The Grey-crowned Babbler is particularly susceptible to clearing and fragmentation, with an apparent reluctance to traverse tracts of cleared land. Isolated small populations are vulnerable to extinction via stochastic events and to loss of genetic viability in the long term (NSW Scientific Committee 2001) (Section 6.2.1).

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Figure 4-7 High Biodiversity Sensitivity areas (dark green) surrounding the Study Area (red outline) link the Study Area to Wilbertroy State Forest to the south-west and the Lachlan River riparian zone the north-east.

4.6 SEPP 44 – KOALA HABITAT PROTECTION

One species of primary feed tree was present within the Study Area, River Red Gum. Secondary feed tree species present in the Proposal Site include Inland Grey Box, and Poplar (Bimble) Box (DECC 2008).

River Red Gum was dominant within the River Red Gum swampy woodland wetland community, however only a negligible amount of this community will be cleared due to the proposed works (0.63 ha). Bimble Box trees occurring in the Poplar Box grassy woodland are also dominant, however only a negligible amount of this community will be cleared due to the proposed works (0.84 ha). No Western Grey Box trees will be removed due to the proposed works.

The Interim Koala Referral Advice for Proponents (DSEWPaC 2012) provides definitions of habitat that is critical to the survival of the Koala. As many patches of woodland (including all Poplar Box, River Red Gum and Inland Grey Box-dominated patches) within and surrounding the Proposal Site contain primary and secondary food trees that comprise at least 30% (for primary) or 50% (for secondary or primary and secondary combined) of the overstorey trees, these patches are considered to be habitat critical to the survival of the species. The Proposal Site also contains a number of areas that may aid the dispersal of Koalas between habitat patches. It is noted, however, that there are no koala recordings within 50 kilometres of the Study Area.

5 EPBC MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on the 30 October 2017 (10km buffer of the Development Envelope) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the Development Envelope (Appendix E). Relevant to Biodiversity these include:

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

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

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

Four wetlands of international importance were returned from the protected matters report. The nearest of these is the Hattah-kulkyne lakes at approximately 500-600km from the Proposal Site. There is no apparent connectivity between the adjacent Lachlan river (approximately 4km from the Proposal Site) and the Hattah-kulkyne lakes.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Three threatened ecological communities were returned from the protected matters report. One Endangered Ecological Community, Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia was identified as potentially occurring within the Development Envelope, however was found not to meet the condition requirements to meet the EPBC Act definition of the community (Section 3.2).

5.3 THREATENED SPECIES

Twenty threatened species were returned from the protected matters report. Of these, two species are known from the Development Envelope (Superb Parrot *Polytelis swainsonii* and the Corben's Long-eared Bat *Nyctophilus corbeni*) and a further six are considered to have the potential to utilise the habitats at the Development Envelope. The following species were considered likely to occur in the PCT's that occurred on site (Ambecol 2015). These species include:

- Painted Honeyeater *Grantiella picta* – Vulnerable EBPC Act
- Australiasian Britten *Botaurus poiclioptilus* – Endangered EPBC Act
- Swift Parrot *Lathamus discolour* – Critically Endangered EPBC Act
- Grey-headed Flying-fox *Pseudomys pilligaensis* – Vulnerable EPBC Act
- *Austrostipa wakoolica* – Endangered EPBC Act;
- Slender Darling Pea *Swainsona murrayana* – Vulnerable EPBC Act

The two threatened flora species listed above are considered to have a low likelihood of occurrence as a result of the species' not being known from proximity to the Study Area, and the quality of habitat within the Development Envelope(being previously cropped and grazed). In addition, all areas with the potential

to be impacted by the proposal were traversed during the survey, targeting habitat that was more likely to support threatened species. No threatened flora species were detected during any of the surveys.

Threatened fauna species identified above have the potential of occurring in the Proposal Site or to fly low over the area in search of prey while moving between habitats close to the area. However, the above species are considered to not be significantly impacted by the proposed development. Remnant woodland that would be retained near the northern boundary of the Proposal Site and the River Red Gum Forest along the banks of Thurumbidgee Lagoon are potential habitat areas for threatened woodland birds in the locality. Threatened woodland bird species would be unable to disperse over open areas of the Proposal Site to move between remnants and are likely to move through the woodland corridors away from the Proposal Site. Therefore, the status of threatened woodland bird species and their habitats would not be impacted by the proposal.

5.4 MIGRATORY SPECIES

Twelve listed migratory species were returned from the protected matters report. One listed migratory species, the Curlew Sandpiper *Calidris ferruginea* was identified as having potential to utilise the Proposal Site within the Study Area. The species is considered unlikely to be reliant on the Proposal Site as a permanent roosting or foraging resource. It is noted that the adjacent Thurumbidgee Lagoon is the nearest waterway to the site, filling intermittently when there is good rain, located approximately 400 m to the north of the Proposal Site. The Lachlan River is located approximately 3.7 km to the north.

6 POTENTIAL IMPACTS

6.1 FLORA

6.1.1 Loss of Vegetation

Construction

The proposed works for the transmission line would have a direct impact on vegetation communities and fauna habitat within the Proposal Site as a result of vegetation clearing. The extent and estimated loss of each vegetation community within the Proposal Site is listed in Table 6-1. Approximately 0.84 hectares of moderate to good condition native vegetation would be permanently removed as a result of the proposed works for the transmission line and the solar arrays, which accounts for a small amount of such vegetation in the Study Area. The two PCT impacted include Poplar Box Woodland and River Red Gum swampy woodland wetland. Neither of these communities are threatened under the TSC Act or EPBC Act. The remainder of vegetation to be impacted is exotic crop species with scattered native grasses and forbs which do not constitute a native PCT. During the design phase, an 'avoid and minimise' approach to loss of native vegetation was adopted. All remnant patches of woodland within the Proposal Site have been avoided for clearing and most of the remnant woodland along the proposed transmission line was also avoided by designing the transmission line to be constructed around these patches. Only minor areas of woodland could not be avoided for clearing.

One TSC Act listed vegetation community (Inland Grey Box Woodland) was recorded adjacent to the indicative transmission line but would not be impacted by the proposed works.

Due to the Inland Grey Box remnant patch being adjacent to the proposed transmission line and hence will not be cleared due to the proposal, it is considered not necessary to undertake further assessment on the likely impacts to this community type due to the proposal. Recommendations have been made which will ensure this patch is conserved and impacts will be mitigated (Section 8).

Table 6-1 Estimated loss of communities within the Proposal Site.

Vegetation Community	Threatened Ecological Community?	BioMetric Vegetation Condition	Total in the Proposal Site and Tx Line(ha)	Extent of Vegetation loss (ha)
Western Grey Box Woodland (TSC)	Yes	Moderate to good	0	0
Poplar Box Woodland	No	Moderate to good	9.44	0.21
River Red Gum swampy woodland wetland	No	Moderate to good	0.63	0.63
Exotic	No	N/A	176.72	101.31
Native Vegetation			**10.08**	**0.84**
Total Vegetation			**187.17**	**102.15**

Notes: While areas have been calculated to two decimal places, they should be treated as estimates only. Exotic vegetation would be maintained under the PV array.

Operation

Alteration to microclimate and erosion potential under the PV Panels

Vegetation and ground habitats would likely be affected by reduced insolation and temperature and increased humidity underneath the PV Panels. Wind speeds may also be reduced.

Shading and groundcover management under the PV Panels

In the grazed paddocks existing native and exotic pasture across the Proposal Site may decline initially due to shading following installation of the PV Panels. Areas of exotic pasture are of little importance in terms of biodiversity; however, a reduction in cover may lead to bare ground and susceptibility of the soil to erosion. The selection of a more suitable shade tolerant pasture species for planting would address this issue. Caution needs to be applied when choosing groundcover species to sow prior to infrastructure installation as sowing a pasture variety that has not been trialled under local conditions may lead to establishment failure or subsequent pasture decline creating management problems post construction.

The response of native vegetation to shading is hard to predict as there has been little research into the effects of pasture shading in the central west of NSW. Shade tolerant species are present onsite within the woodland remnants and may benefit from shading. A study into the effects of tree canopy shade on three Chenopod species in arid Australia showed that some were tolerant of a wide range of light and soil moisture conditions (Prider and Facelli 2004). It is likely that a native groundcover would survive onsite under the PV Panels in areas where a native groundcover currently exists.

Changes in rainfall distribution

Soil underneath the PV Panels would likely receive less rainfall than surrounding soil. However, as these would be moved to a near horizontal angle at night, combined with reduce evapotranspiration losses due to shading and reduced air movement. Lateral movement of surface and subsurface water from adjacent rain-exposed areas would be likely to occur. As such, the net amount of moisture available to vegetation under the PV Panels is unlikely to be reduced. Where higher rates are achieved, higher growth rate of groundcover may occur, reducing effects of shading that are discussed above

There could be a concentration of rainfall runoff in a strip below the lower edge of the PV Panels. This could increase rain-splash intensity and soil erosion potential in this area during heavy rainfall events. The erosion risks should be manageable using adequate site preparation, and responsive pasture and stock management.

Loss of or alteration to grassland habitat for macropods, birds, reptiles and insects due to shading, changed microclimate and reduced productivity

It is unclear what the impact to soil moisture, soil nitrogen and subsequent vegetation composition from factors such as reduced light and near ground wind levels would be following the installation of the PV Panels. The response of local fauna to these changes is equally hard to predict and would be largely influenced by the vegetation changes that occur. An altered microclimate under the PV Panels have the potential to affect sensitive fauna such as ants and poikilothermic species such as reptiles. Basking opportunities may be reduced, although the structure of the PV Panels may provide fauna with a degree of protection from predation. Increased soil moisture may create favourable shelter and foraging habitat for amphibians. As the PV Panels would be located in modified grazing and cropping paddocks with few fauna habitat values, there is a low probability of fauna species, particularly threatened species, being impacted by any microclimate and associated vegetation changes that may occur in these areas.

Effects on fire frequency

It is anticipated that to reduce risk of wildfire vegetation under the PV Panels would be kept low by slashing or sheep grazing. Access tracks would be constructed through the Proposal Site and around the perimeter of the PV project. This network would serve to contain any fire starting at the site, to protect the facility

during a wildfire and to provide access for fire suppression during an event. The proposal is unlikely to significantly affect wildfire frequency in the areas adjacent to the Proposal Site. Fire frequency within the area boundary is already likely to be low given the high levels of modification and low fuel loads.

6.1.2 Weeds

Construction

Spread of African Boxthorn observed in the Proposal Site may occur during vegetation removal and movement of machinery. Appropriate measures would be put in place to ensure this weed is not spread within or out of the Proposal Site (Section 8).

The Western Regional Strategic Weed Management Plan 2017 - 2022 (RSWMP) (Western Local Land Services, 2017), utilises the regulatory tools available in the Biosecurity Act to manage weed risks. Weeds should be dealt with in accordance to the guide to avoid the spread of weeds.

Operation

Rehabilitation of disturbed areas and post-construction weed management would limit the establishment and spread of weed species during construction and operation of the proposed road alignment.

6.2 FAUNA

6.2.1 Habitat removal

The abundance of mature trees within the existing Proposal Site is relatively high. These trees offer important food resources for many fauna species, including birds, bats, and mammals. Mature trees provide more flowers, nectar, fruit and seeds than younger trees, as well as a complex substrate that supplies diverse habitats for invertebrate populations (Recher 1996). Threatened bird species that are more likely to utilise the Proposal Site for these resources include Superb Parrots, Grey-crowned Babblers, Brown Treecreeper, Little Lorikeets, and Varied Sittellas. Of these, Superb Parrots, Brown Treecreepers and Grey-crowned Babblers were observed within the Proposal Site. The removal of some mature trees, along with the sparse to moderate shrub layer that is present in some locations, will remove the foraging resources for such fauna species, and also remove the habitat complexity that some species require for shelter and protection. Many common and widespread birds were also observed utilising woodland within the Proposal Site, and available habitat for these species will likely be reduced as a result of the proposal. However, as only 0.84 hectares of native woodland will be cleared due to the PV Plant and the majority of woodland within the Proposal Site will remain intact, these minor impacts are likely to be negligible to woodland dependent fauna species recorded or likely to occur within the Proposal Site.

The exotic crop and pasture grasses occurring within the Proposal Site can be used by native and exotic grazing herbivores, as well as reptiles and invertebrates for refuge and foraging. However, most of this ground cover would remain intact due to the proposed works. Furthermore, this habitat type is abundant throughout the Study Area, therefore the relative loss of this habitat type due to the proposed works will be negligible.

6.2.2 Loss of hollow-bearing trees

205 hollow-bearing trees are located within or are very close to the Proposal Site. Ten of these trees within the Development Footprint will require removal for the proposed works. Fifty-nine hollows were recorded in these ten trees consisting of 47 small hollows, eight medium hollows and four large hollows. The loss of these trees represents a proportional reduction of approximately 5% of all hollow-bearing trees observed within the Proposal Site.

Threatened hollow-dependant fauna species that were either observed in the Proposal Site or have a high likelihood of utilising the Proposal Site include the Superb Parrot, Brown Treecreeper, Yellow-bellied Sheathtail-bat, Little Pied Bat, Corben's Long-eared Bat and Inland Forest Bat. Species with a lower likelihood of utilising the Proposal Site that roost in hollows include the Little Lorikeet (*Glossopsitta pusilla*), Turquoise Parrot (*Neophema pulchella*), Barking Owl (*Ninox conniverns*) and Squirrel Glider (*Petaurus norfolcensis*). Thus there is potential for the loss of hollow-bearing trees to remove roosting and/or breeding habitat for some threatened species. In addition, the loss of these trees has the potential to reduce foraging opportunities for predatory species (such as owls) that rely on hollow-dependant fauna for prey.

When hollow-bearing trees collapse or shed limbs they also provide hollow logs that serve as important foraging substrates and shelter sites (Mac Nally *et al.* 2001). The distribution and abundance of hollow-bearing trees in NSW has been reduced and fragmented by extensive clearing of native vegetation during the past two centuries, primarily for agriculture. Eventual loss of current hollow-bearing trees, and a lack of recruitment of younger trees to replace them, will result in a large decrease in the hollow resource over the wide geographic area covered by agricultural landscapes in the medium term (Saunders *et al.* 2003, Vesk and Mac Nally 2006).

Other native hollow-dependant fauna species detected during the surveys include the Common Brushtail Possum, Chocolate Wattled Bat (*Chalinolobus morio)*, Gould's Wattled Bat (*Chalinolobus gouldii*), Eastern Freetail-bat (*M*. sp. 2), Inland Freetail-bat (*Mormopterus petersi*), Southern Freetail-bat (*Mormopterus* sp. 4), Little Broad-nosed Bat (*Scotorepens greyii*), Western Broad-nosed Bat (*Scotorepens balstoni*), White-striped Freetail-bat (*Tadarida australis*), Large forest Bat (*Vespadelus darlingtoni*), Southern Forest Bat (*Vespadelus regulus*), Little Forest Bat (*Vespadelus vulturnus*), Australian Wood Duck (*Chenonetta jubata*), Blue Bonnet (*Borthiella haematogaster*), Cockatiel (*Nymphicus hollandicus)*, Galah (*Eolophus roseicapillus),* Sulphur-crested Cockatoo (*Cacatua galerita*), Little Corella (*Cacatua sanguinea*), Budgerigar (*Melopsittacus undulates*), Eastern Rosella (*Platycercus eximius*), Blue Bonnet (*Northiella haematogaster*), Laughing Kookaburra (*Dacelo novaeguineae*), Sacred Kingfisher (*Todiramphus sanctus*), Southern Boobook (*Ninox novaeseelandiae*), Spotted Pardalote (*Pardalotus punctatus*), Striated Pardalote (*Pardalotus striatus*) and Red-rumped Parrot (*Psephotus haematonotus).* The loss of up to ten hollow-bearing trees within the Proposal Site may have a slight impact on populations of these species within the Study Area, particularly considering the importance of this limited resource and the fragmented nature of the surrounding landscape. However, with 195 hollow-bearing trees remaining in the Proposal Site that will not be impacted, this loss of hollow-bearing trees is considered minor. Mitigation and management measures have been proposed which include a staged habitat removal process and the development and implementation of an offset plan.

6.2.3 Wildlife Connectivity and Habitat Fragmentation

The biological species richness of an area of habitat declines with a reduction in the size of that habitat (MacArthur & Wilson 1967; Drinnan 2005). Thus the removal of vegetation from remnant patches in the

landscape will generally reduce the number of species that utilise that remnant patch. Increasing the fragmentation of habitat patches may also have other effects, including declines in biodiversity values as the result of an increase in the ratio of edges to patch size. The value of vegetation within floodplain and riparian areas, such as in the Study Area, is high considering how it can be used by wildlife for traversing across the landscape. Such corridors may be used by fauna to move through inhospitable landscapes. This may help to alleviate issues such as inbreeding depression and the effects of local events such as disease or fire that can increase the risk of extinction for isolated or small populations. However, it has also been suggested that corridors may transmit diseases between habitat patches and assist the movement of feral predators (Simberloff and Cox 1987).

The remnants within the Proposal Site generally have well-vegetated canopies, with patches of moderate to good quality native vegetation as well as patches of low quality non-indigenous or exotic vegetation such as planted exotic trees in crop fields. It is likely that native mammals and birds utilise the existing remnant vegetation to move through the landscape or as a 'stepping stone' from one patch to the next. Wilbertroy State Forest is located approximately three kilometres to the south-west of the Proposal Site and Carawandool State Forest approximately 10 kilometres to the south-east of the Study Area. Thurumbidgee Lagoon and the floodplains to the north of the Proposal Site also likely act a 'stepping stone' for aquatic birds between the Lachlan River and Lake Cowal. However, this lagoon will not be impacted by the proposal. It is likely that these state forests and larger aquatic areas in the local area are more suitable habitat than that of the Proposal Site for local birds and microbats. It is assumed that these species would preferentially use the habitat areas.

The removal of approximately 0.84 hectares of native vegetation in moderate to good condition from the Development Envelope would reduce the extent of remnant vegetation in the local landscape to a minor level. This loss of habitat would only cause minor fragmentation between the Proposal Site and the lagoon/floodplain area directly to the north, and possibly to the north-south remnant vegetation along the proposed transmission line. Species utilising the Proposal Site as a habitat corridor are likely to already be tolerant of a certain level of fragmentation and are more likely to be highly mobile, wide-ranging species. It is unlikely that connectivity structures would be a suitable mitigation measure due to limited overstorey vegetation in the surrounding landscape, and the suite of species that occur within the Study Area.

6.2.4 Koala Habitat

No scratches or scats attributable to Koalas were observed during the field surveys. There are no records of Koalas within 10 kilometres of the Proposal Site.

One species of primary feed tree was present within the Proposal Site being River Red Gum. Two species of secondary feed trees were also present within the Proposal Site, including Poplar Box, and Inland Grey Box. The most abundant native vegetation community in the Proposal Site is the Inland Poplar Box Woodland, which is dominated by Poplar Box. Densities of River Red Gum are high in the Study Area, however the majority of these trees will not be impacted by the proposal (approximately 0.63 ha).

Most of the moderate to good condition native vegetation present within the Study Area consists of habitat critical to the survival of the Koala, and some of these patches consist of "potential Koala habitat" as per SEPP 44. Despite this, the fragmented nature of habitat in the locality, the lack of primary feed tree species to be impacted, and the lack of local records of Koala suggest that the Proposal Site is unlikely to provide habitat that is being or will be utilised by Koalas.

6.2.5 Injury and mortality

Construction

Clearing of vegetation within the proposal site during construction has the potential to injure fauna due to the disturbance of habitat. Many smaller and more common species such as skinks and frogs are difficult to locate or remove during pre-clearing surveys. It is likely there will be some loss of individuals impacted during construction. There is also the potential for hidden hollows to be present in the forks of large trees, in which bats or birds may occur. Injuries or fatalities to native fauna during the clearing process may arise from such situations. Safeguards and management measures would be put in place during the construction phase to prevent and minimise such impacts, and are discussed in Section 8.

Operation

The main operational impacts resulting from operation of the PV Plant relate to:

- Collision risks on PV Plant infrastructure including PV Panels, cables, perimeter barbed wire fencing, and power line;
- PV Panels and reflected light perceived by birds as wetlands;
- Attraction of birds to lights at night; and
- Stranding and predation of birds

Risk to bats and gliders could result from collision with infrastructure, including PV Panels, perimeter fencing and powerlines. This risk is likely to be of a low likelihood. While there may be a low level of mortality following construction, once local populations of gliders and bats become familiar with infrastructure, mortality of individual animals is unlikely. It is recommended that fencing that presents a higher risk of injury or mortality to these species (i.e. barbed wire) is not utilised.

A number of positive impacts to local fauna are likely to occur once the PV Plant is in operation. The ground cover vegetation is likely to become more dense and even naturalise, allowing foraging and refuge opportunities for small mammals, birds, reptiles and invertebrates. This highlights the important role solar stations can play in climate protection and biodiversity preservation hand in hand (GREA 2010).

6.3 PESTS AND PATHOGENS

The proposed works have the potential to facilitate the dispersal of pest fauna species such as the feral European Rabbit (*Oryctolagus cuniculus*), European Red Fox (*Vulpes vulpes*), and Feral Cat (*Felis catus*). However, these species are already present within the Proposal Site and in the locality.

Several pathogens in NSW have the potential to impact on the environment and biodiversity. These may be introduced and spread during the construction of the proposal. Pathogens that have the potential to be introduced and spread during construction activities in NSW include, but are not limited to:

- Phytophthora (*Phytophthora cinnamomi*).
- Myrtle Rust (*Uredo rangelli*).
- Fusarium Wilt/Panama disease (*Fusarium oxysporum*).

Any works where risk of spread is apparent, mitigation measures should be followed to prevent their introduction or spread. Phytophthora is listed as a Key Threatening Processes (KTPs) under both the TSC Act and EPBC Act, and Myrtle Rust is listed under the TSC Act. All of the species listed above are not

considered likely to occur at the Study Area, as they are currently thought to be present only in the coastal or more eastern areas of NSW. Therefore, impacts due to these pathogens are unlikely.

6.4 CHANGED HYDROLOGY

Impacts of changed hydrology on biodiversity include deteriorating water quality, reduced water availability, altered flow regimes in waterways, and the rising of water tables due to clearing of native vegetation and the movement of salts to surface layers of soil and waterways. Vegetation clearing would be of a reduced level. Following construction, ground cover vegetation would be maintained.

Thurumbidgee Lagoon and the floodplains surrounding the Proposal Site was relatively dry at the time of the surveys, and was not offering fauna much in the way of aquatic habitat. However, these floodplains will from time to time. It is concluded that the proposal will not cause any negative impacts to these aquatic species.

6.5 IMPACT ON RELEVANT KEY THREATENING PROCESSES

The construction phase of the proposal will result in the removal of approximately 0.84 hectares of native vegetation in moderate to good condition. This will impact on the biodiversity value within the Development Envelope, these impacts cannot be avoided. Secondary construction impacts could result from soil and water contamination (from pollution incidents) and dust generation. Impacts associated with operational of the solar plant could include the creation of barriers to fauna movement, a result of fencing of the site combined with the expanse of the solar arrays, and potential for collision of birds with the 66kV powerline. Table 6-2 below details the TSC Act and EPBC Key threatening process and the relevance of the process to the proposal.

Table 6-2 List of key threatening processes and their relevance to the proposal.

Key Threatening Processes (KTPs)		
TSC Act	**EPBC Act**	**Relevance**
Clearing of native vegetation	Land clearance	0.84 hectares of moderate to good condition native vegetation would be removed as part of the proposal. This extent does not include state or federally-listed threatened ecological communities. The proposal is thus only minimally likely to contribute to this KTP.
Loss of hollow-bearing trees		Approximately 10 hollow-bearing trees would be removed as a result of the proposed works. An exclusion zone prior to construction would ensure that over-clearing does not occur. Removal of hollow bearing trees would be offset.
Removal of dead wood and dead trees		Approximately three of the ten hollow-bearing trees are dead standing trees which would be impacted by the proposed works. Dead wood is abundant throughout the Study Area, particularly where eucalypts are present. Works would adhere to mitigation measures in Section 8.
Infection of native plants by *Phytophthora cinnamomi*	Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)	The proposed works are not considered likely to exacerbate this KTP, as the pathogen is not known to occur in the region.

Key Threatening Processes (KTPs)		
TSC Act	**EPBC Act**	**Relevance**
Invasion of native plant communities by exotic perennial grasses		A number of exotic perennial grasses (listed in Appendix C) were common across the Study Area, and were already considered dominant in the landscape. Rehabilitation works and regular weed management at the area would help prevent these species from spreading further and may even promote native grass rehabilitation. Recommendations have been made in Section 8 accordingly.
Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)	Competition and land degradation by rabbits	Change to ground cover, and potential harbour may result in increased abundance of this species
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae		With adherence to hygiene guidelines (Section 8) it is considered unlikely that the proposal would exacerbate this KTP, particularly as this pathogen is not known to be present in the region.
Predation by the European red fox (*Vulpes vulpes*)	Predation by European red fox	Disturbance to native fauna and their habitat may attract this species to the Study Area or modify its current population density.
Predation by the feral cat (*Felis catus*)	Predation by feral cats	Disturbance to native fauna and their habitat may attract this species to the Study Area or modify its current population density.

6.6 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 2001e), and the removal of the minimal amount of vegetation for this PV plant is contributing to this process. The amount of native vegetation to be removed (0.84 ha) is however, relatively minor compared to the size of the development and the low quality of the vegetation condition. The majority of the Development Envelope is located within existing modified and exotic dominated vegetation and the native vegetation to be removed is already modified and degraded.

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). Loss of hollow bearing trees would be offset by development and implementation of an offset management plan.

Cumulative impacts are considered best addressed by avoiding and minimising. The proposal is located in a highly modified landscape and the project has been designed to largely avoids impacts to native vegetation and threatened species habitat and the cumulative contribution of the proposal to biodiversity impacts is considered to be negligible.

7 ASSESSMENTS OF SIGNIFICANCE

Assessments of Significance (AoS) have been conducted for species as a result of the construction and operation of the PV plant. The results of the AoS are presented in Appendix A. The species requiring AoS are:

- *Threatened Species Conservation Act 1995*
  - **Brown Treecreeper** (*Climacteris picumnus victoriae*)
  - **Microchiropteran Bats** (Little Pied Bat (*Chalinolobus picatus),* Corben's Long-eared Bat (*Nyctophilus corbeni)*, Inland Forest Bat (*Vespadelus baverstocki*) and Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)).

- *Environment Protection and Biodiversity Conservation Act* 1999
  - **Corben's Long-eared Bat** (*Nyctophilus corbeni*)

8 MANAGING POTENTIAL IMPACTS UPON BIODIVERSITY

8.1 AVOID AND MINIMISE

Measures to avoid and minimise impacts associated with the proposed works include:

- Reductions in clearing areas where vegetation is of conservation significance. This is achieved via;
  - selection of a proposed transmission line design that avoids clearing of remnant patches of woodland where possible.
  - The PV Plant layout has been designed to avoid clearing of hollow-bearing trees as much as possible. Only ten hollow-bearing trees of a possible 205 in the Study Area will be cleared.

8.2 SAFEGUARDS AND MANAGEMENT MEASURES

The proposal would follow a number of environmental safeguards to assist with minimising the impacts on biodiversity during construction and operation of the PV Plant. These measures are listed in Table 8-1 below.

Table 8-1 Safeguards and management measures designed to minimise impacts on biodiversity.

Impact	Environmental safeguards	Responsibility	Timing
Operation			
Clearing and prevention of over-clearing	• A CEMP would be prepared including an erosion sediment control plan, vegetation management measures, a revegetation and weed management program, fauna management measures, and Work Methods Statements for all works within 10 m of the waterways occurring adjacent to the Proposal Site. All site workers should be inducted and made aware of the conservation issues and associated CEMP for the site. • Prior to the commencement of work, the clearing limit needs to be clearly demarcated and maintained. • Pre-clearing surveys would be carried out by an ecologist and would include targeted surveys for nesting Superb Parrots, Grey-crowned Babblers, Brown Treecreepers and general tree hollow inspections where possible. They would include targeted searches for arboreal fauna and inspections of vegetation for other fauna occupancy. Habitat trees would be clearly marked with flagging tape. If active nests are found during clearing works, or hollows are being used by nesting birds or arboreal mammals, an ecologist or local wildlife carer should be contacted to remove the eggs, chicks or juvenile mammals to be hand-raised. • Trees would be removed in such a way as not to cause damage to surrounding vegetation. Root systems of trees and shrubs to be removed should be retained in-ground to ensure surrounding ground layer vegetation is undisturbed and to prevent soil erosion. • Where possible, trees to be removed would be mulched on-site and re-used to stabilise disturbed areas. • The clearing protocol will include assessment of breeding and hibernation periods so as to avoid clearing during these periods, ideally avoiding the period of June to January. • Where trees are to be retained, an adequate protection zone (TPZ) would be provided around each tree for the duration of construction. Details for calculating TPZs are provided within *Australian Standard 4970-2009 – Protection of trees on development sites*. • If work cannot avoid encroaching into the TPZ, it would not impinge on the structural root zones (SRZ) of trees to be retained. Details for calculating the SRZs are provided within *Australian Standard 4970-2009 – Protection of trees on development sites*.	Contractor	Pre-construction Construction

Impact	Environmental safeguards	Responsibility	Timing
	• An unexpected threatened species finds procedure would be developed before clearing is begun.		
Loss of hollow-bearing trees	• Staged habitat removal for the removal of hollow-bearing trees would be undertaken where non-habitat vegetation would be cleared initially following a pre-clearing inspection by a qualified ecologist. Habitat trees would be disturbed by 'knocking' at this time and cleared at least 24 hours after. • Clearing of hollow-bearing trees would not take place between September and February, where possible. If clearing during this period cannot be avoided, an ecologist would be present on site to check all hollows for animals. If a hollow is being used by a threatened species (e.g. Superb Parrot), an exclusion barrier of appropriate distance (e.g. 30 metres from the base of the tree) would be installed to prevent disturbance. If a hollow is being used by a species not listed under the TSC Act or EPBC Act, any animals present will be caught and either released into appropriate alternative habitat or taken to a wildlife career. • An offset Management Plan would be developed and implemented to offset the loss of native vegetation, including hollow-bearing trees.	Contractor	Construction
Damage to native vegetation outside of impact zone	• Stockpile and compound sites would be located using the following criteria: o Within the Proposal Site. o At least 40 metres away from the nearest waterway. o In areas of low ecological conservation significance (i.e. previously disturbed land). o On relatively level ground. o Outside the 1 in 10 year Average Recurrence Interval (ARI) floodplain.	Contractor	Construction
Introduction and spread of priority weeds and pathogens	A Weed Management Plan would be developed for the sites to prevent/minimise the spread of weeds in and between sites. This would include: • Declared priority weeds managed according to the Western Regional Strategic Weed Management Plan 2017-2022. • Develop protocol for weed hygiene in relation to plant, machinery and importation and management of fill. • All pesticides would be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application would be trained to do so and have	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	the proper certificate of completion/competency or statement of attainment issued by a registered training organisation. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated and reported.		
Disturbance to fallen timber, dead wood and bush rock	• Any fallen timber, dead wood and bush rock (if present) encountered on site would be left in situ or relocated to a suitable place nearby. Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Contractor	Construction
Injury and entrapment to fauna due to barbed wire fence construction	• Microbats and birds may be injured through collisions with barbed wire on the perimeter fencing of the PV Plant. In order to help these impacts due to the perimeter fence, use of barbed wire would be avoided.	Vast Solar, contractor	Construction
Accidental spills and contamination from construction activities (including compound sites)	• 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. • Ensure that dry and wet spill kits are readily available	Contractor	Construction
Earthworks	• An Erosion and Sediment Control Plan must be prepared in conjunction with the final design and will be implemented.	Contractor	Construction
Noise	• The Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent vegetation such as work timing during daylight hours and use of ambient noise sensing “quackers” in lieu of reversing beepers.	Contractor	Construction
Dust generation	• The Construction Environmental Management Plan will include measures to prevent dust spreading to nearby habitats.	Contractor	Construction
Light spill during operation	• Avoid nightworks. • If night work is unavoidable, ensure any floodlights are directed away from vegetation.	Contractor	Construction
Mobilisation of sediments	• Preparation and implementation of an erosion and sediment control plan.	Contractor	Construction
Increased Vehicle Traffic	• Awareness training during site inductions regarding enforcing site speed limits.	Contractor	Construction
Operation			

Impact	Environmental safeguards	Responsibility	Timing
Shading by solar array infrastructure	• Feral species to be monitored and a management plan to be prepared and implemented to reduce feral species abundance. • Planting of suitable groundcover feed species for threatened bird species.	Vast Solar	Operation
Feral animal management	• Implement feral animal management program, including species such as rabbits, rodents and starlings to reduce risk of attracting raptors.	Vast Solar	Operation
Movement of vehicles	• Site speed limits to be enforced, with low speed areas in proximity to threatened fauna species and habitat.	Vast solar	Operation
Light spills during night works	• Direct lights away from vegetation.	Vast Solar	Operation

9 OFFSET STRATEGY

A Biodiversity Offset Strategy (BOS) will be developed and implemented as part of the approval of the PV Plant. The BOS will provide a framework for determining the number and type of ecosystem and species credits required to offset residual impacts of the PV Plant on biodiversity ('credit obligation') in accordance with the Biodiversity Offsets Scheme. The objective of the proposed offsetting would be to ensure that an overall 'maintain or improve' outcome is met for the PV Plant; where impacts cannot be avoided, or sufficiently minimised, the residual impact would be offset in perpetuity.

Loss of native vegetation is expected to be minimal in the Development Envelope itself, as the PV Plant is such that vegetation removal can be kept to a minimum across the area of the solar array (the largest part of the proposed development). There is expected to be approximately 0.84 ha loss of vegetation, that includes approximately ten hollow-bearing trees, in the easement for the transmission line and in the area of the solar arrays. The BOS will set out to determine the extent of vegetation required to be offset for the purpose of the PV Plant and proved certainty that a suitable number of offsets are available for the unavoidable impacts. The extent of offset will include non-EEC vegetation, and known threatened fauna species habitat, avoided and retained within the Proposal Site. This offset will be managed to ensure that threatened species habitats continue to exist within Proposal 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. The retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

a) acquiring or retiring credits under the Biodiversity Conservation Act 2016;
b) making payments into the Biodiversity Conservation Fund that has been established by the NSW Government

10 CONCLUSION

The assessment has identified that it is unlikely that the PV Plant would significantly impact on the status of local populations of bird species, including threatened species and listed migratory species.

Three moderate to good condition native vegetation communities were identified within the Study Area, including Western Grey Box Woodland, Poplar Box Woodland and Forest Red Gum Swampy Woodland. One of these communities is listed as an EEC under the TSC Act. A total area of 0.84 hectares of woodland is proposed for removal of which none of this is Western Grey Box Woodland. The remainder of vegetation to be cleared is low condition, exotic-dominated vegetation. No threatened flora species were observed during the field survey, and threatened species evaluations determined that the Study Area is unlikely to provide important habitat for any of the flora species detected in background searches.

Five threatened bird species were confidently identified in the Proposal Site during the field surveys; the Superb Parrot (TSC-V, EPBC-V), Grey-crowned Babbler (TSC-V), Spotted Harrier (TSC-V), Turquoise Parrot (TSC-V), Brown Treecreeper (TSC-V). A number of other threatened bird species are likely to use the Proposal Site on occasion. Four threatened microbats, the Little Pied Bat (TSC-V), Corben's Long-eared Bat (TSC-V, EPBC-V), the Inland Forest Bat (TSC-V) and the Yellow-bellied Sheathtail-bat (TSC-V) were detected in the Proposal Site with varying degree of confidence. All four species are considered likely to utilise the Proposal Site. Assessments of significance under the TSC Act and EPBC Act determined that the proposal is not likely to have a significant impact on any of the fauna species that may utilise the Proposal Site. Loss of 0.84 hectares of moderate to good condition native vegetation, including up to ten hollow-bearing trees, is a minimal impact of the proposal that has the potential to impact on native flora and fauna within the Study Area. Mitigation and management measures have been recommended in order to prevent further loss and to minimise disturbance. They include the establishment of exclusion zones, staged habitat removal for hollow-bearing trees, erosion control, prevention of fauna fatalities and injuries during operation and the prevention of weed establishment and spread. Furthermore, development and implementation of an Biodiversity Offset Strategy has been recommended in accordance with the Biodiversity Offset Scheme in order to compensate for the loss of both native vegetation and hollow-bearing trees within the Development Envelope.

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APPENDIX A THREATENED SPECIES ASSESSMENTS OF SIGNIFICANCE

A.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:

- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)
- Microchiropteran Bats, including:
    - Little Pied Bat (*Chalinolobus picatus)*
    - Corben's Long-eared Bat (*Nyctophilus corbeni)*
    - Inland Forest Bat (*Vespadelus baverstocki*), and
    - Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)

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.

Brown Treecreeper

Background searches for the Brown Treecreeper (eastern subspecies) returned 129 individual records within 10 kilometres of the proposal site. This species was also recorded in the study area on four separate occasions during the current surveys, twice in the proposed transmission line easement, once in Thurumbidgee Lagoon and once in the patch of Western Grey Box Woodland adjacent to the proposed transmission line easement.

The Brown Treecreeper is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range. It mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. It is usually not found in woodlands with a dense shrub layer. Fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. This species is sedentary, considered to be resident in most locations throughout its range, although some birds may disperse locally after breeding. Forages on invertebrates found on trunks and branches of trees, amongst fallen timber and spends much more time foraging on the ground and fallen logs than other treecreepers.

The Brown Treecreeper nests in small to medium – sized hollows in dead or live trees and stumps. It breeds in pairs or co-operatively in territories which range in size from 1.1 to 10.7 ha (mean = 4.4 ha). Male offspring are usually retained whilst female offspring usually disperse locally.

Approximately 47 small and 8 medium hollows will be removed due to the proposed transmission line easement, which are suitable nesting sites for the Brown Treecreeper. Additional trees with small hollows are likely along the proposal site, but are often difficult to detect. There are approximately 195 hollow-bearing trees within or adjacent to the Proposal Site that will not be affected by the works, which represent alternative habitat for the Brown Treecreeper.

Other trees within the Proposal Site with loose bark provide foraging habitat for the Brown Treecreeper, as does fallen timber. Overall, approximately 0.84 ha of native vegetation would be removed as a result of the proposed works.

Due to Brown Treecreeper nesting season occurring from late September to late October, it is noted that tree clearing should be avoided during these periods. However, due to the retention of a large number of hollows and hollow-bearing trees in the vicinity of the proposal site, the loss of the potential habitat as a result of the proposed transmission line easement and solar arrays is considered unlikely to interfere with the life cycle of these species such that any local populations would be placed at risk of extinction.

Microchiropteran Bats

Background searches for threatened microbats returned one record of microbat species, the Corben's Long-eared Bat, within 10 kilometres of the proposal site, although some records from the locality are known (discussed below). This is not unexpected due to the paucity of bat surveys that have been undertaken across most of NSW. The habitat evaluation table considers four species likely to occur within 10 km of the proposal site, including the Little Pied Bat, Corben's Long-eared Bat, Inland Forest Bat and the Yellow-bellied Sheathtail Bat. All four of these species were recorded within the proposal site using Anabat.

The Little Pied Bat is known to roost in trees, caves abandoned mines and buildings. Roost sites within caves are usually warm and dry but this species can withstand temperatures of up to 40^{o}C. Most colonies within caves contain less than ten individuals. There are no cave sites located within the study area. Favoured hollows for the Little Pied Bat include large mature trees with dead limbs and dead trees that have fallen over leaving a hollow stump. The species is known to roost alone and move roost location most days, although remain within the same general area (Churchill, 2008). This species was possibly recorded (5 poor quality calls, which were too difficult to accurately distinguish from other species) outside in patches of vegetation in the landscape surrounding the proposal site, but not within the proposal site itself. The Little Pied Bat has been recorded within the Strahorn State Forest, about 25 kilometres to the north-west of the proposal site. Although quite a distance away, this species is known to forage long distances from their roost sites (Penney, 2002). Six possible calls of this species in the proposal site

The Corben's Long-eared Bat is known to roost in a variety of tree species including Casuarinas, mallee, and box eucalypts. The species has been found to also roost in the fissures of tree branches and under dry sheets of bark that are still attached to the trunks of ring-barked trees. Tree hollows are usually used as maternity sites and range in opening size from 5-10cm. The species is more common in box/ironbark/cypress vegetation that occurs in a north-south belt along the western slopes and plains, consistent with the location of the study area. Calls of a Long-eared Bat (*Nyctophilus* sp.) were recorded both within and outside of the proposal site, but could not be accurately identified to species level, as there are two other Long-eared Bat species that may be found in the study area. It is more likely that one of the two common and widespread species was present within the study area. However, the Corben's Long-eared Bat has been recorded on the western edge of Goobang National Park,

approximately 10 kilometres from the proposal site. In a recent roosting study, individuals were found to move large distances on a nightly basis. Roost sites were on average 1.89 ± 1.61 kilometres (range 0.34–7.06 km) from the capture point. Individuals used a number of different roost sites within the time they were tracked. Most roosts were used for just a single day (1.3 ± 0.6 days) before the individual moved to a new roost site (Lumsden & Bennett 2006). A total of 57 definite calls for *Nyctophylus* were recorded within the proposal site.

The Inland Forest Bat roosts in hollows, fissures or cracks in live or dead trees, and roosts in abandoned buildings. Known to roost in very small hollows in stunted trees only a few metres high. The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including mallee, mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat. However, other habitats may be used for foraging and/or drinking. Colony size ranges from a few individuals to more than sixty. Females congregate to raise young in November and December, with young carried for the first week following birth. Young are independent by January. These bats fly rapidly and cover an extensive foraging area and are presumed to feed on flying insects. A total of 22 probable calls were recorded for this species within the proposal site.

The Yellow-bellied Sheathtail bat roosts in large tree hollows and in buildings. In treeless areas, the species has been known to utilise mammal burrows for roosting habitat. The Yellow-bellied Sheathtail Bat forages in most habitats across its range, however seasonal movements are unknown and there is speculation about the species migrating to southern Australia during colder months (Churchill, 2008). The study area thus supports suitable roosting habitat for this species. One definitively identified call of this species was recorded approximately 8 km from the study area, in a patch of high quality Inland Grey Box Woodland. There was also one unlikely but possible call recorded from within the study area. This species has also recently been recorded in 2013 along the Bogan River, about six kilometres west of the proposal site. One probable call of this species was recorded within the proposal site.

Approximately 47 small hollows will be removed by the proposal, which are suitable for tree-roosting microbats. Additional trees with small hollows are likely along the proposal site, but are often difficult to detect. There are at least 195 hollow-bearing trees within adjacent to the proposal site that will not be affected by the works, which represent alternative habitat for microbats.

Other trees within the proposal site with loose bark may provide roosting habitat for the Corben's Long-eared Bat. Overall, approximately 0.84 hectares of native vegetation would be removed as a result of the proposed works.

Due to female Inland Forest Bat congregating to raise young in November and December, with young carried for the first week following birth and becoming independent by January, it is noted that tree clearing should be avoided during these periods. However, due to the retention of a large number of hollows and hollow-bearing trees in the vicinity of the proposal site, the loss of the potential habitat as a result of the proposal is considered unlikely to interfere with the life cycle of these species such that any local populations 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.

Brown Treecreeper

N/A
Microchiropteran Bats
N/A

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.**
Brown Treecreeper
N/A
Microchiropteran Bats
N/A

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.**
Brown Treecreeper
i. Approximately 0.84 ha of native vegetation and up to ten hollow-bearing trees would be removed due to the proposed development. These trees include approximately 47 small and eight medium hollows which are suitable nesting sites for the Brown Treecreeper. There are also approximately 195 hollow-bearing trees within and adjacent to the proposal site that will be retained. Other trees with small hollows may also occur within the proposal site that were undetected due to the presence of obscure hollows. Trees with decorticating bark would also provide foraging habitat, as well as fallen timber. ii. Habitat within the proposal site is only marginally likely to become more fragmented as a result of the proposed works. This is due to the loss of scattered trees and trees on the edge of remnant patches that currently provide connectivity. Despite this, connectivity will largely be retained for mobile species such as birds and bats, all of which will still be able to traverse the landscape using the vegetation to be retained within and around the proposal site. Due to this, the proposed works are unlikely to isolate the Brown Treecreeper from any areas of habitat along the proposed transmission line easement. iii. The proposed transmission line easement provides suitable potential habitat for the Brown Treecreeper in an otherwise cleared landscape. The importance of this habitat to the long-term survival of this species is not considered to be high, due to the presence of equivalent and more well-connected vegetation patches in the surrounding landscape. The remnant patches and scattered trees to be retained within and adjacent to the proposal site do provide many mature hollow-bearing trees within a cleared agricultural landscape, with at least 473

hollows in approximately 195 hollow-bearing trees that will be retained within and adjacent to the proposal transmission line easement. Thus, the importance of the habitat to be removed is not considered high, and is unlikely to impact upon the survival of this species within the locality.

Microchiropteran Bats

i. Approximately 0.84 hectares of native vegetation and up to eight hollow-bearing trees would be removed as part of the proposed works. These trees include approximately 47 small hollows suitable for microbats proposed for removal. Microbats may also be present within larger hollows in hollow-bearing trees proposed for removal. There are also approximately 195 hollow-bearing trees within and adjacent to the proposal site that will be retained. Other trees with small hollows may also occur within the proposal site that were undetected due to the presence of obscure hollows. Trees with decorticating bark would also provide microbats with roosting habitat.

ii. Habitat within the proposal site is only slightly likely to become more fragmented as a result of the proposed works, due to the loss of scattered trees and trees on the edge of remnant patches that currently provide connectivity. Despite this, connectivity will largely be retained for the mobile species such as birds and bats, all of which will still be able to traverse the landscape using the vegetation to be retained within and around the proposal site. Due to this, the proposed works are unlikely to isolate any threatened microbat species from any areas of habitat along the proposal site.

iii. The proposal site provides suitable potential habitat for these threatened microbats in an otherwise cleared landscape. The importance of this habitat to the long-term survival of these species is not considered to be high, due to the presence of equivalent and more well-connected vegetation patches in the surrounding landscape. The remnant patches and scattered trees to be retained within and adjacent to the proposal site do provide many mature hollow-bearing trees within a cleared agricultural landscape, with at least 473 hollows in about 195 hollow-bearing trees will be retained within and adjacent to the proposal boundary. Thus the importance of the habitat to be removed is not considered high, and is unlikely to impact upon the survival of these species within the locality.

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

Brown Treecreeper

No areas of critical habitat have been declared for this species.

Microchiropteran Bats

No areas of critical habitat have been declared for these species.

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

Brown Treecreeper

An action or recovery plan has not been prepared for the Brown Treecreeper. However, a number of activities to assist this species have been listed. Those relevant to the proposed tree removal as a result of development of the PV array and the transmission line easement include:

- Do not allow removal of hollow-bearing dead or living trees and stumps on private and public lands.

The proposed transmission line easement will remove approximately ten hollow-bearing trees containing a total of 47 small and eight medium hollows. However, this loss of nesting habitat is considered negligible when considering the abundant tree hollows to be retained in the study area.

Microchiropteran Bats

The *Action Plan for Australian Bats* (Environment Australia 1999) lists the Little Pied Bat as near threatened. The recommended actions that are relevant to the proposed works include:

- Protection of known roosts.

Although the proposal site does not contain known roosts, it does contain potential roost sites for this species.

The *Action Plan for Australian Bats* (Environment Australia 1999) lists the Corben's Long-eared Bat as vulnerable. There are two recovery objectives, however they are not relevant to the proposed works.

There are not currently any Recovery Plans or Threat Abatement Plans for the Inland Forest Bat or Yellow-bellied Sheathtail-bat.

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.

Brown Treecreeper

A number of key threatening processes are relevant to the proposed transmission easement including:

- Clearing of native vegetation;
- Removal of dead wood and dead trees; and
- Loss of hollow-bearing trees.

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two ha in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off-site impacts such as downstream sedimentation. Given that 0.84 ha of native vegetation would be cleared as a result of the proposed transmission line easement, the proposal has only a small potential to increase the impact of this key threatening process.

Two to three dead trees and dead wood that occurs within the proposal site and transmission line easement would be removed. This has the potential to impact the Brown Treecreeper which utilises these features for foraging and nesting (hollows). As part of the mitigation measures, it has been recommended that fallen timber is retained and placed in adjacent areas. The removal of two to three dead standing trees within the proposed Development Envelope is unlikely to have a significant impact on the Brown Treecreeper, particularly if mitigation measures are implemented.

The PV Plant would remove up to ten hollow-bearing trees, containing 59 hollows within the proposal site. All of these trees may potentially be used by the Brown Treecreeper for nesting, although the 47 small and eight medium hollows are most likely to be used. The proposed development would thus contribute to this key threatening process. However, this loss of nesting habitat is considered negligible when considering the abundant tree hollows to be retained in the study area.

Microchiropteran Bats

A number of key threatening processes are relevant to the proposal including:

- Clearing of native vegetation;
- Removal of dead wood and dead trees; and
- Loss of hollow-bearing trees.

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off-site impacts such as downstream sedimentation. Given that 0.84 hectares of native vegetation would be cleared as a result of the proposal, the proposal has only a small potential to increase the impact of this key threatening process.

Dead trees and dead wood that occurs within the proposal site are also likely to be removed as part of the proposed works. This has the potential to impact any microbats that utilise these features to roost. As part of the mitigation measures, it has been recommended that fallen timber is retained and placed in adjacent areas. The removal of two to three dead standing trees within the proposal site is unlikely to have a significant impact on these threatened microbats, particularly if mitigation measures are followed.

The proposed works would remove up to ten hollow-bearing trees, containing 59 hollows within the proposal site. All of these trees may potentially harbour microbats (including threatened species), although the 47 small hollows that particularly suit some microbat species are most likely. The proposed works would thus contribute to this key threatening process.

Conclusion

The Assessment of Significance has concluded that the proposal is unlikely to have a significant impact on the Brown Treecreeper (eastern subspecies) or the Microchrioptereran Bat species, Little Pied Bat, Corben's Long-eared Bat, Inland Forest Bat or the Yellow-bellied Sheathtail Bat. The proposal is considered unlikely to:

- Reduce the long-term viability of this threatened species.
- Accelerate the extinction of this species or place it at risk of extinction; or
- Adversely affect breeding and foraging habitat.

Safeguards have been proposed that include the removal of hollow bearing trees during seasons that are unlikely to affect the species breeding and nesting, and the replacement of removed hollows with nest boxes through the preparation of a Nest Box Management Strategy.

A.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT PRINCIPAL SIGNIFICANT IMPACT ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act* 1999 specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The following assessment assesses the significance of the likely impacts associated with the proposed works on:

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

a) Will the action lead to a long-term decrease in the size of a population of a species?
Corben's Long-eared Bat
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. Recent studies have shown that this species will use a large number of different roost sites, usually for a single day before moving onto another roost site. The Corben's Long-eared Bat moves large distances 1.91 ± 1.86 km (range 25 m - 5.88 km) between consecutive roosts. A recent study found that not all individuals were located every day despite extensive searching, suggesting that they were using even larger home ranges, incorporating areas outside the area that could be regularly searched (Schulz & Lumsden 2010). The nearest record for this species is located over 10 km to the south-west of the proposal site. However the species is also known to travel long distances during foraging activities. A substantial food source for this species comes from the eucalypt trees in which it dwells (Lumsden & Bennett 2000). The proposal site provides this resource. The species is also known to travel large distances on a nightly basis, using different roost sites. The proposal site does not contain an important population of the Corben's Long-eared Bat.
b) Will the action reduce the area of occupancy of the species?
Corben's Long-eared Bat
The proposal site does not contain an important population of the Corben's Long-eared Bat.
c) Will the action fragment and existing population into two or more populations?
Corben's Long-eared Bat
The proposal site does not contain an important population of the Corben's Long-eared Bat.
d) Will the action adversely affect habitat critical to the survival of a species?
Corben's Long-eared Bat
No areas of critical habitat have been declared for these species.
e) Will the action disrupt the breeding cycle of a population?
Corben's Long-eared Bat
The proposal site does not contain an important population of the Corben's Long-eared Bat.

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

Corben's Long-eared Bat

Approximately ten hollow-bearing trees, containing 47 small hollows (< 10 cm), suitable for the Corben's Long-eared Bat, would be removed as part of the proposed works. Additional trees with small hollows are likely within the proposal site, but are often difficult to detect. A remaining 195 hollow-bearing trees occur within or adjacent to the proposal site which would not be impacted by the proposed works. Other trees within the proposal site with loose bark may also provide roosting habitat for the Corben's Long-eared Bat. Overall, approximately 0.84 hectares of native vegetation would be removed as a result of the proposed works. While this species was not definitively identified during field surveys it does have the potential to occur. The removal of approximately 47 small hollows and 0.84 hectares of the available habitat for this species is not considered likely to decrease the availability of habitat to the extent that the species could decline.

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

Corben's Long-eared Bat

Bats have been recorded being evicted from tree hollows by feral species, including the Common Starling (*Sturnus vulgaris*). The proposed works are unlikely to result in an increase in the abundance of species such as the Common Starling.

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

Corben's Long-eared Bat

There is no record of diseases that may cause the Corben's Long-eared Bat to decline.

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

Corben's Long-eared Bat

The *Action Plan for Australian Bats (*Environment Australia 1999*)* lists the Corben's Long-eared Bat as Vulnerable. There are two recovery objectives, however they are not relevant to the proposed works.

Conclusion

The proposed vegetation removal (including approximately 0.84 hectares of native vegetation and ten hollow-bearing trees with 47 small hollows) within the proposal site is unlikely to significantly impact a population of Corben's Long-eared Bat, due to the availability of alternative suitable (or higher quality) habitat within the surrounding landscape.

APPENDIX B THREATENED SPECIES EVALUATIONS

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for the Forbes LGA and a 10km radius of the proposed area in the *Atlas of NSW Wildlife*[1] and those identified as potentially occurring in a 10km radius area according to the Commonwealth EPBC *Protected Matters Search Tool*[2].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the Study Area

Marginal: Some suitable habitat is present within the Proposal Site.

Absent: No potential or known habitat is present within the Study Area

Likelihood of occurrence

None: Species / EEC does not occur at the Proposal Site.

Unlikely: Species known or predicted within the locality but unlikely to occur in the Study Area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species

Yes: The proposal could impact this species or its habitats. An AOS has been applied to these entities.

TSC-V Listed as Vulnerable under the Threatened Species Conservation Act

TSC-E Listed as Endangered under the Threatened Species Conservation Act

TSC-EEC Listed as an Endangered Ecological Community under the Threatened Species Conservation Act

TSC-EP Listed as an Endangered Population under the Threatened Species Conservation Act

EPBC-V Listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act

EPBC-E Listed as Endangered under the Environment Protection and Biodiversity Conservation Act

[1] The *Atlas of NSW Wildlife* is administered by the NSW Department of Environment, Climate Change and Water (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment, Water, Heritage and the Arts.

EPBC-EEC	Listed as an Endangered Ecological Community under the Environment Protection and Biodiversity Conservation Act
EPBC-CEEC	Listed as a Critically Endangered Ecological Community under the Environment Protection and Biodiversity Conservation Act
EPBC – Ma	Listed as Marine Species under the Environment Protection and Biodiversity Conservation Act
EPBC – Mi	Listed as Migratory Species under the Environment Protection and Biodiversity Conservation

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
FAUNA							
Amphibians							
Crinia sloanei Sloane's Froglet		V	A small ground-dwelling frog. Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. The closest record to the Site is from Goobang National Park in 1998. At a number of sites where records are verified by museum specimens, the species has not been subsequently detected during more recent frog surveys in the vicinity (e.g. Holbrook, Nyngan, Wagga Wagga and Tocumwal). The low number of sites, low number of recorded individuals per site, and the low proportion of records of this species in regional surveys all indicate that a moderately low number of mature individuals exist. This indicates that this is not just a rare or uncommonly encountered species, but that there has been a reduction in population size and range. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats. Typically breeds in ephemeral wetlands, or periodically inundated areas of permanent wetlands, in grasslands, woodlands, and disturbed environments. Shelters in any vegetation, ground debris, or cracks in the soil that would provide suitable refuge. Best detected in winter after 60mm of rain.	0	Yes – irregularly inundated floodplains present in the study area.	Unlikely – no records within 10 km and floodplain area will not be impacted.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Litoria raniformis Southern Bell Frog	V		In the past, the Growling Grass Frog was distributed across a large area of south-east Australia, including Tasmania, at altitudes of up to 1300 m. The Growling Grass Frog's range has declined over time with the most pronounced decline evident in NSW. The species has disappeared from a number of sites along the Murrumbidgee River and there are no recent records from the Monaro district near the Victorian border.The species once occurred throughout the Southern Tablelands and was also recorded on the Central Tablelands as far north as Bathurst. In NSW and the ACT, the range of the species was centred on the Murray and Murrumbidgee River valleys and their tributaries. The species is currently widespread throughout the Murray River valley (Mahony 1999) and has been recorded from six Catchment Management Areas in NSW: Lower Murray Darling, Murrumbidgee, Murray, Lachlan, Central West and South East.	0	Yes – irregularly inundated floodplains present in the study area.	Unlikely – no records within 10 km and floodplain area will not be impacted.	No
Birds							
Actitus hypoleucos Common Sandpiper		Ma, Mi	Widespread east of the Great Dividing Range; sparsely scattered in Western and Plains regions of NSW. Occurs along shallow, pebbly, muddy or sandy edges of rivers and streams, coastal to far inland; dams, lakes, sewage ponds; margins of tidal rivers; waterways in mangroves or saltmarsh; mudflats; rocky or sandy beaches; and on man-made structures such as causeways, street gutters, drains and riverside lawns.	2	Marginal	Possible – low likelihood, rare visitor - particularly during	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
						flood events	
Anseranas semipalmata Magpie Goose	V		The Magpie Goose is still relatively common in the Australian northern tropics, but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	7	Yes	Possible – particularly during flood events	No – Negligible habitat loss.
Anthochaera phrygia Regent Honeyeater	CE	E, Mi	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests. The species	1	Yes	Possible	No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises *E. microcarpa, E. punctata, E. polyanthemos, E. mollucana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea,* and *Angophora floribunda*. Nectar and fruit from the mistletoes *A. miquelii, A. pendula* and *A. cambagei* are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. A shrubby understorey is an important source of insects and nesting material. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria.				
Apus pacificus Fork-tailed Swift		Ma, Mi	This species breeds in the north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara and Eucla in November and in the south-west land division in mid-	3	Marginal – broad habitat	Possible – low likelihood,	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			December, and leaving by late April. It is common in the Kimberley, uncommon to moderately common near north-west, west and southeast coasts and rare to scarce elsewhere. They never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks.		preference, mostly aerial	but may be a rare visitor	
Artamus cyanopterus cyanopterus Dusky Woodswallow	V		Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range.	0	Yes	Possible	Construction, No
Botaurus poiciloptilus Australasian Bittern	E	E	In NSW, this species occurs along the coast and is frequently recorded in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Occurs in permanent freshwater wetlands with tall, dense vegetation. Favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, , Bolboschoenus*) or cutting grass (*Gahnia*) growing over muddy or peaty substrate. Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds. In Australia, the Bittern occurs with the Australian Painted Snipe *Rostratula benghalensis australis.*	3	Yes	Possible - particularly during flood events	Construction, No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Burhinus grallarius Bush Stone-curlew	E		The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	7	Yes	Possible	Construction, No – Negligible habitat loss.
Calidris acuminate Sharp-tailed Sandpiper		Ma, Mi	Prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches. Its breeding habitat in Siberia is the peat-hummock and lichen tundra of the high Arctic.	2	Yes	Possible - particularly during flood events	No
Calidris ferruginea Curlew Sandpiper	E	Mi	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh. This species does not breed in Australia. This species	1	Yes	Possible - particularly during flood events	Construction, No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.				
Calidris melanotus Pectoral Sandpiper		Ma, Mi	In Australasia, prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Also occasionally found further inland, preferring wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire.	2	Yes	Possible - particularly during flood events	No
Calyptorhynchus lathami Glossy Black-Cockatoo	V		The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. In the Riverina area, inhabits open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill.	1	Marginal – Proposal site is on edge of known distribution. No She-oaks present.	Unlikely	No
Certhionyx variegatus Pied Honeyeater	V		Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Occasionally occurs further east, on the slopes and plains and the Hunter Valley, typically during periods of drought. Inhabits wattle shrub (primarily Mulga, *Acacia aneura*), mallee, spinifex and eucalypt woodlands,	1	Yes	Possible	Construction, No –

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (*Eremophila* spp.); also from mistletoes and various other shrubs (e.g. *Brachysema* spp. and *Grevillea* spp.); also eats saltbush fruit, berries, seed, flowers and insects. Highly nomadic, following the erratic flowering of shrubs; can be locally common at times. Constructs a relatively large cup-shaped nest, usually robust, although occasionally loose, constructed of grasses and fine twigs, bound with spider webs, in the fork of a shrub or tree up to 5 m above the ground.				Negligible habitat loss.
Chthonicola sagittata Speckled Warbler	V		Has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100 ha survive. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside. Some cooperative breeding occurs. The species may act	136	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			as host to the Black-eared Cuckoo. Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills.				
Cinclosoma castanotum Chestnut Quail-thrush	V		In NSW it seems to occur almost exclusively in mallee habitats, with understorey dominated by spinifex, chenopods or other shrubs including Acacia species. Only rarely, such as in Cocoparra NP, is it recorded in other types of woodland, and in these areas a dense understorey may be a prerequisite. Occupies vegetation with a wide range of fire histories, though appears to occur at highest densities in areas two to fifteen years post fire. These birds forage on the ground, often among spinifex clumps, on a wide range of invertebrates (including grasshoppers, bugs, beetles, flies, caterpillars and ants), seeds of both native and introduced species and, more rarely, fruits. Its nest is a depression in the ground lined with strips of bark, fine grass or sticks, placed near a mallee trunk, against a fallen branch, under a low bush or in a sparse tuft of grass.	1	Absent	None	No
Circus assimilis Spotted Harrier	V		The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals (e.g.	10	Present – wide-ranging species	Occurs – identified in proposal site	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.				
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V		Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of *Climacteris picumnus victoriae* runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper *Climacteris picumnus picumnus* which then occupies the remaining parts of the state. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. The population density of this subspecies has been greatly reduced over much of its range, with major declines recorded in central NSW and the northern and southern tablelands. Declines have occurred in remnant vegetation fragments smaller than 300 hectares that have been isolated or fragmented for more than 50 years. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging;	129	Present	Occurs – identified in proposal site	Construction, potential breeding habitat could remove as a result of transmission line development.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.				
Daphoenositta chrysoptera Varied Sittella	V		The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	5	Present – rough-barked trees relatively common within the proposal site.	Possible	Construction, No – Negligible habitat loss.
Drymodes brunneopygea Southern Scrub-robin	V		This species is restricted to mallees and shrublands across southern Australia and in NSW is confined to two main areas. The first is in central NSW (the proposal site) and is centred on Round Hill and Nombinnie Nature Reserves, though suitable habitat probably exists on adjoining leasehold lands. This population once extended south and east to near Griffith and West Wyalong, but clearing appears to have led to its local extinction in most of this region. Inhabits mallee and acacia scrub, particularly with dense sub-shrubs in the understorey, including Broombush and other dry shrubs. Occupies vegetation with a post fire age of 4-80 years, but is most abundant in areas with a post fire age of 26-40 years as dependent on a well-developed shrub layer. Forages around the base of mallee trees and on the ground beneath shrubs for ground- and litter-dwelling invertebrates, with certain ant species dominating. Constructs a shallow cup-shaped nest of twigs, bark and grass,	1	Absent	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			which is normally located on the ground and usually concealed in the shelter of a tree, shrub or fallen branch. This species usually has a clutch of only one egg.				
Epthianura albifrons White-fronted Chat	V		The White-fronted Chat is found in damp open habitats, particularly wetlands containing saltmarsh areas that are bordered by open grasslands or lightly timbered lands. Along the coastline, White-fronted Chats are found in estuarine and marshy grounds with vegetation less than 1 m tall. The species is also observed in open grasslands and sometimes in low shrubs bordering wetland areas. Inland, the White-fronted Chat is often observed in open grassy plains, saltlakes and saltpans that are along the margins of rivers and waterways. The species is sensitive to human disturbance and is not found in built areas.	6	Yes	Possible	Construction, No – Negligible habitat loss.
Falco hypoleuco Grey Falcon	E		The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or	12	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid.				
Falco subniger Black Falcon	V		Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. Usually associated with streams or wetlands, visiting them in search of prey and often using standing dead trees as lookout posts. Habitat selection is generally influenced more by prey densities than by specific aspects of habitat floristics or condition, although in agricultural landscapes the Black Falcon tends to nest in healthy, riparian woodland remnants with a diverse avifauna. Feeds mostly on other birds, especially flocking, ground-feeding granivores such as pigeons and parrots, but also some small mammals, large insects and occasionally carrion. Home range is likely to be more than 100 km^2.	10	Yes	Possible	Construction, No – Negligible habitat loss.
Gallinago hardwickii Latham's Snipe		Ma, Mi	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's Snipe does not breed within Australian jurisdiction. Latham's Snipe is an omnivorous species that feeds on seeds and other plant material (mainly from species in	2	Present	Possible - particularly during flood events	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			families such as Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae), and on invertebrates including insects (mainly flies and beetles), earthworms and spiders and occasionally molluscs, isopods and centipedes.				
Glossopsitta pusilla Little Lorikeet	V		The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina. Nesting season extends from May to September.	3	Yes	Possible	Construction, No – Negligible habitat loss.
Grantiella picta Painted Honeyeater	V		Nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland.	5	Yes	Possible	Construction, No –

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches**.**				Negligible habitat loss.
Grus rubicunda Brolga	V		Formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. They feed using their heavy straight bill as a 'crowbar' to probe the ground or turn it over, primarily on sedge roots and tubers. They will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water. Two eggs are laid from winter to autumn.	5	Yes	Possible - particularly during flood events	Construction, No – Negligible habitat loss.
Haliaeetus leucogaster White-bellied Sea-Eagle		Mi	White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. Birds form permanent pairs that inhabit territories throughout the year. Their loud "goose-like" honking call is a familiar sound, particularly during the breeding season. Birds are normally seen, perched high in a tree, or soaring over waterways and adjacent land. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India. The White-bellied Sea-Eagle feeds mainly off aquatic animals,	5	Marginal	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter, and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline. They harass smaller birds, forcing them to drop any food that they are carrying. Sea-Eagles feed alone, in pairs or in family groups. White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30m above the ground, but may be also be placed on the ground or on rocks, where there are no suitable trees. At the start of the breeding season (May to October), the nest is lined with fresh green leaves and twigs. The female carries out most of the incubation of the two white eggs, but the male performs this duty from time to time.				
Hamirostra melanosternon Black-breasted Buzzard	V		The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands. Not a powerful hunter, despite its size, mostly taking reptiles, small mammals, birds, including nestlings, and carrion. Also specialises in feeding on large eggs, including those of emus, which it cracks on a rock. Breeds from August to October near water in a tall tree. The stick nest is large and flat and lined with green leaves. Normally two eggs are laid.	3	Yes	Possible	Construction, No – Negligible habitat loss.
Hieraaetus morphnoides	V		The Little Eagle is a medium-sized bird of prey that is found throughout the Australian mainland excepting the most densely forested parts of the	7	Yes	Possible	Construction, No –

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Little Eagle			Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.				Negligible habitat loss.
Haliaeetus leucogaster White-bellied Sea-Eagle		Mi	White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. Birds form permanent pairs that inhabit territories throughout the year. Their loud "goose-like" honking call is a familiar sound, particularly during the breeding season. Birds are normally seen, perched high in a tree, or soaring over waterways and adjacent land. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India. The White-bellied Sea-Eagle feeds mainly off aquatic animals, such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter, and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline. They harass smaller birds, forcing them to drop any food that they are carrying. Sea-Eagles feed alone, in pairs or in family groups. White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30m above the ground, but may be also be placed on the ground or on rocks, where there are no suitable trees. At the start of the breeding season (May to October), the nest is lined with fresh green leaves and twigs. The female carries out most of the incubation of the two white eggs, but the male performs this duty from time to time.	5	Marginal	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Hylacola macrorhyncha Shy Heathwren	V		Occurs across southern Australia extending from the wheatbelt in southern Western Australia east to central NSW, including Kangaroo Island. Two sub-species occur in NSW. The first (*macrorhyncha*) is confined to central NSW between Griffith, Roto, Nymagee and West Wyalong (including the proposal site), with most records within OEH managed reserves (including Yathong, Nombinnie, Round Hill and The Charcoal Tank Nature Reserves and Cocoparra National Park). Inhabits mallee woodlands with a relatively dense understorey of shrubs and heath plants. The central NSW population (for example in Cocoparra NP) also occurs at low densities in rocky hilltop vegetation with a thick shrub layer such as Broombush or Tea-tree. Appears to occur in all age classes of vegetation, though believed to prefer either one to five years following fire when the resprouting eucalypts provide dense vegetation cover or in long unburnt (greater than 40 years) areas which have a well developed shrub layer. Feeds on the ground, almost entirely on insects (cockroaches, grasshoppers, bugs, lerps, beetles, caterpillars, moths, ants, spiders and insect eggs) and rarely on seeds, including those of saltbush. Breeds late winter to early summer and builds a dome-shaped nest in a concealed location on the ground, using a variety of plant materials. Generally occurs singly or in pairs, where it can be secretive, keeping within dense vegetation. In spring, males may sing from the top of low shrubs.	1	No	Unlikely	No
Lathamus discolour Swift Parrot	E	E	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering	8	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. Return to home foraging sites on a cyclic basis depending on food availability.				
Leipoa ocellata Malleefowl	E	V	The stronghold for this species in NSW is the mallee in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. The population in central NSW has been significantly reduced through land clearance and fox predation and now occurs chiefly in Yathong, Nombinnie and Round Hill NRs and surrounding areas, though birds continue to survive in Loughnan NR. To the south of this area the species is probably locally extinct in such reserves as Pulletop NR (last recorded 1989), Ingalba NR (1982) and Buddigower NR (1990) and the intensely studied population at Yalgogrin was, in 2003, predicted to be locally extinct by 2008 (although this has not been confirmed). Further east, a population continues to persist in the Goonoo forest near Dubbo. Outside these areas, occasional records have been made in the Pilliga forests (most recently 1999), around Cobar (1991) and Goulburn River NP (1989) though the extent and status of populations in these areas are unknown. Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated	1	Marginal – less frequently found in woodland	Unlikely – susceptible to fox predation and unlikely to occur in fragmented landscape	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers. A pair may occupy a range of between 50 and 500 ha, overlapping with those of their neighbours. Mainly forage in open areas on seeds of acacias and other native shrubs (*Cassia, Beyeria, Bossiaea*), buds, flowers and fruits of herbs and various shrubs, insects (cockroaches, ants, soil invertebrates), and cereals if available. Incubate eggs in large mounds that contain considerable volumes of sandy soil.				
Limosa limosa Black-tailed Godwit	V		Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars. Frequently recorded in mixed flocks with Bar-tailed Godwits.	1	Marginal – primarily a coastal species	Unlikely - possibly during flood events	No
Lophochroa leadbeateri Major Mitchell's Cockatoo	V		Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Normally found in pairs or small groups, though flocks of hundreds may be found	2	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			where food is abundant. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.				
Lophoictinia isura Square-tailed Kite	V		The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km^2. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	1	Yes	Possible	Construction, No – Negligible habitat loss.
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	V		Common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form is found from Brisbane to Adelaide throughout much of inland NSW, with the exception of the north-west. The species is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. Prefers lightly	11	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season. May breed any time between July and November, often rearing several broods. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.				
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	V		The subspecies is widespread, from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond River district. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*) and Forest Red Gum (*Eucalyptus tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. A gregarious species usually seen in pairs and small groups of up to 12 birds. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside	11	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			of branches and trunks, probing for insects. Breeds solitarily or co-operatively, with up to five or six adults, from June to December. The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest. Two or three eggs are laid and both parents and occasionally helpers feed the young.				
Myiagra cyanoleuca Satin Flycatcher		Mi	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring. The Satin Flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy.	1	Absent	Unlikely	No
Neophema pulchella Turquoise Parrot	V		The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows,	32	Yes	Possible	No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.				
Ninox connivens Barking Owl	V		Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large *Eucalypts*. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*Eucalyptus albens*), (Red Box) *Eucalyptus polyanthemos* and Blakely's Red Gum (*Eucalyptus blakelyi*). Breeding occurs during late winter and early spring.	2	Yes	Possible	Construction, No – Negligible habitat loss.
Numenius madagascariensis Eastern Curlew		CE	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. Eastern Curlews are rarely recorded inland. In NSW the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast.The Eastern Curlew breeds in Russia and north-eastern China but its distribution is poorly known. During the non-breeding season a few birds occur in southern Korea and China, but most spend the non-breeding season in north, east and south-east Australia	0	Absent	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Oxyura australis Blue-billed Duck	V		The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached. Blue-billed Ducks will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed. Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes.	12	Yes	Possible - particularly during flood events	Construction, No
Pachycephala inornata Gilbert's Whistler	V		Sparsely distributed over much of the arid and semi-arid zone of inland southern Australia, from the western slopes of NSW to the Western Australian wheatbelt. The eastern population extends from the central NSW mallee (Yathong, Nombinnie and Round Hill NRs), south and east through the Cocoparra Range to Pomingalama Reserve (near Wagga Wagga) then north through the South West Slopes east as far as Cowra and Burrendong Dam, to	10	Absent – prefers mallee shrublands	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			the Goonoo reserves (with scattered records as far north as Pilliga). The north western limits of this population are poorly known, with records from as far west as Cobar and recent records from Quanda NR, though records further west may be due to confusion with the Golden Whistler. In a number of reserves in this area there have been no recent records (last records from Pulletop NR 1982, Pomingalama Reserve 1995 and Ingalba NR 1999) and this species may be locally extinct. Occasional records are also made of this species in the Capertee Valley. The species is also recorded in River Red Gum forests along the Murray River valley between Mathoura and Wentworth, with the eastern populations (between Mathoura and Barham) apparently isolated from other NSW populations. The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Within the mallee the species is often found in association with an understorey of spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth *Callitris* pine. Parasitic 'cherries' (*Exocarpus* species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised. The Gilbert's Whistler forages on or near the ground in shrub thickets and in tops of small trees. Breeding takes place between August and November. Nests are usually built below about two and a half metres (but up to six metres) above the ground in the fork of dense foliage of plants such as				

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			wattles or cypress pines. At Cowra three pairs nested in a 25 ha area. The nest is either a lined cup or sometimes birds use the old nests of other species, particularly disused babblers' nests.				
Pandion cristatus Eastern Osprey	V	Ma, Mi	Favours coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Nests are located high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	3	Absent	Unlikely	No
Pandion haliaetus Osprey	V		The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. The total range (breeding plus non-breeding) around the northern coast is more widespread, extending from Esperance in Western Australia to NSW, where records become scarcer towards the south, and into Victoria and Tasmania, where the species is a rare vagrant The distribution of the species around the northern coast (south-western Western Australia to south-eastern NSW) appears continuous except for a possible gap at Eighty Mile Beach.	0	Absent	Unlikely	No
Petroica boodang Scarlet Robin	V		Found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains	3	Yes	Possible	Construction, No –

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. Primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.				Negligible habitat loss.
Petroica phoenicea Flame Robin	V		Endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation	4	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas. Birds forage from low perches, from which they sally or pounce onto small invertebrates which they take from the ground or off tree trunks, logs and other coarse woody debris. Flying insects are often taken in the air and sometimes gleans for invertebrates from foliage and bark. In their autumn and winter habitats, birds often sally from fence-posts or thistles and other prominent perches in open habitats.				
Polytelis swainsonii Superb Parrot	V	V	Found throughout eastern inland NSW. On the South-western Slopes their core breeding area is to the south of the site, roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. It is estimated that there are less than 5000 breeding pairs left in the wild. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. Breeding pairs, no sign of breeding was not observed at the site, only foraging behaviour. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Because the Superb Parrots often use different habitats for different activities, the timing of their occurrence in	23	Yes	Present – observed within the proposal site.	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			each habitat may vary with the time of year. Between mid-January and early April, Superb Parrots do not use the River Red Gum breeding habitats on the Edward and Murrumbidgee Rivers, and their whereabouts at this time is unknown. Between April and August, they inhabit forests and woodlands dominated by River Red Gum, box-gum, White Cypress Pine (*Callitris glaucophylla*) and Boree. Nest in small colonies, often with more than one nest in a single tree. Breed between September and January. May forage up to 10 km from nesting sites, primarily in grassy box woodland. When foraging on the ground, Superb Parrots often eat the seeds of plants such as the native Ringed Wallaby-grass (*Danthonia caespitosa*), barley-grasses (*Critesion*), as well as cereal crops including wheat, oats and canola (*Brassica napus*); and spilt grain. They also eat the seed-pods of many understorey species of wattles such as Gold-dust Wattle (*Acacia acinacea*), Silver Wattle (*A. dealbata*) and Deane's Wattle (*A. deanei*) and cultivated Cootamundra Wattle (*A. baileyana*). When foraging in the forest canopy, Superb Parrots eat the flowers and fruits of eucalypts, especially in spring and summer, the berries of mistletoe, such as Box Mistletoe (*Amyema miquelii*) and Grey Mistletoe (*A. quandang*), and, in winter, lerps from the foliage of eucalypts.				
Pomatostomus temporalis temporalis Grey-crowned Babbler (eastern subspecies)	V		Occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Birds are generally unable to cross large open	40	Yes	Present – observed within and outside proposal site.	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			areas. Live in family groups that consist of a breeding pair and young from previous breeding seasons. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Breed between July and February. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year.				
Rostratula australis Australian Painted Snipe	E	V, Mi	Little is known of the ecology, habitat requirements and reproductive biology of Australian Painted Snipe. They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Females, which are larger and more brightly coloured than males, are thought to sometimes be polyandrous, mating with several males and leaving each one to incubate and raise chicks. They lay 3-4 eggs per clutch and incubation lasts about 15-16 days. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. This may suggest the species is nomadic but the extent to which its cryptic behaviour may contribute to this belief is uncertain. The birds are able to remain hidden in rank vegetation, but many reports are of birds not being secretive, but rather still and unobtrusive. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and	3	Yes	Possible - particularly during flood events	Construction, No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Forages nocturnally on mud flats and in shallow water. Breeding is often in response to local conditions; generally occurs from September to December.				
Stagonopleura guttata Diamond Firetail	V		The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia. Groups separate into small colonies to breed, between August and January. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Usually encountered in flocks of between five to 40 birds, occasionally more. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's	28	Yes	Possible	Construction, No – Negligible habitat loss.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. Appears to be sedentary, though some populations move locally, especially those in the south. Has been recorded in some towns and near farm houses.				
Stictonetta naevosa Freckled Duck	V		The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. The largest numbers of Freckled Ducks occur in brackish to hyposaline wetlands that are densely vegetated with Lignum. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nesting usually occurs between October and December but can take place at other times when conditions are favourable. Nests are usually located in dense vegetation at or near water level.	13	Yes	Possible - particularly during flood events	Construction, No
Tringa nebularia Common Greenshank		Ma, Mi	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	3	Yes	Possible - particularly during	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
						flood events	
Fish							
Maccullochella peelii peelii Murray Cod		V	Grow up to a maximum size of 1200mm. Found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Murray cod are able to live in a wide range of habitats from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The most common components of adult cod's diet include crustaceans such as yabbies, shrimp and crayfish, and fish such as the introduced common carp, goldfish and redfin perch, and the native fish bony herring, catfish, golden perch, western carp gudgeon and even other cod. It appears that Murray cod prefer protected spawning sites, and typically spawn large (3.0-3.5mm diameter) adhesive eggs onto firm substrates such as hollow logs, rocks, pipes and clay banks, from spring to early summer.	0	Absent	Unlikely	No
Macquaria australasica Macquarie Perch	E	E	Macquarie perch grow to a maximum size of 400mm. They are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. The conservation status of the different populations is not well known, but there have been long-term declines in their abundance. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries. They are quiet, furtive fish that feed on aquatic insects,	0	Absent	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			crustaceans and molluscs. Sexual maturity occurs at two years for males and three years for females. Macquarie perch spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed.				
Mammals							
Chalinolobus picatus Little Pied Bat	V		The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Can tolerate high temperatures and dryness but need access to nearby open water. Feeds on moths and possibly other flying invertebrates.		Yes	Yes – 2 possible recordings	Yes
Dasyurus maculatus Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground. The home-range of this species is unknown, but estimates are between 800ha and 20km^2. Usually traverse their ranges along densely vegetated creeklines. They need suitable den sites and abundant food, requiring large areas of intact vegetation for foraging. Use 'latrine sites', often on flat rocks among boulder fields and rocky cliff-	0	Marginal – proposal site is west of its known distribution. No caves or	Unlikely – low likelihood of occurrence along roadside reserve in fragmente	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			faces; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl.		rocky crevices.	d landscape	
Nyctophilus corbeni Corben's Long-eared Bat	V	V	Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. It can be found in the Hunter Valley, extending from central NSW to the eastern Hunter Valley coast. Records also indicate populations in River Red Gum, *Eucalyptus camaldulensis,* forests along the Murray River. In the Hunter Valley, NSW, the species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks. It has primarily been recorded in moister woodland of various eucalypt species with a distinct shrub layer frequently adjacent to watercourses. There are a small number of records from closed forest adjacent to dry sclerophyll woodlands; in Araucarian notophyll vine forest in the Bunya Mountains and in semi evergreen vine thickets on the banks of the Dawson River and in the Brigalow Belt Bioregion. Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Schulz and Lumdsden (2010) DoE SPRAT Profile) found that roost sites were on average 1.89 ± 1.61 km (range 0.34–7.06 km) from the capture point. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially	0	Present	Possible – Definite recordings of *Nyctophilus* sp.	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			caterpillars and beetles - and will even hunt on the ground. Mating takes place in autumn with one or two young born in late spring to early summer.				
Petaurus norfolcensis Squirrel Glider	V		The Squirrel Glider is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland. The species is found inland as far as the Grampians in Victoria and the Pilliga and the Coonabarabran areas of NSW. Inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. In NSW, potential habitat includes Box-Ironbark forests and woodlands in the west, the River Red Gum forests of the Murray Valley and the eucalypt forests of the northeast. Requires abundant hollow-bearing trees and a mix of eucalypts, acacias and banksias. Nightly movements are estimated at between 300 and 500 m. Home-ranges have been estimated at between 0.65 and 8.55ha. Smooth-barked eucalypts are preferred as these eucalypts form hollows more readily than rough-barked and support a greater diversity of invertebrates. Squirrel Glider's forage in the upper and lower forest canopies and in the shrub understorey.	1	Marginal – proposal site west of known distribution.	Unlikely – not detected during spotlight surveys and no records from within 10 km.	No
Phascolarctos cinereus Koala	V	V	Occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains. Examples of important shelter trees are cypress pine and brush box. The quality of forest and woodland communities	0	Present – secondary feed trees common within proposal site.	Unlikely – no recordings within 50km of proposal site.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			as habitat for koalas is influenced by a range of factors, such as; species and size of trees present; structural diversity of the vegetation; soil nutrients; climate and rainfall; size and disturbance history of the habitat patch. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Breeding season for the koala peaks between September and February.				
Pteropus poliocephalus Grey-headed Flying-fox	V	V	Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source, often in stands of riparian rainforest, Paperbark or Casuarina forest, and are commonly found in gullies, close to water, or in vegetation with a dense canopy. Forage on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia,* and fruits of rainforest trees and vines. Travel up to 50 km to forage. Annual mating commences in January and a single young is born each October or November. Site fidelity to camps is high with some camps being used for over a century.	0	Marginal	Unlikely	No
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V		The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts	0	Present – wide ranging species.	Possible – 1 possible recorded call.	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.				
Vespadelus baverstocki Inland Forest Bat	V		Because of the difficulty of identification, the distribution of this species, particularly in NSW, is very poorly known. Believed to occur widely in all the mainland states, generally in areas with annual rainfall less than 400 millimetres. In Victoria it is confined to the extreme north west. In NSW it has been most regularly captured in the far south west, north from the Murray River to Menindee, and at least as far east as the Balranald-Ivanhoe Road. There is some evidence to suggest that this species also occurs in the central NSW mallee, centred on Nombinnie Nature Reserve, although there has been very little recent survey in this part of the state. There are also records just south of the Queensland border around the Culgoa River, though whether this connect with the other NSW populations, or is the southern extent of a northern population is unknown. There are records further east in NSW but the identification of these records have not been confirmed. There are relatively few records any *Vespadelus* species in the north west of NSW and so whether this species does occur here is unknown. Some of the gaps in knowledge on the distribution on this and other bat species in western NSW probably reflects the lack of survey effort in most of this region. Roosts in hollows, fissures or cracks in live or dead trees, and roosts in abandoned	0	Present	Present – 21 probable recorded calls	Yes

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			buildings. Known to roost in very small hollows in stunted trees only a few metres high. The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including mallee, mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat. However, other habitats may be used for foraging and/or drinking. Colony size ranges from a few individuals to more than sixty. Females congregate to raise young in November and December, with young carried for the first week following birth. Young are independent by January. These bats fly rapidly and cover an extensive foraging area and are presumed to feed on flying insects.				
Reptiles							
Aprasia parapulchella Pink-tailed Legless-lizard	V	V	Only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows. It is thought that this species	0	Absent – outside species known and predicted distribution. No Kangaroo Grass at site	Unlikely	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			lays 2 eggs inside the ant nests during summer; the young first appear in March. Best detected from September to February.				
FLORA							
Austrostipa metatoris A pear-grass	V	V	Most records occur in the Murray Valley with sites including Cunninyeuk Station, Stony Crossing, Kyalite State Forest (now part of Murrumbidgee Valley Regional Park) and Lake Benanee. Scattered records also occur in central NSW including Lake Cargelligo, east of Goolgowi, Condobolin and south west of Nymagee. Otherwise only known from near Bordertown in south east South Australia, where it may be locally extinct.	0	Marginal. No likely habitat types in study area, but some associated species present.	Unlikely. No records within 10 km of study area and the area is likely to be degraded.	No
Austrostipa wakoolica A spear-grass	E	E	A densely-tufted, perennial spear-grass, growing to 1 m tall. Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest. Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include *Callitris glaucophylla, Eucalyptus microcarpa, E.*	0	Marginal. No likely habitat types in study area, but some associated	Unlikely. No records within 10 km of study area and the area is	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			populnea, Austrostipa eremophila, A. drummondii, Austrodanthonia eriantha and *Einadia nutans*. Flowers from October to December, mainly in response to rain. Seed dispersal is mainly by wind, rain and flood events; the awn and sharp point of the floret appear to be an adaptation for burying the seed into the soil; grass seed is traditionally believed to be viable for three to five years, so a long-lived seed bank is considered unlikely for this species. Recorded as common in the Mairjimmy State Forest population.		species present.	likely to be degraded.	
Diuris tricolor Pine Donkey Orchid	V		The Pine Donkey Orchid (formerly known as *Diuris sheaffiana*) is a terrestrial species that has a flower stalk 20-40 cm high. It is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. Localities include the Condobolin-Nymagee road, Wattamondara towards Cowra, Cooyal, Adelong, Red Hill north of Narrandera, Coolamon, near Darlington Point, Eugowra, Girilambone, Dubbo, Muswellbrook, and several sites west of Wagga Wagga. Disturbance regimes are not known, although the species is usually recorded from disturbed habitats. Associated species include *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta*, Ironbark and *Acacia* shrubland. The understorey is often grassy with herbaceous plants such as *Bulbine* species. Flowers from September to November or generally spring. The species is a tuberous, deciduous terrestrial orchid and the flowers have a pleasant, light sweet scent. It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW. Usually recorded as common and locally frequent in populations, however only one or two plants have also been observed at sites. The species has been noted as growing in large colonies.	0	Marginal. Some associated species present.	Unlikely. No records from the region and not observed despite surveys undertaken during flowering period.	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Philotheca ericifolia		V	*Philotheca ericifolia* occurs on the central and northern slopes and north-western plains of NSW, with its distribution centred near Dubbo. It extends to the Pilliga in the north and West Wyalong in the south. It is known from Goobang National Park, Wingen Maid Nature Reserve and Wollemi National Park. *Philotheca ericifolia* grows chiefly in dry sclerophyll forest and heath on damp sandy flats and in gullies. The species has been collected from a variety of habitats including open woodland, heathland, dry sandy creek beds and rocky ridge and cliff tops. Preferred soils have a sandy, gravelly or rocky component. Associated species at sites include *Melaleuca uncinata*, *Acacia triptera*, *Eucalyptus crebra*, *Corymbia trachyphloia*, *Acacia burrowii*, *Beyeria viscosa* and *Philotheca australis*. It is also recorded growing in association with *Eucalyptus rossii*, *Eucalyptus punctata*, *Leucopogon muticus* and *Calytrix tetragona*. It appears to favour moist sites, with records from a soakage area in the Hervey's Range and a dry creek bed in alluvial deposits amongst coarse gravel. The species may tolerate some level of disturbance, with records from a recently burnt site (wildfire) and a regeneration zone resulting from clearing. Plants in the Pilliga East State Forest subpopulation were observed resprouting from rootstock in a site recently burnt by wildfire.	0	Marginal. Some associated species present.	Unlikely. No records from the region and not observed despite surveys undertaken during flowering period.	No
Swainsona murrayana Slender Darling-pea	V	V	An ascending to erect perennial forb growing to 25 cm high. Occurs from South Australia through south-west Victoria and central NSW to south-east Queensland. Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Found in grassland, herbland, and open Black-box woodland, often in depressions. Has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and	0	Marginal. Some associated species present.	Unlikely. Not recorded within 10 km of study area,	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated. It is often associated with low chenopod shrubs (*Maireana* spp.), wallaby-grass (*Austrodanthonia* spp), and spear grass (*Austrostipa* spp.).			and abiotic factors likely not appropriate.	
Swainsona sericea Silky Swainson-pea	V		A slender, erect perennial plant with few stems 20 - 30 cm high. The range of *S. recta* has contracted to two disjunct clusters in NSW, one between Wellington and Mudgee, and the other from Canberra and Queanbeyan south to Williamsdale. The largest known population has about 3,400 plants, scattered along 22 km of narrow railway easement in NSW from Tralee (south of Queanbeyan) to south of Williamsdale. Occurs in grassland and open woodland, often on stony hillsides, dominated by one or more of the following: *Callitris endichleri, C. glaucophylla*, *Eucalyptus blakelyi, E. bridgesiana*, *E. dives*, *E. melliodora, E. microcarpa, E. nortonii and E. polyanthemos.* Requires a forb-rich grassy groundlayer dominated by *Themeda triandra, Poa sieberiana* var. *sieberiana or Austrostipa* spp. Resprouts in autumn and winter from a woody root. It flowers in spring, peaking over two to three weeks in October.	0	Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Tylophora linearis	V	E	An herbaceous climber with clear latex that grows to about 2 m long. Known from eight localities in the Dubbo area and Mt Crow near Barraba in NSW, and "Myall Park" near Glenmorgan in Queensland. This species is conserved within Goobang National Park, Eura State Forest, Goonoo SF, Pilliga West SF and Coolbaggie Nature Reserve. Grows in dry scrub, open forest and woodlands associated with *Melaleuca uncinata*, *Eucalyptus fibrosa*, *E. sideroxylon*, *E. albens*, *Callitris endlicheri*, *C. glaucophylla*, *Allocasuarina luehmannii*, *Acacia hakeoides*, *A. lineata*, *Myoporum* spp., and *Casuarina* spp. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: Brigalow (*Acacia harpophylla* dominant and co-dominant), and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later.	1	Marginal. Some associated species present, and recorded within 10 km of study area.	Unlikely	No
THREATENED ECOLOGICAL COMMUNITIES							
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	EEC		Tall woodland or open forest dominated by Fuzzy Box *Eucalyptus conica*, often with Grey Box *Eucalyptus microcarpa*, Yellow Box *Eucalyptus melliodora*, or Kurrajong *Brachychiton populneus*. Buloke *Allocasuarina luehmannii* is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. Found on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly found in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Less than 5% of the original extent is estimated to remain. Shrubs include Wilga, Deane's Wattle, Hop Bush, Cassia, Water Bush and Sifton Bush.				
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		EEC	Predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt and ranges from central New South Wales through northern and central Victoria into South Australia. Relatively less well studied and understood in comparison with other grassy woodland systems in south-eastern Australia. The ecological community also occupies a complex position in the landscape. For example, in NSW it can be transitional between the temperate lower slopes and tablelands occupied by, e.g. the EPBC Act-listed *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* ecological community, and the semi-arid floodplain communities. Generally occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. The ecological community may extend to more elevated hillslopes on the fringes of its range where it intergrades with other woodland or dry sclerophyll forest communities. Often occurs on productive soils derived from alluvial or colluvial materials but may occur on a range of substrates. Soils include: duplex soils; red-brown earths; gradational soils; non-calceric and calceric browns with variable textures including sandy clay loam, clay loam, sandy loam, loam, heavy clay; and loams with quartzite surface stones and rocky outcroppings in the Mount Lofty Ranges. Gilgai topography may be present. The ecological community tends to occupy drier sites within the belt of grassy woodlands in south-eastern Australia (Prober and Thiele, 1993). The mean annual rainfall associated with the distribution		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			of the ecological community lies in the range 375-700 mm/year. The typical structure of ecological community is a woodland to open forest with a canopy dominated by eucalypts and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids. Tussock grasses dominate the ground layer vegetation, though other graminoids or forbs may be common. Chenopods also may be present in the ground layer. The tree canopy is dominated (≥ 50% canopy crown cover) by *Eucalyptus microcarpa* (Grey Box). Widespread associated tree species that may be present include: *Allocasuarina luehmannii* (Buloke), *Brachychiton populneus* (Kurrajong), *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *E. camaldulensis* (River Red Gum), *E. conica* (Fuzzy Box), *E. leucoxylon* (Yellow Gum, SA Blue Gum), *E. melliodora* (Yellow Box) and *E. populnea* (Bimble Box, Poplar Box). The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: *Austrodanthonia*, *Austrostipa*, *Elymus*, *Enteropogon*, *Dianella* and *Lomandra*; and one or more of the chenopod genera: *Atriplex*, *Chenopodium*, *Einadia*, *Enchylaena*, *Maireana*, *Salsola* and *Sclerolaena.* Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.				
Inland Grey Box Woodland in the Riverina, NSW South Western	EEC		Includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii*		Present	Present	No – the proposed transmission

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions			(Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally occurs as an open woodland 15–25 m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey. Generally occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. Tends to occupy drier sites within the belt of grassy woodlands in south-eastern Australia. Inland Grey Box Woodland occurs predominately within the Riverina and South West Slopes regions of NSW down to the Victorian border. It includes Albury to the east and may extend out west towards Hay. This community also extends across the slopes and plains in Central and Northern NSW up to the Queensland Border. This includes Yetman and Inverell in the North, Molong to the east of the Central Slopes and plains and out towards Nymagee to the west. Occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22- 26°C. There is a correlation between the distribution of *Eucalyptus microcarpa* communities and soils of Tertiary and Quaternary alluvial origin, largely corresponding with the Red Brown Earths. The majority of remnant patches of Inland Grey Box Woodland survive with trees largely intact but with the shrub or ground layers degraded to varying degrees through grazing or pasture modification. Some species				line will avoid any clearing of this community in the north of the proposal site.

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			that are part of the community appear intolerant to heavy grazing by domestic stock and are confined to the least disturbed remnants.				
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in NSW South Western Slopes Bioregion			Mallee and Mallee-Broombush dominated woodland and shrubland, lacking *Triodia*, in the NSW South Western Slopes has a very highly restricted distribution, with known occurrences falling with a region of less than 4000 km^2 bounded by Lake Cowal - Temora - Ardlethan - Ungarie. It is estimated that the total area remaining is around 2300 hectares within the local government areas of Bland and Temora. Most remaining areas are on private property or within roadside easements, though small areas are known from the following Natures Reserves: Buddigower, The Charcoal Tank, portions of South West Woodland (former Blue Mallee Flora Reserve and State Forest and Wyalong State Forest) and possibly Big Bush.		Absent	None	No
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	EEC		Scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community. This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narrandera, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.				
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions			Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions is the name given to the ecological community dominated by White Cypress Pine (*Callitris glaucophylla*). Sandhill Pine Woodland is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs. Sandhill Pine Woodland has been recorded in the far south-western portion of the NSW South Western Slopes bioregion near Urana, extending through the Riverina bioregion, from the Urana – Narranderra district in the east, into the southern part of the Murray-Darling Depression bioregion, as far west as the South Australian border.		Absent	None	No
Weeping Myall Woodlands		EEC	The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Queensland, with one small outlying patch in northern Victoria. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Brigalow Belt North,		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Murray-Darling Depression, Nandewar and Cobar Peneplain IBRA Bioregions. Occurs in a range from open woodlands to woodlands, generally 4-12 m high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species. Other common names for Weeping Myall include Myall, Boree, Balaar, Nilyah, Bastard Gidgee, and Silver Leaf Boree. Weeping Myall trees often occur in monotypic stands, however other vegetation may also occur in the ecological community, though not as dominant species. These include: Western Rosewood (*Alectryon oleifolius* subsp. *elongatus*); Poplar Box (*Eucalyptus populnea*); or Black Box (*Eucalyptus largiflorens*). Grey Mistletoe (*Amyema quandang*) commonly occurs on the branches of Weeping Myall trees throughout the ecological community's range. The understorey of Weeping Myall Woodlands often includes an open layer of shrubs above an open ground layer of grasses and herbs, though the ecological community can exist naturally either as a shrubby or a grassy woodland. Generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded. The ecological community occurs on black, brown, red-brown or grey clay or clay loam soils. The Weeping Myall Woodlands provide important habitat for a range of animals such as the Superb Parrot (*Polytelis swainsonii*), Painted Honeyeater (*Grantiella picta*) and the Bush Stone-curlew (*Burhinus grallarius*).				
White Box Yellow Box Blakely's Red Gum Woodland	EEC		An open woodland community (sometimes occurring as a forest formation). Areas that are part of the Australian Government listed ecological community must have either: an intact tree layer and predominately native ground layer; or an intact native ground layer with a high diversity of native plant species but no remaining tree layer. Box-Gum Woodland is found from the		Absent	None	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the canopies are clearly separated. The understorey in intact sites is characterised by scattered shrubs, native tussock grasses, and a high diversity of herbs. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Sites with particular characteristics, including varying age classes in the trees, patches of regrowth, old trees with hollows and fallen timber on the ground are very important as wildlife habitat. Sites in the lowest parts of the landscape often support very large trees which have leafy crowns and reliable nectar flows - sites important for insectivorous and nectar feeding birds. Sites that retain only a grassy groundlayer and with few or no trees remaining are important for rehabilitation, and to rebuild connections between sites of better quality. Remnants support many species of threatened fauna and flora. This ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres.				

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CEEC	An open woodland community (sometimes occurring as a forest formation). Areas that are part of the Australian Government listed ecological community must have either: an intact tree layer and predominately native ground layer; or an intact native ground layer with a high diversity of native plant species but no remaining tree layer. Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the canopies are clearly separated. The understorey in intact sites is characterised by scattered shrubs, native tussock grasses, and a high diversity of herbs. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Sites with particular characteristics, including varying age classes in the trees, patches of regrowth, old trees with hollows and fallen timber on the ground are very important as wildlife habitat. Sites in the lowest parts of the landscape often support very large trees which have leafy crowns and reliable nectar flows - sites important for insectivorous and nectar feeding birds. Sites that retain only a grassy groundlayer and with few or no trees remaining are important for rehabilitation, and to rebuild connections between sites of better quality. Remnants support many species of threatened fauna and flora. This		Absent	Absent	No

Species	TSC Act/ FM Act	EPBC Act	Habitat requirements	Number of records (NSW Wildlife Atlas 10km radius)	Presence of habitat	Likelihood of occurrence	Potential Impact
			ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres.				

APPENDIX C FLORA SPECIES RECORDED

All native and introduced vascular plant species encountered within the Study Area, and their relative abundances, were recorded (where identifiable). Cover/abundance assessments are based on visual estimates of foliage cover (after Carnahan 1997), scored using a modified Braun-Blanquet 6-point scale:

1 1 to a few individuals present, less than 5% cover

2 many individuals present, but still less than 5% cover

3 5 - <20% cover

4 20 - <50% cover

5 50 - <75% cover

6 75 - 100% cover

Cover/abundance scores relate to general abundance over the site, not to representative quadrats. Single-figure values are generalised over the Study Area. Where the abundance of a particular species varies markedly over the survey sector, a range of cover values is provided. Where a range of values is given, abundance is based on a standard 20 metre x 20 metre quadrat scale. Cover abundance is provided for each vegetation type, with abbreviations as follows:

GBW Western Grey Box – Poplar Box – White Cypress Pine woodland

PBW Poplar Box Grassy Woodland

EX Exotic-dominated or planted non-local vegetation (includes areas where sparse native overstorey is present but shrub and ground layers are exotic)

RRG River Red Gum swampy woodland

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Scientific nomenclature follows Harden (1990-2002), with recent name changes as per the Australian Plant Name Index of the Australian National Herbarium.

Species not indigenous to the area are preceded by an asterisk (*), and weeds declared as a priority within the Parkes Shire Council are denoted by a triangle (△).

Scientific name	Common name	Family	Abundance			
			GBW	PBW	EX	RRG
TREES						
Allocasuarina luehmannii	Buloke	Casuarinaceae	1			
Callitris glaucophylla	White Cypress Pine	Curpressaceae	1			
Eucalyptus camaldulensis subsp. *camaldulensis*	River Red Gum	Myrtaceae		1		4
Eucalyptus microcarpa	Inland Grey Box	Myrtaceae	3			
Eucalyptus populnea ssp. *bimble*	Bimble Box	Myrtaceae	1	3-4	1	
SHRUBS, SUB-SHRUBS						
Acacia hakeoides	Hakea Wattle	Fabaceae		1		
Acacia spectabilis	Mudgee Wattle	Fabaceae		1		
Acacia sp.	Wattle	Fabaceae		1		1
Callistemon sp.	Bottlebrush	Myrtaceae			1	
**Datura* sp.	Thornapple	Solanaceae		1	1	

Scientific name	Common name	Family	Abundance			
			GBW	PBW	EX	RRG
Dodonaea viscosa ssp. *angustissima*	Narrow-leaved Hopbush	Sapindaceae	1	1		
Einadia sp.	Saltbush		1	1		1
Geijera parviflora	Wilga	Rutaceae		2		
△**Lycium ferocissimum*	African Boxthorn	Solanaceae	2	2	1	1
Maireana microphylla	Small-leaf Bluebush	Chenopodiaceae				1
**Marrubium vulgare*	White Horehound	Lamiaceae		1		
**Olea europaea*	African Olive	Oleaceae			2	
**Schinus* sp.	Pepper Tree	Anacardiaceae			1	
Sclerolaena birchii	Galvanized Burr	Chenopodiaceae		1		
Senna (=*Cassia*) *artemisioides* ssp. *Zygophylla*	Silver Cassia	Fabaceae		1		
**Senna* sp.	Senna	Fabaceae		1		
**Sida ?rhombifolia*	Paddy's Lucerne	Malvaceae	1	1	1	
FORBS						
**Anagallis (=Lysimachia) arvensis*	Scarlet Pimpernel	Myrsinaceae		1		
**Arctotheca calendula*	Capeweed	Asteraceae		1	1	
Atriplex sp.	Atriplex	Chenopodiaceae		1		
Centipeda cunninghamii	Common Sneezeweed	Asteraceae	1			
**Cirsium vulgare*	Spear Thistle	Asteraceae	1	1		
Einadia nutans	Climbing Saltbush	Chenopodiaceae		1		
Geranium sp.	Geranium	Geraniaceae	1	1		
Goodenia pinnatifida	Goodenia	Goodeniaceae	1	1		1
**Lepidium africanum*	Lepidium	Brassicaceae	1	1		
Maireana sp.	Maireana	Amaranthaceae		1		
**Malva parviflora*	Mallow	Malvaceae	1	1		
Opercularia sp.	Stinkweed	Rubiaceae				1
Oxalis sp.	Oxalis	Oxalidaceae	1	1		
Ptilotus sp.	Ptilotus	Amaranthaceae		1		
Sclerolaena sp.	Sclerolaena	Chenopodiaceae	1	1		
Senna artemisioides subsp. zygophylla (Benth.) Randell	Senna	Fabaceae		1		
Sida corrugata	Corrugated Sida	Malvaceae	1	1	1	1
**Sonchus oleraceus*	Smooth Sowthistle	Asteraceae		1		
Trifolium sp.	Clover	Fabaceae			2	
Vittadinia cuneata	Fuzzweed	Fabaceae		1		
Wahlenbergia sp.	Bluebell	Campanulaceae		1		1
GRASSES						

Scientific name	Common name	Family	Abundance			
			GBW	PBW	EX	RRG
Aristida ramosa	Wire-grass	Poaceae		1		
Austrostipa scabra ssp. *scabra*	Speargrass	Poaceae	1	2		
Austrostipa verticillata	Slender Bamboo Grass	Poaceae		1		
**Avena* sp.	Wild Oats	Poaceae		1	5	
Chloris truncata	Native Windmill Grass	Poaceae		1		
Elymus scaber	Common Wheat Grass	Poaceae		1		
Enteropogon acicularis	Windmill Grass	Poaceae		1		
**Hordeum* sp.	Barley Grass	Poaceae	3	1	2	1
**Lolium perenne*	Ryegrass	Poaceae	2	1	2	3
Microlaena stipoides	Weeping Grass	Poaceae		1		1
Rytidosperma sp.	Wallaby Grass	Poaceae	1	1		
**Triticum* sp.	Wheat	Poaceae		1	1	

APPENDIX D FAUNA SPECIES RECORDED

Common Name	Scientific Name	Survey	Observation Type
Amphibians & Reptiles			
Boulenger's Snake-eyed Skink	*Morethia boulengeri*	Active search	Observed
Common Dwarf Skink	*Menetia greyii*	Opportunistic/Active Search	Observed
Ragged Snake-eyed Skink	*Cryptoblepharus pannosus*	Opportunistic/Active search	Observed
Birds			
Apostlebird	*Struthidea cinerea*	Opportunistic	Observed
Australian Hobby	*Falco longipennis*	Targeted Search	Observed
Australian Magpie	*Cracticus tibicen*	Targeted Search	Observed
Australian Pelican	*Pelecanus conspicillatus*	Opportunistic	Observed
Australian Raven	*Corvus coronoides*	Targeted Search	Observed
Australian Reed-warbler	*Acrocephalus australis*	Targeted Search	Observed
Australian Wood Duck	*Chenonetta jubata*	Opportunistic	Observed
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Targeted Search	Observed
Blue-faced Honeyeater	*Entomyzon cyanotis*	Opportunistic	Observed
Black Kite	*Milvus migrans*	Opportunistic	Observed
Blue Bonnet	*Northiella haematogaster*	Targeted Search	Observed
Brown Songlark	*Cincloramphus cruralis*	Targeted Search	Observed
Brown Treecreeper*	*Climacteris picumnus*	Targeted Search	Observed
Cockatiel	*Nymphicus hollandicus*	Targeted Search	Observed
Common Starling	*Sturnus vulgaris*	Targeted Search	Observed
Crested Pigeon	*Ocyphaps lophotes*	Targeted Search	Observed
Eastern Rosella	*Platycercus eximius*	Targeted Search	Observed
Emu	*Dromaius novaehollandiae*	Opportunistic	Observed
Galah	*Eolophus roseicapillus*	Targeted Search	Observed
Great Cormorant	*Phalacrocorax carbo*	Opportunistic	Observed
Grey-crowned Babbler*	*Pomatostomus temporalis temporalis*	Targeted Search	Observed
Grey Butcherbird	*Cracticus torquatus*	Opportunistic	Observed
Grey Fantail	*Rhipidura albiscapa*	Opportunistic	Observed
Grey Teal	*Anas gracilis*	Targeted Search	Observed
Horsefield's Bronze-cuckoo	*Chrysococcyx basalis*	Targeted Search	Heard
Intermediate Egret	Ardea intermedia	Opportunistic	Observed
Laughing Kookaburra	*Dacelo novaeguineae*	Targeted Search	Observed

Common Name	Scientific Name	Survey	Observation Type
Little Black Cormorant	*Phalacrocorax sulcirostris*	Targeted Search	Observed
Little Raven	*Corvus mellori*	Targeted Search	Observed
Magpie-lark	*Grallina cyanoleuca*	Targeted Search	Observed
Nankeen Kestrel	*Falco cenchroides*	Targeted Search	Observed
Noisy Friarbird	*Philemon corniculatus*	Targeted Search	Observed
Noisy Miner	*Manorina melanocephala*	Targeted Search	Observed
Pacific Black Duck	*Anas superciliosa*	Targeted Search	Observed
Pied Butcherbird	*Cracticus nigrogularis*	Targeted Search	Observed
Red-rumped Parrot	*Psephotus haematonotus*	Targeted Search	Observed
Royal Spoonbill	*Platalea regia*	Targeted Search	Observed
Rufous Songlark	*Megalurus mathewsi*	Targeted Search	Observed
Rufous Whistler	*Pachycephala rufiventris*	Targeted Search	Heard
Sacred Kingfisher	*Todiramphus sanctus*	Targeted Search	Observed
Short-billed Corella	*Cacatua sanguinea*	Targeted Search	Observed
Southern Boobook	*Ninox novaeseelandiae*	Opportunistic	Heard
Spotted Harrier[*]	*Circus assimilis*	Targeted Search	Observed
Spotted Pardalote	*Pardalotus punctatus*	Targeted Search	Observed
Striated Pardalote	*Pardalotus striatus*	Targeted Search	Observed
Sulphur-crested Cockatoo	*Cacatua galerita*	Opportunistic	Observed
Superb Parrot[*#]	Polytelis swainsonii	Targeted Search	Observed
Tawny Frogmouth	*Podargus strigoides*	Opportunistic	Observed
Turquoise Parrot	*Neophema pulchella*	Targeted Search	Observed
Tree Martin	*Petrochelidon nigricans*	Targeted Search	Observed
Wedge-tailed Eagle	*Aquila audax*	Targeted Search	Observed
Welcome Swallow	*Hirundo neoxena*	Targeted Search	Observed
White-faced Heron	*Egretta novaehollandiae*	Targeted Search	Observed
White-necked Heron	*Ardea pacifica*	Targeted Search	Observed
White-plumed Honeyeater	*Lichenostomus penicillatus*	Targeted Search	Observed
White-winged Chough	*Corcorax melanorhamphos*	Targeted Search	Observed
Willie Wagtail	*Rhipidura leucophrys*	Targeted Search	Observed
Yellow-billed Spoonbill	*Platalea flavipes*	Targeted Search	Observed
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Targeted Search	Observed
Zebra Finch	*Taeniopygia guttata*	Targeted Search	Observed
Non-volant mammals			

Common Name	Scientific Name	Survey	Observation Type
Cat^	*Felis catus*	Spotlight	Observed
Common Brushtail Possum	*Trichosurus vulpecula*	Spotlight	Observed
Eastern Grey Kangaroo	*Macropus giganteus*	Spotlight, opportunistic	Observed
European Fox^	*Vulpes vulpes*	Spotlight, opportunistic	Observed
European Rabbit^	*Oryctolagus cuniculus*	Spotlight, opportunistic	Observed
Swamp Wallaby	*Wallabia bicolor*	Spotlight	Observed
Bats			
Gould's Wattled Bat	*Chalinolobus gouldli*	Definite – 3 locations	Anabat˜
Chocolate Wattled Bat	*Chalinolobus morio*	Definite – 2 locations	Anabat˜
Little Pied Bat*	*Chalinolobus picatus*	Possible – 2 locations	Anabat˜
Eastern Freetail-bat	*Mormopterus* sp. 2 (=*ridei*)	Possible (2 poor calls) both in and outside proposal site	Anabat˜
Inland Freetail-bat	*Mormopterus* sp. 3 (=*petersi*)	Definite – 3 sites	Anabat"
Southern Freetail-bat	*Mormopterus* sp. 4	Definite – 2 sites	Anabat˜
Long-eared Bat*	*Nyctophilus* sp. (*N. geoffroii, N. gouldii,* or *N. corbeni)*	Definite – 3 sites	Anabat˜
Yellow-bellied Sheathtail-bat*	*Saccolaimus flaviventris*	Probable – 1 site	Anabat˜
Western Broad-nosed Bat	*Scotorepens balstoni*	Definite and Probable – 2 sites	Anabat˜
Little Broad-nosed Bat	*Scotorepens greyii*	Definite and Probable – 2 sites	Anabat˜
White-striped Freetail-bat	*Tadarida australis* (=*Nyctinomus=Austronomus*) *australis*	Definite and Probable – 2 sites	Anabat˜
Inland Forest Bat*	*Vespadelus baverstocki*	Probable – 2 sites	Anabat˜
Large Forest Bat	*Vespadelus darlingtoni*	Possible – 2 sites	Anabat˜
Southern Forest Bat	*Vespadelus regulus*	Possible and Probable – 2 sites	Anabat˜
Little Forest Bat	*Vespadelus vulturnus*	Probable – 2 sites	Anabat˜
Forest Bat	*Vespadelus* sp. (either *V. regulus* or *V. vulturnus*)	Definite – 3 sites	Anabat˜

APPENDIX E DATABASE SEARCH AND RESULTS

Numbers in parentheses indicate number of species records within search area from relevant database.

OEH Bionet Wildlife Atlas: Lists records and predictions of threatened species on the schedule of the TSC Act within 10 km of the study area. Search was conducted on the 30 October 2017.

EPBC Protected Matters Search tool: Lists items/species on the Schedules of the EPBC Act with the potential to occur within 10 km of the study area. Search was conducted on the 30 October 2017.

ACRONYMS

EPBC: Environment Protection and Biodiversity Conservation Act

FM: Fisheries Management Act

TSC: Threatened Species Conservation Act

E: Endangered

V: Vulnerable

CE: Critically Endangered

EEC: Endangered Ecological Community

CEEC: Critically Endangered Ecological Community

EP: Endangered Population

Species	Common Name	OEH Wildlife Atlas	EPBC Protected Matters
Fauna			
AMPHIBIANS			
Crinia sloanei	Sloane's Froglet	TSC-V	
Litoria raniformis	Southern Bell Frog	TSC-V	
BIRDS			
Actitis hypoleucos	Common Sandpiper		EPBC-Migratory
Anseranas semipalmata	Magpie Goose	TSC-V	
Anthochaera Phrygia	Regent Honeyeater	TSC-CE	EPBC-E, Migratory
Apus pacificus	Fork-tailed Swift		EPBC-Migratory
Artanus cyanopterus cyanopterus	Dusky Woodswallow		
Botaurus poiciloptilus	Australasian Bittern	TSC-E	EPBC-E
Burhinus grallarius	Bush Stone-curlew	TSC-E	
Calidris acuminata	Sharpe-tailed Sandpiper		EPBC-Migratory
Callidris ferruginea	Curlew Sandpiper	TSC-E	EPBC-Marine, Migratory

Calidris melanotos	Pectoral Sandpiper		EPBC- CE, Migratory
Calyptorhynchus lathami	Glossy Black-Cockatoo	TSC-V	
Certhionyx variegatus	Pied Honeyeater	TSC-V	
Chthonicola sagittata	Speckled Warbler	TSC-V	
Cinclosoma castanotum	Chestnut Quail-thrush	TSC-V	
Circus assimilis	Spotted Harrier	TSC-V	
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	TSC-V	
Daphoenositta chrysoptera	Varied Sittella	TSC-V	
Drymodes brunneopygia	Southern Scrub-robin	TSC-V	
Epthianura albifrons	White-fronted Chat	TSC-V	
Falco hypoleucos	Grey Falcon	TSC-E	
Falco subniger	Black Falcom	TSC-V	
Gallinago hardwickii	Latham's Snipe		EPBC-Migratory
Glossopsitta pusilla	Little Lorikeet	TSC-V	
Grantiella picta	Painted Honeyeater	TSC-V	
Grus rubicunda	Brolga	TSC-V	
Haliaeetus leucogaster	White-bellied Sea-eagle	TSC -V	EPBC-Migratory
Hamirostra melanosternon	Black-breasted Buzzard	TSC-	
Hieraaetus morphnoides	Little Eagle	TSC-V	
Hirundapus caudacutus	White-throated Needletail		EPBC - Migratory
Hylacola cautus	Shy Heathwren	TSC-V	
Lathamus discolour	Swift Parrot	TSC-E	EPBC-E, Marine
Leipoa ocellata	Malleefowl	TSC-E	EPBC-V
Limosa limosa	Black-tailed Godwit	TSC-V	
Lophochroa leadbeateri	Major Mitchell's Cockatoo	TSC-V	
Lophoictinia isura	Square-tailed Kite	TSC-V	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	TSC-V	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	TSC-V	
Motacilla flava	Yellow Wagtail		EPBC-Migratory
Myiagra cyanoleuca	Satin Flycatcher		EPBC-Migratory
Neophema pulchella	Turquoise Parrot	TSC-V	
Ninox connivens	Barking Owl	TSC-V	

Numenius madagascariensis	Eastern Curlew		EPBC – CE, Marine Migratory
Oxyura australis	Blue-billed Duck	TSC-V	
Pachycephala inornata	Gilbert's Whistler	TSC-V	
Pandion cristatus	Eastern Osprey	TSC-V	
Pandion haliaetus	Osprey	TSC-V	EPBC – Marine, Migratory
Petroica boodang	Scarlet Robin	TSC-V	
Petroica phoenicea	Flame Robin	TSC-V	
Polytelis swainsonii	Superb Parrot	TSC-V	EPBC-V
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	TSC-V	
Rostratula australis	Australian Painted Snipe	TSC-E	EPBC-E, Marine, Migratory
Stagonopleura guttata	Diamond Firetail	TSC-V	
Stictonetta naevosa	Freckled Duck	TSC-V	
Tringa nebularia	Common Greenshank		EPBC-Migratory
FISH			
Maccullochella peelii	Murray Cod		EPBC-V
Macquaria australasica	Macquarie Perch		EPBC-E
MAMMALS			
Dasyurus maculatus	Spotted-tailed Quoll	TSC-V	EPBC-E
Nyctophilus corbeni	Corben's Long-eared Bat	TSC-V	EPBC-V
Petaurus norfolcensis	Squirrel Glider	TSC-V	
Phascolarctos cinereus	Koala	TSC-V	EPBC-V
Pteropus poliocephalus	Grey-headed Flying-fox	TSC-V	EPBC-V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	TSC-V	
REPTILES			
Aprasia parapulchella	Pink-tailed Legless-lizard		EPBC-V
Flora			
Austrostipa metatoris	A pear-grass	TSC-V	EPBC-V
Austrostipa wakoolica	A spear-grass	TSC-E	EPBC-E
Diuris tricolor	Pine Donkey Orchid	TSC-V	
Philotheca ericifolia			EPBC - V
Swainsona murrayana	Slender Darling-pea	TSC-V	EPBC-V
Swainsona sericea	Silky Swainson-pea	TSC-V	
Tylophora linearis		TSC-V	EPBC-E

Threatened Ecological Communities		
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		EPBC-EEC
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	TSC-EEC	
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in NSW South Western Slopes Bioregion		
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	TSC-EEC	
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions		
Weeping Myall Woodlands		EPBC-EEC
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EPBC-CEEC
White Box Yellow Box Blakely's Red Gum Woodland	TSC-CEEC	

APPENDIX F PRIORITY WEEDS

The following weeds are declared noxious in the control area of Forbes Shire Council.

Weed	Duty
African boxthorn *Lycium ferocissimum*	**Prohibition on dealings** *Must not be imported into the State or sold*
Alligator weed *Alternanthera philoxeroides*	**Prohibition on dealings** *Must not be imported into the State or sold* **Biosecurity Zone** The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens). *Within the 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*
Anchored water hyacinth *Eichhornia azurea*	**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*
Arrowhead *Sagittaria montevidensis*	**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.* **This Regional Recommended Measure applies to all species of *Sagittaria***
Athel pine *Tamarix aphylla*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** Exclusion zone: all waterways and riparian areas in the region. Core infestation area: whole region except for the exclusion zone. *Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should reduce impacts from the plant on priority assets. Land managers should mitigate the risk of the plant being introduced to their land.*
Bellyache bush *Jatropha gossypiifolia*	**Prohibition on dealings** *Must not be imported into the State or sold*
Black knapweed *Centaurea nigra*	**Prohibition on dealings** *Must not be imported into the State or sold*

Weed	Duty
Bitou bush *Chrysanthemoides monilifera* subsp. *rotundata*	**Prohibition on dealings** *Must not be imported into the State or sold* **Biosecurity Zone** The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. *Within the 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*
Blackberry *Rubus fruticosus* species aggregate	**Prohibition on dealings** *Must not be imported into the State or sold* **All species in the *Rubus fruiticosus* species aggregate have this requirement, except for the varietals Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree**
Blue heliotrope *Heliotropium amplexicaule*	**Regional Recommended Measure** Exclusion zone: Weddin local government area. Core infestation area: whole region except for exclusion zone. *Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should reduce impacts from the plant on priority assets. Land managers should mitigate the risk of the plant being introduced to their land.*
Boneseed *Chrysanthemoides monilifera* subsp. *monilifera*	**Prohibition on dealings** *Must not be imported into the State or sold* **Control Order** Bonseed Control Zone: Whole of NSW *Boneseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed 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 of boneseed 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.*
Boxing glove cactus *Cylindropuntia fulgida* var. *mamillata*	**Prohibition on dealings** *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. Land managers should mitigate spread from their land.* **This Regional Recommended Measure applies to all species of Cylindropuntia except Cylindropuntia rosea (Hudson pear)**
Bridal creeper *Asparagus asparagoides*	**Prohibition on dealings** *Must not be imported into the State or sold* ***this requirement also applies to the Western Cape form of bridal creeper** **Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.*

Weed	Duty
Bridal veil creeper *Asparagus declinatus*	**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*
Broomrapes *Orobanche* species	**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* **All species of *Orobanche* are Prohibited Matter in NSW, except the natives *Orobanche cernua* var. *australiana* and *Orobanche minor***
Burr ragweed *Ambrosia confertiflora*	**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.*
Cabomba *Cabomba* species	**Prohibition on dealings** *Must not be imported into the State or sold*
Cape broom *Genista monspessulana*	**Prohibition on dealings** *Must not be imported into the State or sold*
Carrion flower *Orbea variegata*	**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.*
Cat's claw creeper *Dolichandra unguis-cati*	**Prohibition on dealings** *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. Land managers should mitigate spread from their land.*
Chilean needle grass *Nassella neesiana*	**Prohibition on dealings** *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.*
Climbing asparagus *Asparagus africanus*	**Prohibition on dealings** *Must not be imported into the State or sold*
Climbing asparagus fern *Asparagus plumosus*	**Prohibition on dealings** *Must not be imported into the State or sold*

Weed	Duty
Common pear *Opuntia stricta*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Core infestations: Land managers should mitigate spread from their land.* ***This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)**
Coolatai grass *Hyparrhenia hirta*	**Regional Recommended Measure** Exclusion zone: whole region except for the core infestation area of the Warrumbungle and Coonamble Shire Council areas *Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should reduce impacts from the plant on priority assets. Land managers should mitigate the risk of the plant being introduced to their land.*
East Indian hygrophila *Hygrophila polysperma*	**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.*
Eurasian water milfoil *Myriophyllum spicatum*	**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*
Fireweed *Senecio madagascariensis*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant*
Flax-leaf broom *Genista linifolia*	**Prohibition on dealings** *Must not be imported into the State or sold*
Frogbit *Limnobium laevigatum*	**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* **All species of *Limnobium* are Prohibited Matter**
Gamba grass *Andropogon gayanus*	**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*
Giant reed *Arundo donax*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.*
Gorse *Ulex europaeus*	**Prohibition on dealings** *Must not be imported into the State or sold*

Weed	Duty
Grey sallow *Salix cinerea*	**Prohibition on dealings** *Must not be imported into the State or sold*
Harrisia cactus *Harrisia* species	**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.*
Hawkweeds *Hieracium* species	**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* **All species in the genus *Hieracium* are Prohibited Matter**
Honey locust *Gleditsia triacanthos*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.*
Hudson pear *Cylindropuntia rosea*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.*
Hydrocotyl *Hydrocotyl ranunculoides*	**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*
Hygrophila *Hygrophila costata*	**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.*
Hymenachne *Hymenachne amplexicaulis* and hybrids	**Prohibition on dealings** *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.*
Johnson grass *Sorghum halepense*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.*
Karroo thorn *Acacia karroo*	**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*

Weed	Duty
Kidney-leaf mud plantain *Heteranthera reniformis*	**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.*
Kochia *Bassia scoparia*	**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* **Excluding the subspecies *trichophylla***
Koster's curse *Clidemia hirta*	**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*
Lagarosiphon *Lagarosiphon major*	**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*
Lantana *Lantana camara*	**Prohibition on dealings** *Must not be imported into the State or sold*
Long-leaf willow primrose *Ludwigia longifolia*	**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.*
Ludwigia *Ludwigia peruviana*	**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.*
Madeira vine *Anredera cordifolia*	**Prohibition on dealings** *Must not be imported into the State or sold*
Mesquite *Prosopis* species	**Prohibition on dealings** *Must not be imported into the State or sold* **All species in the genus *Prosopis* have this requirement** **Regional Recommended Measure** *Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.*
Mexican feather grass *Nassella tenuissima*	**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*
Miconia *Miconia* species	**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* **All species of *Miconia* are Prohibited Matter in NSW**

Weed	Duty
Mikania vine *Mikania micrantha*	**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* ***all species in the genus *Mikania* are Prohibited Matter in NSW**
Mimosa *Mimosa pigra*	**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*
Mother-of-millions *Bryophyllum* species	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.*
Parkinsonia *Parkinsonia aculeata*	**Prohibition on dealings** *Must not be imported into the State or sold* **Control Order** Parkinsonia Control Zone: Whole of NSW *Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia 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 of parkinsonia 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.*
Parthenium weed *Parthenium hysterophorus*	**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* **Prohibition on dealings** *The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017*
Pond apple *Annona glabra*	**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*
Prickly acacia *Acacia nilotica*	**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*

Weed	Duty
Prickly pear - common pear *Opuntia stricta*	**Prohibition on dealings** *Must not be imported into the State or sold* **Except for *Opuntia ficus-indica* (Indian fig)** **Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.* **This Regional Recommended Measure applies to all species of *Opuntia* except for *Opuntia ficus-indica* (Indian fig)**
Prickly pear - Hudson pear *Cylindropuntia rosea*	**Prohibition on dealings** *Must not be imported into the State or sold* **All species in the *Cylindropuntia* genus have this requirement** **Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.* **This Regional Recommended Measure applies to all species of *Cylindropuntia* except *Cylindropuntia rosea* (Hudson pear)**
Rope pear *Cylindropuntia imbricata*	**Prohibition on dealings** *Must not be imported into the State or sold* **All species in the *Cylindropuntia* genus have this requirement** **Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.* **This Regional Recommended Measure applies to all species of *Cylindropuntia* except *Cylindropuntia rosea* (Hudson pear)**
Rubber vine *Cryptostegia grandiflora*	**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*
Sagittaria *Sagittaria platyphylla*	**Prohibition on dealings** *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. Notify local control authority if found.* **This Regional Recommended Measure applies to all species of *Sagittaria***
Salvinia *Salvinia molesta*	**Prohibition on dealings** *Must not be imported into the State or sold*
Scotch broom *Cytisus scoparius*	**Prohibition on dealings** *Must not be imported into the State or sold*

Weed	Duty
Serrated tussock *Nassella trichotoma*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** Exclusion zone: whole region except for the core infestation area that is bounded by the Central West Local Land Services boundary north along Burrendong Way to Stuart Town, east along Mookerawa Road to Burrendong Dam, and east along Oaky Creek, bounded by the Central West Local Land Services boundary *Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should reduce impacts from the plant on priority assets. Land managers should mitigate the risk of the plant being introduced to their land.*
Siam weed *Chromolaena odorata*	**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*
Silverleaf nightshade *Solanum elaeagnifolium*	**Prohibition on dealings** *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. Land managers should mitigate spread from their land.*
Snakefeather *Asparagus scandens*	**Prohibition on dealings** ***Must not be imported into the State or sold***
Smooth tree pear *Opuntia monacantha*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Core infestations: Land managers should mitigate spread from their land.* ***This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)**
Spiny burrgrass - spinifex *Cenchrus spinifex*	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.*
Spongeplant *Limnobium spongia*	**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* **All species of *Limnobium* are Prohibited Matter**
Spotted knapweed *Centaurea stoebe* subsp. *micranthos*	**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*

Weed	Duty
Tiger pear *Opuntia aurantiaca*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Core infestations: Land managers should mitigate spread from their land.* ***This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)**
Tropical soda apple *Solanum viarum*	**Control Order** Tropical Soda Apple Control Zone: Whole of NSW *Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple 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 on the land, or on or in a carrier.*
Velvety tree pear *Opuntia tomentosa*	**Prohibition on dealings** *Must not be imported into the State or sold* **Regional Recommended Measure** *Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Core infestations: Land managers should mitigate spread from their land.* **This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)**
Water caltrop *Trapa* species	**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* **All species in the *Trapa* genus are Prohibited Matter in NSW**
Water hyacinth *Eichhornia crassipes*	**Biosecurity Zone** The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong). *Within the 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*
Water lilies *Nymphaea* species	**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.*

Weed	Duty
Water soldier *Stratiotes aloides*	**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*
Willows *Salix* species	**Prohibition on dealings** *Must not be imported into the State or sold* **All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)**
Witchweeds *Striga* species	**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* **All species in the *Striga* genus are Prohibited Matter in NSW, except the native *Striga parviflora***
Yellow burrhead *Limnocharis flava*	**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*

APPENDIX G PERSONNEL

Ecologist, Cameron Radford (BSc. Env M. Wildlife Hlth & Pop Mgmt) has over six years' experience as a fauna and flora ecologist working in NSW, South Australia and Queensland. He has experience working in both consultancies and not-for-profit organisations covering all aspects of ecological work including research, assessment and reporting, management and species/ecosystem conservation and restoration. Cameron has led fauna survey teams in semi-arid desert to coastal habitats and has strong experience in fauna and flora surveys and assessments throughout south-eastern Australia. Through his extended experience in environmental assessment and research, Cameron has developed excellent report writing and data analysis skills, as well as strong interpersonal communication skills working with private and public sector stakeholders. Within the NGH Environmental team, Cameron has worked on a range of projects including renewable energy, road infrastructure and water infrastructure.

Brenton von Takach (BScEnv, MConBio) is a botanist and ecologist with NGH Environmental's biodiversity team, and performs flora and fauna assessments for a wide variety of projects. Brenton has been involved with developments ranging from large-scale wind farms and dam upgrades to minor road alterations. He is well-versed in a broad array of monitoring and survey techniques for both flora and fauna, and has conducted surveys in a number of biogeographic regions of NSW. As a result, he is familiar with many of the vegetation types and communities found throughout the state. Brenton's work requires knowledge of and experience in the management of threatened species and ecological communities as well as a solid understanding of legislative requirements at both State and Commonwealth levels. Prior to joining nghenvironmental he worked for the *Australian Wetlands and Rivers Centre* at the University of NSW, conducting survey trips across Australia to undertake vegetation assessments and fauna trapping programs. He has been involved in fauna monitoring programs with OEH and radio tracking fauna for the Australian Wildlife Conservancy. Brenton is a very capable field ecologist with excellent reporting skills.

Nick Graham-Higgs (BSc) is an environmental practitioner with over 30 years of experience, and in 2011 this was formally recognised with the award of Fellowship of the Environment Institute of Australia and New Zealand (FEIANZ). Nick has been a Certified Environmental Practitioner (CEnvP) under the EIANZ's certification scheme, since 2005.

Nick has specialising in environmental management, biodiversity assessment and impact assessment. He has managed and prepared documentation for a wide range of projects, of varying scales and affecting a diverse range of natural and constructed environments. Nick's role includes provision of technical advice and review.