Winterbourne Wind Farm

Biodiversity Constraints Assessment

25 June 2020

Project No.: 0526676

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25 June 2020

Winterbourne Wind Farm

Biodiversity Constraints Assessment

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Acronyms and Abbreviations

Name	Description
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
DAWE	Department of Agriculture, Water and Environment
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia
IBRA	Interim Biographic Regionalisation of Australia
LGA	Local Government Areas
LLS Act	*Local Land Services Act 2013*
MNES	Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TEC	Threatened Ecological Communities
The Project	Winterbourne Wind Farm Project
VIS	Vegetation Information System
WoNS	Weeds of National Significance
WWF	Winterbourne Wind Farm
WWPL	WinterbourneWind Pty Ltd

1. INTRODUCTION

WinterbourneWind Pty Ltd (WWPL) propose to construct and operate the Winterbourne Wind Farm Project (WWF, or the project), a renewable energy development located to the north and east of Walcha in the Northern Tablelands of New South Wales (NSW).

WWPL is seeking State Significant Development (SSD) Consent under Division 4.7 of Part 4 of the *Environmental Planning & Assessment Act* 1979 (EP&A Act).

As a first step in the SSD Consent process, WWPL engaged Environmental Resources Management Australia (ERM) to prepare a Scoping Report (this report) in support of an application to the Secretary of the Department of Planning, Industry and Environment (DPIE) for Secretary's Environmental Assessment Requirements (SEARs). The SEARs will guide the preparation of an Environmental Impact Statement (EIS) for the project as part of a broader development application.

WWPL also engaged ERM to prepare a Biodiversity Constraints Assessment to inform the Scoping Report and preliminary project design.

1.1 Objectives

The objective of this assessment is to identify and describe biodiversity values within the project boundary. This assessment allows preliminary recommendations to be provided in terms of avoidance, mitigation and/or additional assessment for biodiversity values. For this assessment, biodiversity values include:

- Native species and communities with a particular focus on those listed as migratory, vulnerable, endangered or critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the NSW *Biodiversity Conservation Act 2016* (BC Act) and avian species susceptible to turbine strikes (e.g. raptors); and
- Important habitat components (e.g. hollow-bearing trees) and landscape features.

This report is informed by a combination of:

- Desktop assessment.
- Fieldwork completed during Spring 2019 (November), which included:
  - Biodiversity Assessment Method (BAM) plot surveys;
  - Targeted fauna surveys; and
  - Habitat and landscape values assessments.
- Additional biodiversity survey completed (February 2020), which focused on threatened fauna species (summarised in **Appendix D** of this report).

The report includes:

- Identification of protected/sensitive biodiversity areas, threatened species and threatened ecological communities, important habitat components and landscape features, and fauna species susceptible to turbine strikes.
- A description of outcomes and recommendations to support the ongoing project design and assessment process.

1.2 Project Overview

The project is situated approximately 425 kilometres (by road) from Sydney and 180 kilometres north-west of Port Macquarie. It is located ~75 kilometres north-east of Tamworth and ~35 kilometres south-south-west of Armidale within both Walcha and Uralla Local Government Areas (LGA).

The project boundary extends around an area of approximately 24,400 hectares of which less than 1,000 hectares is expected to be disturbed during the project lifecycle. The project is at an elevation of approximately 1,100 to 1,300 metres (above sea level) and is comprised of hills and ridgelines rising out of the Walcha Plateau.

The project locality and an indicative layout is identified in **Figure 1.1** and **Figure 1.2**.

WWF is proposed to consist of up to 126 wind turbine generator locations with a combined maximum installed capacity of 700 megawatts (MW). A maximum tip height of 250 metres is proposed.

The project would also include:

- An internal electrical reticulation network (both overhead and underground);
- Three on-site substations;
- New and upgraded access roads;
- Temporary construction facilities (including concrete batching plants); and
- Operation and maintenance buildings.

Large-scale battery storage is also proposed for the project to support stabilising the supply of electricity to the National Electricity Market (NEM).

The project is also proposed to include approximately 30 km of 330kV overhead transmission line running through the wind farm and continuing northwest from the project site. This new transmission line would connect to the existing grid network operated by TransGrid at a new switchyard which would be constructed approximately 7 km south of Uralla, NSW.

This switchyard location has also been proposed by WalchaEnergy as part of its Salisbury Solar Farm project, and has been referred to as the “Uralla Hub”. The proposed transmission line route and switchyard location are identified in **Figure 1.2** below.

It should be noted that the biodiversity assessment described herein was undertaken based on an earlier project layout, and does not include several proposed turbine locations or the proposed transmission line route. Additional field surveys and biodiversity assessment will be conducted on these locations as part of the EIS.

SALISBURY PLAINS

OXLEY WILD RIVERS

LONG FLAT

ARMIDALE REGIONAL COUNCIL

URALLA SHIRE COUNCIL

TAMWORTH REGIONAL COUNCIL

WALCHA COUNCIL

Armidale

Tamworth

A15

B54

OXLEY WILD RIVERS

THUNDERBOLTS WAY

WALCHA

OXLEY HIGHWAY

MOONA PLAINS

OXLEY WILD RIVERS

OXLEY WILD RIVERS

Legend

- Project Boundary
- Highway / Major Road
- Local Road
- Existing 66kV Transmission Line
- National Parks

Source:
Base Data - DCDB, DTDB Nov 2019
ESRI World Imagery Apr 2015
ESRI World Street Map

Project Locality

F1.1

Drawing No:	0526676s_WWF_SRB_G011_R4.mxd		Winterbourne Wind Farm Scoping Report
Date:	16/06/2020	Drawing Size: A3	
Drawn By:	VN	Reviewed By: DMS	Client: WWPL

Coordinate System: GDA 1994 MGA Zone 56

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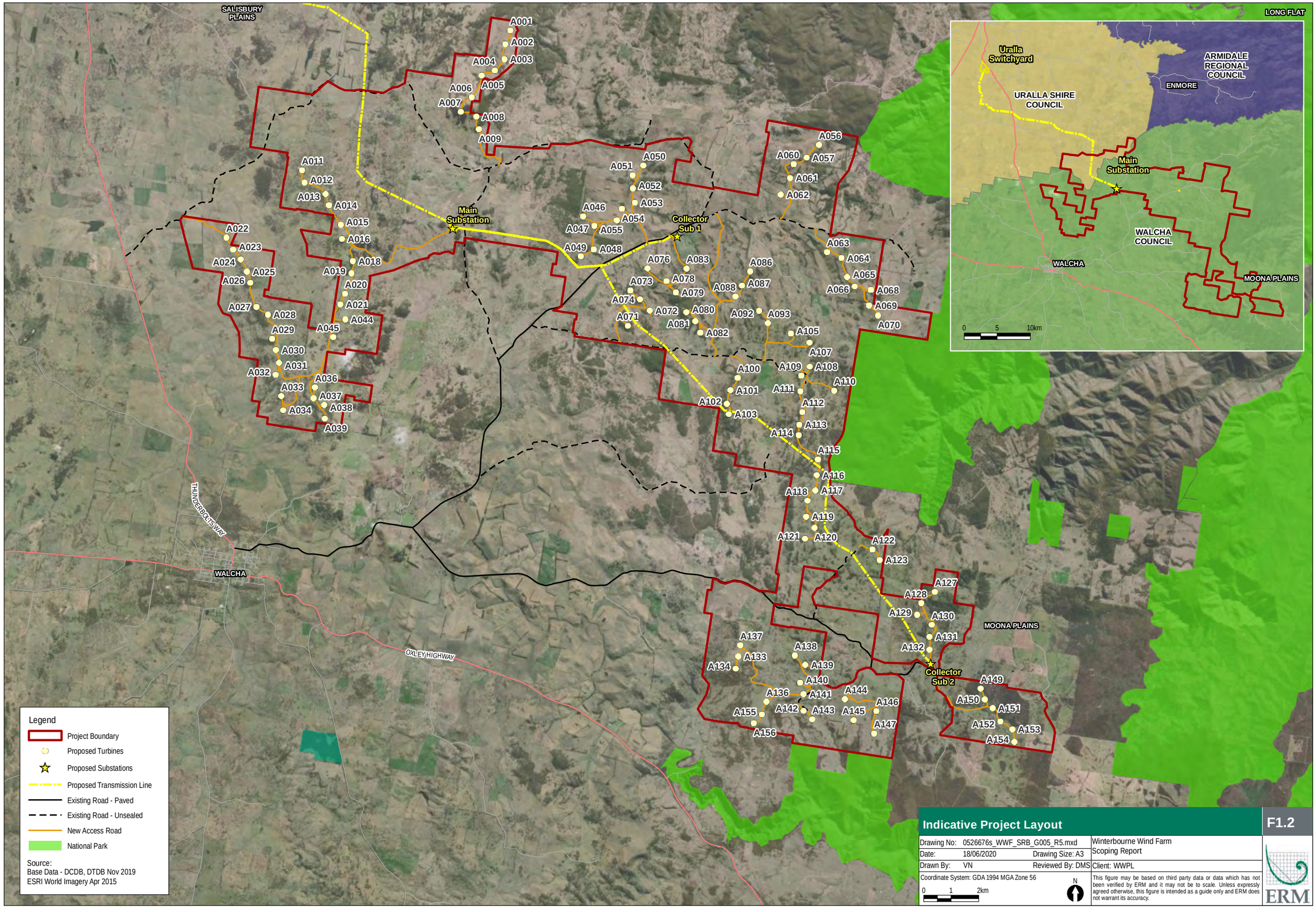

Indicative Project Layout

F1.2

Drawing No:	0526676s_WWF_SRB_G005_R5.mxd		Winterbourne Wind Farm Scoping Report
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Drawn By:	VN	Reviewed By: DMS	Client: WWPL

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2. LEGISLATION

This chapter provides a discussion of the biodiversity-related federal and state legislation and policies relevant to the development of the project.

2.1 Applicable Legislation

A description of the relevant legislative context is provided below. This report addresses the objectives and requirements of the legislation as it relates to the identification of biodiversity values. Impacts to these values will be addressed separately if required as part of the EIS to be prepared under Part 5 of the EP&A Act.

2.1.1 Commonwealth Legislation

2.1.1.1 Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act requires approval of the Commonwealth Minister for Environment (formerly the Minister of Sustainability, Environment, Water, Population and Communities) for actions that may have a significant impact on Matters of National Environmental Significance (MNES).

The EPBC Act is administered by the Commonwealth Department of Environment and Energy (DoEE) and lists threatened species, ecological communities and other MNES, as outlined in **Table 5.1** of this report. Any proposed action that is expected to have an impact on MNES must be referred to the Minister for assessment under the EPBC Act, or assessed under the accredited process between the Commonwealth and the State of NSW.

2.1.2 Statutory Legislation and Guidelines

2.1.2.1 Biodiversity Conservation Act 2016 (BC Act)

The NSW *Biodiversity Conservation Act 2016* came into effect on 25 August 2017. The BC Act replaced the NSW *Threatened Species Conservation Act 1995*, the NSW *Nature Conservation Trust Act 2001* and parts of the NSW *National Parks and Wildlife Act 1974*. The BC Act establishes mechanisms for:

- The management and protection of listed threatened species of native flora and fauna (excluding fish and marine vegetation) and threatened ecological communities (TECs).
- The listing of threatened species, TECs and key threatening processes.
- The development and implementation of recovery and threat abatement plans.
- The declaration of critical habitat.
- The consideration and assessment of threatened species impacts in development assessment process.
- Biodiversity Offsets Scheme (BOS), including the Biodiversity Values Map and BAM to identify serious and irreversible impacts.

The BC Act establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the BAM.

A Biodiversity Values Map and Biodiversity Offsets Scheme Entry Threshold tool are available to identify the presence of mapped biodiversity values within land proposed for development as well as the clearing thresholds that would trigger application of the BAM.

The Biodiversity Offsets Scheme applies to state significant development and state significant infrastructure projects, unless the Secretary of DPIE determines that the project is not likely to have a significant impact. Based on the assessment of preliminary biodiversity values, the project is likely to require the preparation of a Biodiversity Development Assessment Report (BDAR) to support any EIS being prepared.

2.1.2.2 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* came into effect on 1 July 2017, effectively replacing the *Noxious Weeds Act 1993*, and 13 other Acts, with a single Act. Under the *Noxious Weeds Act* all landowners have a responsibility to control noxious weeds on their property. Under the *Biosecurity Act* the same responsibility will apply and will be known as a General Biosecurity Duty.

The General Biosecurity Duty states "*Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.*" The general biosecurity duty applies to all weeds listed in Schedule 3 of the Biosecurity Act.

2.1.2.3 Weeds of National Significance

32 Weeds of National Significance (WoNS) have been agreed by Australian governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social and economic impacts. Some of the Weeds of National Significance (WoNS) are also listed as primary weeds in LGAs.

Primary weeds have been identified in different LGAs due to the level of threat infestation they represent. A strategic plan for each weed will be required at each site to define responsibilities and identify strategies and actions to control the weed species.

These can be downloaded from:

http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html

2.1.2.4 State Environmental Planning Policy (Koala Habitat Protection) 2019

A State Environmental Planning Policy (SEPP) Koala Habitat Protection now replaces SEPP 44 – Koala Habitat Protection (SEPP 44). The Koala Habitat Protection SEPP includes a new definition of 'core koala habitat', two maps to help protect koalas across NSW, and the list of tree species listed under the SEPP has been expanded from 10 to 123, across nine distinct regions of NSW.

The policy intent of SEPP 44 has been retained in the Koala Habitat Protection SEPP and the former SEPP will be repealed when the new SEPP commences on 1 March 2020.

The Project would, as far as practicable, aim to be consistent with the objectives of the Koala Habitat Protection SEPP and will be addressed within any BDAR prepared to support the EIS.

2.1.2.5 Local Land Services Act 2013

The *Local Land Services Act 2013* (LLS Act) regulates the management of vegetation on rural land. The amendments to the LLS Act have resulted in a change to the criteria for native vegetation clearing. There are now three different land categories for clearing on rural land:

- Category 1 – 'Exempt land' which will not be subject to clearing approval;
- Category 2 – 'Regulated Land' on which clearing of native vegetation may be carried out with or without approval in accordance with an 'allowable activity' or 'code' under the LLS Act, and
- 'Excluded Land' – Land not categorised in the Regulatory Maps and to which the LLS Act does not apply.

A review of the Native Vegetation Regulatory Map (Regulatory Map) and confirmation of the relevant land categories will be included within any BDAR prepared to support the EIS.

2.1.2.6 Fisheries Management Act 1994

The *Fisheries Management Act 1994* provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. Similar to the BC Act, the *Fisheries Management Act 1994* lists threatened species, populations and ecological communities of fish and marine vegetation. Consideration of the likely occurrence of threatened fish in the waterways in the project site will be provided in the EIS.

Schedule 6 of the *Fisheries Management Act 1994* also lists the following key threatening process that may be relevant to this project and which will be addressed within the EIS:

- Degradation of native riparian vegetation along New South Wales water courses;
- Human-caused climate change; and
- Removal of large woody debris from New South Wales rivers and streams.

Any waterway crossings will need to consider an appropriately designed structure that does not obstruct fish passage and will be designed in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management and the Policy and Guidelines for Fish Friendly Waterway Crossings.

Notwithstanding this, it is noted that a permit under section 219 would not be required for waterway crossings as Section 5.23 of the EP&A Act excludes SSD projects from requiring "*a permit under section 201, 205 or 219 of the Fisheries Management Act 1994*".

3. METHODOLOGY

This section describes the methods used to conduct the desktop assessment and Spring 2019 (November) field surveys, the latter incorporating BAM plot surveys, targeted fauna surveys and habitat/landscape values assessments.

3.1 Desktop Review

The desktop review included the following online resources:

- NSW Threatened Biodiversity Data Collection, including the Wildlife Atlas (BioNET), Vegetation Information System (VIS) database and threatened species profiles. Accessed October 2019.
- Results of the Commonwealth Department of Environment and Energy (DoEE) Protected Matters Search Tool (PMST) identifying threatened species and communities with potential to occur within the locality (10 km buffer around the project boundary). Accessed October 2019.
- NSW SEED mapping to identify Plant Community Types (PCT), threatened species or communities known or likely to occur; Mitchell Landscapes, map of Interim Biographic Regionalisation of Australia (IBRA) version 7.
- IBAT Proximity Report, 2018. Generated under licence 2057-4329 from the Integrated Biodiversity Assessment Tool on 08/10/2019: http://www.ibat-alliance.org.
- Atlas of Living Australia (ALA) Database. Accessed October 2019.
- Local government databases.

3.2 Field Surveys

For the purpose of this Biodiversity Constraints Assessment Report, only the Spring Field Surveys (November 2019) have been used to supplement the report. Additional Field Surveys (Summer February 2020) have been undertaken but do not contribute to this report.

Two ecologists conducted field surveys within the project boundary between 8 November 2019 and 21 November 2019, representing a total of 200 person hours. The field surveys included a range of targeted and general survey methods, which are detailed in **Table 3.1**.

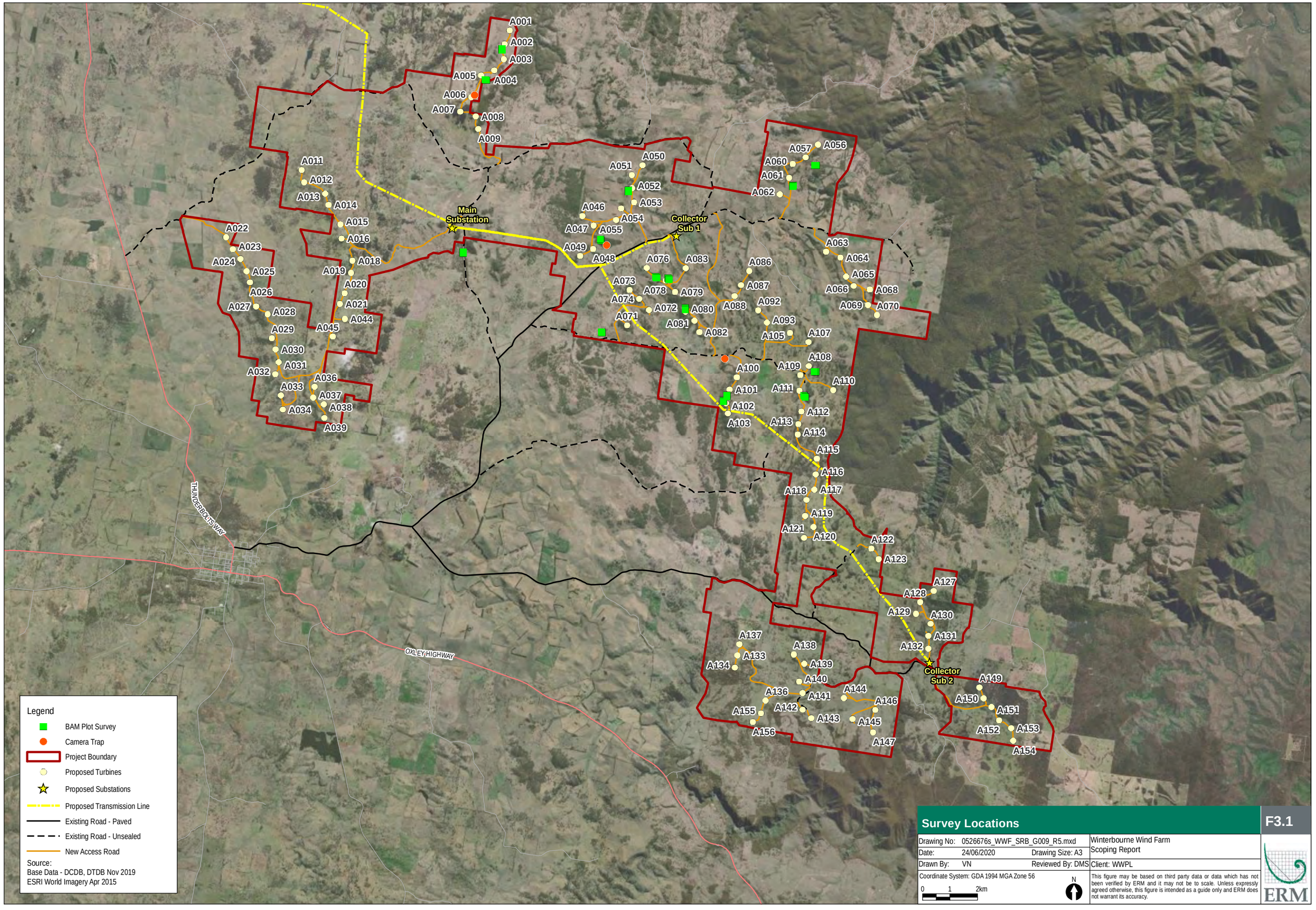
The purpose of the field surveys was to:

- Collect floristic and condition data of Plant Community Types (PCTs) in accordance with the BAM.
- Identify native species and communities with a particular focus on those listed as migratory, vulnerable, endangered or critically endangered under the EPBC Act, the BC Act and avian species susceptible to turbine strikes (e.g. Birds of Prey).
- Identify important habitat components (e.g. hollow-bearing trees) and landscape features.

Due to logistical, property access and safety limitations (e.g. bushfire risk) the survey effort was spatially restricted, as outlined in **Figure 3.1**.

Table 3.1 Field Survey Summary (Spring Surveys – November 2019)

Target	Survey Methods	Survey effort
Vegetation communities	BAM Plot Surveys	■ 15 BAM Plots
Habitat and landscape features	Habitat and Landscape Assessments	■ Opportunistically undertaken over the 12 day survey period
Birds	Waterhole Survey	■ Opportunistically undertaken over the 12 day survey period
	Birds of Prey Survey	■ Opportunistically undertaken over the 12 day survey period
	Diurnal Surveys	■ Opportunistically undertaken over the 12 day survey period
Reptiles & Amphibians	Diurnal Surveys	■ Opportunistically undertaken over the 12 day survey period
Mammals	Camera Trapping	■ 3 Camera Traps ■ 432 hrs (6 days and 6 nights)
	Scat Surveys	■ Opportunistically undertaken over the 12 day survey period
	Diurnal Surveys	■ Opportunistically undertaken over the 12 day survey period



Survey Locations

F3.1

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Drawn By:	VN	Reviewed By: DMS	Client: WWPL

Coordinate System: GDA 1994 MGA Zone 56

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3.2.1 Flora Surveys

3.2.1.1 BAM Plot Surveys

A total of 15 floristic plots were conducted in accordance with the BAM (OEH 2018). BAM Plot Surveys were coordinated and organised by Gabrielle Rose - Accredited Assessor (BAAS18091). At each plot location the following was conducted:

- One 20 x 20 metre plot for assessment of composition and structure.
- One 20 x 50 metre plot for assessment of function, including a series of five 1 x 1 metre plots to assess average leaf litter cover.

The assessment of composition and structure recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (cover values are rounded to the nearest whole number) or estimated to the nearest 5% (5% -100%). Abundance was counted (up to 20) and estimated above 20.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 20 x 50 metre plot and five 1 x 1 metre sub-plots.

3.2.1.2 PCT Identification

The method used for preliminary identification of the Plant Community Types (PCT) included:

- Use of the BioNet Vegetation Classification's Community Identification keys. Search criteria used included Vegetation Formation, Vegetation Class, IBRA Region and selected community species in the upper / mid / low stratum.
- Selection of the PCT was undertaken by comparing the descriptions of each potential PCT with characteristics of the vegetation such as landform location, species composition and other landscape features relevant to the vegetation community. When the vegetation community under assessment was likely to conform to more than one PCT, the decision on a given PCT over other options was based on presence of characteristic species, species richness and other aspects of the PCT description.
- The condition of the PCT was defined based on the absence of upper stratum, dominance of exotics over natives and percentage bare land present.

3.2.2 Habitat Assessments

Prior to conducting habitat assessments, experienced ecologists reviewed vegetation community mapping and aerial photography to assess distribution of habitat types. Assessments included quantifying habitat features present, particularly those relevant to migratory and threatened species.

Key habitat features included relative vegetative cover, abundance of nesting/shelter/basking sites, presence of aquatic habitats, presence of foraging resources, refuge sites, dominant canopy species, connectivity and disturbances.

3.2.3 Fauna Surveys

3.2.3.1 Camera Trapping

Motion sensor camera traps were deployed to target the Tiger Quoll (*Dasyurus maculatus*). Three camera traps were deployed at three locations within the project boundary, which were considered potential Tiger Quoll habitat (refer to **Figure 3.1**).

The camera traps were active for six days and six nights. Camera traps were baited with sardines and chicken necks. Camera traps were deployed in accordance with '*A Guide for the Use of Remote Camera for Wildlife Survey in Northern Australia*' (Gillespie et al., 2015).

3.2.3.2 Waterhole Surveys

Waterhole surveys were conducted in order to target aquatic bird species, particularly migratory species within the region. Waterholes included mostly artificial farm dams but also included small waterbodies in the landscape. During the waterhole surveys, observations were made from a stationary position, and birds were identified by call detection and visual observations.

3.2.3.3 Scat Surveys and Analysis

Scat surveys were opportunistically undertaken within the project boundary. Ecologists targeted large hollow-bearing trees and koala feed trees during the scat surveys. Targeted trees would be subject to at least two minutes of searching.

Scat identification was assisted with 'Tracks, Scats and other Traces: A Field Guide to Australian Mammals' (Triggs 2004). Confirmation and assessment of scats was undertaken by the following mammalian experts:

- Dr David Dique (Koala Expert); and
- Barba Triggs (Author of 'Tracks, Scats and other Traces: A Field Guide to Australian Mammals').

3.2.3.4 Birds of Prey Surveys

Birds of Prey surveys actively targeted diurnal soaring species. Birds of Prey surveys were undertaken at vantage points (e.g. ridgelines) at mid-morning when Birds of Prey become increasingly active.

3.2.3.5 Diurnal Surveys

Diurnal surveys were undertaken to target a range of mammal, bird, reptile and amphibian species. Scats, scratches, diggings, tracks and other signs were investigated to determine the presence of native fauna. Diurnal surveys were conducted opportunistically within the project boundary when practical.

3.3 Field Survey Conditions

Table 3.2 details the daily weather observations that were recorded for Woolbrook weather station during the field survey, which is approximately 25 kilometres from the project. The weather was fine throughout the survey periods, with temperatures ranging from a minimum of 2.7ºC to a maximum of 33ºC. The region has suffered from drought conditions, receiving only 39.6 mm of rain in the previous 3 months. No rainfall was recorded during the survey period.

Table 3.2 Daily Weather Observations at Woolbrook Weather Station

Date	Temperature		Rain	9:00 AM Statistics			
	Min	Max	mm	Temp	Relative Humidity	Wind Direction	Wind Speed (km/h)
	°C	°C		°C	%		
08/11/2019	9.2	26.3	0	20.5	54	NW	15
09/11/2019	8.5	17.5	0	11.0	76	WNW	19
10/11/2019	4.2	21.6	0	12.5	-	NW	11
11/11/2019	10.4	25.0	0	13.0	89	Calm	
12/11/2019	7.0	29.7	0	20.0	-	N	19
13/11/2019	12.5	22.8	0	16.5	-	SW	9
14/11/2019	7.5	24.5	0	15.5	-	NW	4
15/11/2019	2.7	27.5	0	19.5	-	SW	6
16/11/2019	5.6	28.0	0	22.0	52	W	4
17/11/2019	7.6	25.7	0	14.5	84	NNW	4
18/11/2019	13.6	25.2	0	16.4	58	Calm	
19/11/2019	12.3	29.7	0	21.6	27	NW	6
20/11/2019	8.2	33.0	0	24.3	63	Calm	
21/11/2019	13.0	32.0	0	22.0	-	Calm	

Source: Australian Government Bureau of Meteorology, www.bom.gov.au

3.4 Likelihood of Occurrence

Consistent with the accepted approach for biodiversity assessment, a likelihood of occurrence assessment was undertaken, informed by desktop sources and the field survey results. Desktop sources identified a number of fauna and flora species listed under the EPBC Act and BC Act that have been recorded previously or are predicted to occur within a 10 kilometre buffer of the project boundary. The likelihood of occurrence approach refines the desktop generated list using site-specific and specific-species habitat information.

Desktop sources are indicative only and likelihood rankings, particularly in regard to the presence of preferred habitat, are conservative. The assessment ranks the likelihood of the species occurring within the project boundary through analysis of species distribution information and the presence of specific habitat attributes as identified through the desktop analysis and field survey.

The criteria applied are outlined in **Table 3.3**. The preliminary likelihood of occurrence assessment is provided in **Appendix C** of this report.

Table 3.3 Likelihood of Occurrence Criteria

Factor	Preferred habitat exists	Suitable habitat exists[1]	Habitat does not exist[2]
Records within project boundary	Known	Known	Known
Records in the locality[3]	Likely	Potential	Unlikely
No records in the locality, but project boundary is within known distribution	Potential	Unlikely	Unlikely
No records in the locality, and Investigation Area is outside of distribution	Unlikely	Unlikely	Unlikely

1. *Habitat may be considered suitable, but not preferred because: some desired habitat features may be present, but not all; habitat may have poor connectivity; or habitat may be known to be disturbed.*
2. *Based on sources reviewed and/or field survey results.*
3. *'Locality' refers to a 10 km buffer of the project boundary.*

3.5 Assumptions and Limitations

The field and desktop assessments provide an overview of the biodiversity values that exist within the project boundary. Surveys were undertaken at discrete locations based on the proposed infrastructure footprint (e.g. turbine and road locations) to gain a general understanding of the types of species and habitat features that occur. While not all portions within the project boundary could be visited during the field survey, the landscape and its features were generally consistent throughout.

The absence of a species from a database list or observational studies does not confirm its absence within the project boundary. The lack of existing records from databases is more likely to indicate a low historic sampling effort in the region, as opposed to an absence of species. Similarly, the timing of the survey precludes the detection of a number of migratory and wader species that are typically absent from the area at that time of the year. Future biodiversity surveys will aim to cover multiple seasons in order to address temporal variability with a particular focus on migratory species.

In recent years, areas within project boundary and the greater region have suffered from drought conditions. Field survey results that indicate poor condition of vegetation communities, the absence of particular species and a low abundance and diversity of native fauna and flora may be the result of drought conditions.

To overcome these limitations, the likelihood of occurrence is based on the precautionary approach and identifies species that have the potential to occur rather than relying on species sightings alone.

4. BIODIVERSITY VALUES

This chapter summarises the results of the desktop and field investigations used to understand and assess the potential biodiversity values present within the project boundary.

4.1 Desktop Review

4.1.1 Threatened and Conservation Significant Species

4.1.1.1 Protected Matters Search Tool

The Protected Matters Search Tool was used to identify potential threatened and conservation significant species within a 10 kilometre radius of the project boundary (**Table 4.1**). A total of 42 conservation significant species were detected as potentially occurring within this radius. Half of these species are birds, most of which are listed as migratory species. There were ten threatened flora species, eight threatened mammals, two threatened amphibians and one threatened reptile detected as potentially occurring within the 10 kilometre radius.

Table 4.1 Protected Matters Search Tool

Type	Scientific Name	Common Name	BD Act	EPBC Act
Birds	*Anthochaera phrygia*	Regent Honeyeater	CE	CE
	Numenius madagascariensis	Far Eastern Curlew	-	CE
	Lathamus discolor	Swift Parrot	E	CE
	Calidris ferrunginea	Curlew Sandpiper	E	CE, Mi
	Rostratula australis	Australian Painted-snipe	E	E
	Cuculus optatus	Oriental Cuckoo	-	Mi
	Monarcha melanopsis	Black-faced Monarch	-	Mi
	Rhipidura rufifrons	Rufous Fantail	-	Mi
	Calidris acuminata	Sharp-tailed Sandpiper	-	Mi
	Gallinago hardwickii	Latham's Snipe	V	Mi
	Apus pacificus	Fork-tailed Swift	-	Mi
	Symposiachrus trivirgatus	Spectacled Monarch	-	Mi, Ma
	Motacila flava	Yellow Wagtail	-	Mi, Ma
	Actitis hypoleucos	Common Sandpiper	-	Mi, Ma
	Calidris melanotos	Pectoral Sandpiper	-	Mi, Ma
	Pandion cristatus	Osprey	V	Mi, Ma
	Tringa nebularia	Common Greenshank	-	Mi, Ma
	Grantiella picta	Painted Honeyeater	V	V
	Erythrotriorchis radiates	Red Goshawk	CE	V
	Turnix melanogaster	Black-breasted Button-quail	CE	V
	Hirundapus caudacutus	White-throated Needletail	-	V, Mi

Type	Scientific Name	Common Name	BD Act	EPBC Act
Mammals	Chalinolobus dwyeri	Large-eared Pied Bat	V	V
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V
	Petauroides volans	Greater Glider	E	V
	Phascolarctos cinereus	Koala	V	V
	Potorous tridactylus	Long-nosed Potoroo	V	V
	Pseudomys novaehollandiae	New Holland Mouse	-	V
	Pteropus poliocephalus	Grey-headed Flying-fox	V	V
	Dasyurus maculatus	Tiger Quoll	V	E
Reptiles	*Wollumbinia belli*	Bell's Turtle	E	V
Amphibians	*Litoria piperata*	Peppered Tree Frog	CE	V
	Mixophyes balbus	Stuttering Frog	E	V
Plants	*Euphrasia arguta*	-	CE	CE
	Cynanchum elegans	White-flowered Wax Plant	E	E
	Diuris eborensis	-	E	E
	Callistemon pungens	-	-	V
	Dichanthium setosum	Bluegrass	V	V
	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V
	Hakea fraseri	Gorge Hakea	V	V
	Haloragis exalata subsp. velutina	Tall Velvet Sea-berry	V	V
	Prostanthera cineolifera	Singleton Mint Bush	V	V
	Thesium australe	Austral Toadflax	V	V

V = Vulnerable; E = Endangered; CE = Critically Endangered; Ma = Marine; Mi = Migratory

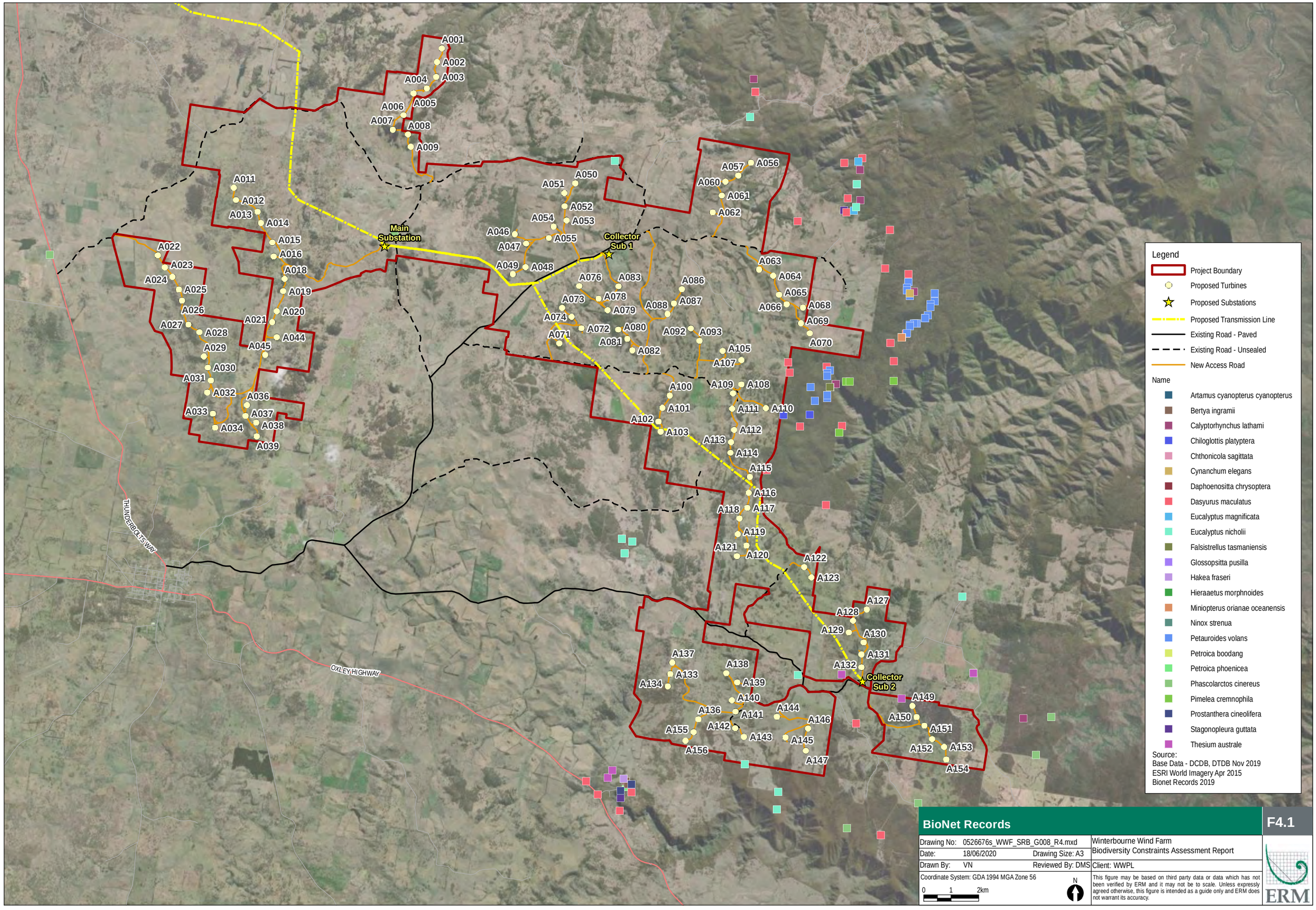
4.1.1.2 BioNet

BioNet records of threatened or conservation significant species within a 10 kilometre radius of the project boundary are detailed in **Table 4.2.** BioNet records within the Project Area are presented in **Figure 4.1**. A total of 32 threatened species have been recorded within this radius. Almost half of those species are threatened birds. There are ten threatened flora species and seven threatened mammalian species recorded within that 10 kilometre radius. Notably, Beadle's Grevillea (*Grevillea beadleana*) has been recorded 2300 times and the Tiger Quoll (*Dasyurus maculatus*) has been recorded 192 times. BioNet indicates that there are Austral Toadflax and Koala records within the project boundary.

Table 4.2 BioNet Records

Type	Scientific Name	Common Name	BC Act	EPBC Act	Individuals recorded within 10 km
Birds	*Hirundapus caudacutus*	White-throated Needletail	-	V, Mi	11
	Stagonopleura guttata	Diamond Firetail	V	-	5
	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	9
	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	2
	Chthonicola sagittata	Speckled Warbler	V	-	5
	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	1
	Daphoenositta chrysoptera	Varied Sittella	V	-	14
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	1
	Glossopsitta pusilla	Little Lorikeet	V	-	n/a
	Haliaeetus leucogaster	White-bellied Sea-Eagle	V	Ma	1
	Hieraaetus morphnoides	Little Eagle	V	-	2
	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	2
	Ninox strenua	Powerful Owl	V	-	2
	Petroica boodang	Scarlet Robin	V	-	n/a
	Petroica phoenicea	Flame Robin	V	-	n/a
Mammals	*Phascolarctos cinereus*	Koala	V	V	1
	Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	1
	Potorous tridactylus	Long-nosed Potoroo	V	V	n/a
	Dasyurus maculatus	Tiger Quoll	V	E	192
	Pteropus poliocephalus	Grey-headed Flying-fox	V	V	n/a
	Petauroides volans	Greater Glider	-	V	1
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	70
Flora	*Bertya ingramii*	Narrow-leaved Bertya	E	E	90
	Eucalyptus magnificata	Northern Blue Box	E	-	0
	Pimelea cremnophila	-	CE	-	n/a
	Chiloglottis platyptera	Barrington Tops Ant Orchid	V	-	n/a
	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	0
	Grevillea beadleana	Beadle's Grevillea	E	E	2300
	Hakea fraseri	Gorge Hakea	V	V	0
	Haloragis exalata subsp. velutina	Tall Velvet Sea-berry	V	V	n/a
	Picris evae	Hawkweed	V	V	n/a
	Thesium australe	Austral Toadflax	V	V	0

1. *Records within a 10 km radius of the project boundary and within last 50 years only.*
2. *V = Vulnerable; E = Endangered; CE = Critically Endangered; Ma = Marine; Mi = Migratory.*



BioNet Records

F4.1

Drawing No:	0526676s_WWF_SRB_G008_R4.mxd		Winterbourne Wind Farm Biodiversity Constraints Assessment Report
Date:	18/06/2020	Drawing Size: A3	
Drawn By:	VN	Reviewed By: DMS	Client: WWPL
Coordinate System: GDA 1994 MGA Zone 56 0 1 2km		N	This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

4.1.2 Threatened Ecological Communities

In accordance with state vegetation mapping data there are potentially vegetation communities within the Project Boundary that conform to the criteria of four threatened ecological communities (TECs). The TECs include:

- EPBC Act TECs:
  - New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands.
  - Box Gum Grassy Woodland and Derived Grassland communities in NSW.
- BC Act TECs:
  - New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion.
  - Box Gum Woodland in New England Tablelands.

The existing vegetation mapping for the project area indicates that there are several vegetation communities that contain key species for these four TECs (e.g. *Eucalyptus nova-anglica, E. blakelyi, E. albens and E. melliodora*).

Based on the state vegetation mapping data, a number of turbine locations are within or in close proximity (<100 m) to vegetation communities that could support TECs under the EPBC Act or the BC Act. However, further field vegetation mapping is required to determine the actual presence and extent of TECs at the site, with reference to the following guidelines:

- NSW Scientific Committee, 2002. 'White Box-Yellow Box Blakely's Red Gum Woodland'.
- Australian Government, Department of Environment and Heritage EPBC Act Policy Statements. 'White box – Yellow Box – Blakely's Red Gum grass woodlands and derived native grasslands'.
- Australian Government, Department of Sustainability, Environment, Water, Population and Communities. 'Farming and Nationally Protected New England Peppermint Grassy Woodlands'.
- NSW Government, Environment Climate Change & Water. 'New England Peppermint Woodland on Basalts and Sediments in the New England Tableland Bioregion'.

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4.1.3 Protected Areas

No Protected Areas intercept the project. **Table 4.3** details nearby Protected Areas.

Table 4.3 Protected Areas

Protected Areas	Occurrence	Presence within Project Boundary	Distance from Project Boundary
World heritage properties	Gondwana Rainforests of Australia	No	<3.5 km
National heritage places	Gondwana Rainforests of Australia	No	<3.5 km
Other protected areas	Oxley Wild Rivers National Park	No	<1. 5 km
Ramsar wetlands of international importance	No	No	>50 km
Commonwealth marine areas	No	No	>50 km
The Great Barrier Reef Marine Park	No	No	>50 km
Alliance for Zero Extinction Sites	No	No	>50 km
Important Bird and Biodiversity Areas	No	No	>50 km

4.1.4 Native Vegetation and Landscape Features

Native vegetation and landscape characteristics for the current turbine locations (refer **Figure 1.2**) are summarised in **Table 4.4**. Due to the number of turbines, those in close proximity to one another have been assessed in groups (21 turbine groups in total).

The project is located wholly within the New England Tablelands Bioregion and also wholly within the Walcha Plateau Sub-bioregion. In accordance with NSW Hydrography, the proposed turbine locations do not intercept any mapped watercourses, although some turbines are in close proximity (<100 m) to drainage features. The proposed turbine locations do not intercept any high biodiversity value areas as mapped by the NSW Biodiversity Values Map. Although two turbine groups are located approximately 100 m from high biodiversity value areas. The mapped high biodiversity areas follow watercourses in the project area.

Areas within the project boundary have been subject to extensive clearing and are now regularly grazed by livestock. However, there are still some large to moderate vegetation patches scattered within the project boundary and many small vegetation patches and tree lines that maintain connectivity to the surrounding bushland and the Oxley Wild Rivers National Park.

Table 4.4 Native Vegetation and Landscape Characteristics at Turbine Locations

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
1, 2, 3, 4, 5, 6, 7, 8, 9	Several drainage features present, which drain into Scrubby Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area contains a combination of scattered trees, large vegetation patches and grasslands. This area is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	The majority of the area is mapped as non-remnant vegetation. Although there is a portion of this area mapped as remnant vegetation. This includes: ■ a moderate sized patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest; ■ a large patch of Peppermint *(Eucalyptus nova-anglica or Eucalyptus radiata* or *Eucalyptus nicholii*) woodland/forest.	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
12, 13, 14, 15, 16,18, 19, 20 , 21, 44, 45	Several drainage features present, which drain into Emu Creek, Jack Creek, Mihi Creek and Grose Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area contains a combination of scattered trees, large vegetation patches and grasslands. This zone is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	The majority of this area is mapped as remnant vegetation, with only a small portion mapped as non-remnant. Remnant vegetation includes*:* ■ A large contiguous patch of New England Stringy Bark (*Eucalyptus caliginosa*) and Peppermint (*Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) woodland/forest ■ A large contiguous patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
22, 23, 24, 25, 26, 27, 28,29, 30, 31, 32, 33, 34	Several drainage features present, which drain into Ohio Creek and Grose Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area contains a combination of scattered trees, small vegetation patches and grasslands. This area is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	The majority of this zone is mapped as remnant vegetation, with a small portion mapped as non-remnant. Remnant vegetation includes: ■ Large patch of New England Peppermint *(Eucalyptus nova-anglica*) woodland/forest	**Yes** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
36, 37, 38, 39	Several drainage features present, which drain into My Ladys Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	These areas have been subject to extensive vegetation clearing and now exist as grasslands. There is combination of scattered trees, vegetation patches and grasslands. This area is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	The majority of the area is mapped as non-remnant vegetation. A small portion of the area is a part mapped as remnant vegetation. This includes: ■ a small patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ Three small and medium sized patches of Yellow-Box (*Eucalyptus melliodora*) and Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest	**Yes** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW **BC Act:** ■ Box Gum Woodland in New England Tablelands

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
44	Several drainage features present, which drain into Washpool Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains a vegetation patch connected to the greater region.	The majority of the area is mapped as remnant vegetation. It includes: ■ A large patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest	**No**
46, 47, 48, 49	Several drainage features present, which drain into Lambing Flat Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches connected to the greater region.	The majority of the area is mapped as non-remnant vegetation. A small portion is mapped as remnant vegetation. This includes: ■ A moderate sized patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ A small linear patch and moderate patch of Yellow Box (*Eucalyptus melliodora*) – Blakely's Red Gum (*Eucalyptus blakelyi*) woodland/ forest	**Yes** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW **BC Act:** ■ Box Gum Woodland in New England Tablelands

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
50, 51, 52, 53, 54, 55	Several drainage features present, which drain into Scrubby Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches connected to the greater region.	The majority of the area is mapped as non-remnant vegetation. A small portion is mapped as remnant vegetation. This includes: ■ A moderate sized patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ Several small patches of New England Stringybark (*Eucalyptus caliginosa*) - *(Eucalyptus nova-anglica* or *Eucalyptus radiate* or *Eucalyptus nicholii*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
56, 57, 60, 61, 62	Several drainage features present and Eagle Gully, which drain into Hole Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area contains a combination of scattered trees, linear vegetation patches and grasslands. This area is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	This area is mapped as non-remnant.	**No**

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
63, 64, 65, 66, ,68, 69, 70	Several drainage features present that drain into Winterbourne Creek and Port Macquarie Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches connected to the greater region. It is immediately adjacent to Oxley Wild Rivers National Park.	The majority of this area is mapped as non-remnant vegetation, with a relatively small portion mapped as remnant vegetation. Remnant vegetation includes: ■ Moderate sized patches of montane Stringybark – Gum woodland/forest ■ Small patches of Dry Open New England Blackbutt (*Eucalyptus campanulata*) woodland/ forest	**Possible** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW **BC Act:** ■ Box Gum Woodland in New England Tablelands
71, 72, 73, 74, 76, 78, 79, 80, 81, 82, 83	Several drainage features present that drain into Dog Trap Creek and Lambing Flat Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area contains a combination of scattered trees, large vegetation patches and grasslands. This zone is connected to the surrounding vegetation communities and also to Oxley Wild Rivers National Park.	The majority of this area is mapped as remnant vegetation, with only a small portion mapped as non-remnant. Remnant vegetation includes: ■ Several moderate to large patches of Yellow-Box (*Eucalyptus melliodora*) and Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ A large contiguous patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest	**Yes** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW **BC Act:** ■ Box Gum Woodland in New England Tablelands

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
86, 87, 88, 92, 93, 105, 107	Several drainage features present that drain into Winterbourne Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains tree lines connected to the greater region.	The majority of this area is mapped as non-remnant vegetation, with a small portion mapped as remnant vegetation. Remnant vegetation includes: ■ Scattered patches of New England Peppermint *(Eucalyptus nova-anglica*) woodland/forest ■ Large patches of Peppermint *(Eucalyptus nova-anglica* or *Eucalyptus radiate* or *Eucalyptus nicholii*), Mountain Gum (*Eucalyptus cypellocarpa*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest	**Yes** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
108, 109, 110, 111, 112, 113, 114	Several drainage features present that drain into Snake Creek and Brookmount Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches connected to the greater region. It is in close proximity to Oxley Wild Rivers National Park.	This area has an almost equal amount of mapped remnant and non-remnant vegetation. Remnant vegetation includes: ■ A moderate sized contiguous patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ Moderate sized patches of montane Stringybark –Gum woodland/forest	**Possible** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW **BC Act:** ■ Box Gum Woodland in New England Tablelands

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
100, 101, 102, 103	Several drainage features present that drain into Snake Creek.	The creek is mapped on the Biodiversity Value Map, and is located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains tree lines that are connected to the greater region.	This area has an almost equal amount of mapped remnant and non-remnant vegetation. Remnant vegetation includes: ■ Moderate and small sized patches of Peppermint (Eucalyptus *nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
115, 116, 117, 118, 119, 120, 121	Several drainage features present.	Creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains tree lines that are connected to the greater region.	This area has an almost equal amount of mapped remnant and non-remnant vegetation. Remnant vegetation includes: ■ Moderate and small sized patches of Peppermint *(Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest ■ A large contiguous patch of New England Stringy Bark (*Eucalyptus caliginosa*) and Peppermint *(Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
122, 123,	Several drainage features present that drain into Rowleys Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains scattered trees that are connected to the greater region.	The majority of this area is mapped as non-remnant vegetation, with only a small portion mapped as remnant vegetation. Remnant vegetation includes: ■ Large patches of Peppermint (Eucalyptus *nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*), Mountain Gum (*Eucalyptus cypellocarpa*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest ■ A small patch of New England Peppermint *(Eucalyptus nova-anglica*) woodland/forest	**Yes** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
127, 128, 129, 130, 131, 132	Several drainage features present that drain into Ellas Creek and Rowleys Creek.	Within 100m of a patch of vegetation mapped by the Biodiversity Values Map.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains scattered trees and vegetation patches that are connected to the greater region.	The majority of this zone is mapped as non-remnant vegetation, with only a small portion mapped as remnant vegetation. Remnant vegetation includes: ■ A small patch of Broad–leaved Stringy Bark (*Eucalyptus caliginosa*) woodland/forest ■ A large patch of Peppermint *(Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*), Mountain Gum (*Eucalyptus cypellocarpa*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
133, 134, 137	Several drainage features present that drain into Majors Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches that are connected to the greater region.	The majority of this area is mapped as non-remnant vegetation, with a small portion mapped as remnant vegetation. Remnant vegetation includes: ■ A large contiguous patch of New England Stringy Bark (*Eucalyptus caliginosa*) and Peppermint *(Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) woodland/forest	**No**

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
138, 139, 140	Several drainage features present that drain into Graveyards Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains scattered trees that are connected to the greater region.	This Zone is mapped as non-remnant.	**No**
141, 142, 143, 136, 155, 156	Several drainage features present that drain into Graveyards Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains scattered trees that are connected to the greater region.	This Zone is mapped as non-remnant except for: ■ Large patches of Peppermint (Eucalyptus *nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*), Mountain Gum (*Eucalyptus cypellocarpa*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest	**Possible** **EPBC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion
144, 145, 146, 147	Several drainage features present that drain into Graveyards Creek and Stockyard Creek.	Within 100m of a patch of vegetation mapped by the Biodiversity Values Map.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands, however, contains vegetation patches that are directly connected to Oxley Wild Rivers National Park.	The majority of this area is mapped as non-remnant vegetation, with a small portion mapped as remnant vegetation. Remnant vegetation includes: ■ Apple (*Angophora floribunda*) and Manna Gum (*Eucalyptus viminalis*) Woodland ■ Dry Grassy Stringybark woodland/forest	**No**

Turbine Number	Rivers, streams, estuaries and wetlands	Biodiversity Values Map	Landscape Connectivity	Vegetation Communities	Associated Threatened Ecological Community
149, 150, 151, 152, 153, 154	Several drainage features present that drain into Moona Creek.	The creeks are mapped on the Biodiversity Value Map, and are located over 100m from any proposed turbine locations.	Large parts of the area have been subject to extensive vegetation clearing and now exist as grasslands. This area is mostly characterised by cleared grasslands and forest patches that are connected to the greater region. This area is immediately adjacent to Oxley Wild Rivers National Park.	This area has an almost equal amount of mapped remnant and non-remnant vegetation. Remnant vegetation includes: ■ A moderate and large patch of Dry Grassy Stringybark woodland/forest ■ Large patches of Peppermint (*Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*), Mountain Gum (*Eucalyptus cypellocarpa*) and Manna Gum (*Eucalyptus viminalis*) woodland/forest ■ A large patch of New England Stringy Bark (*Eucalyptus caliginosa*) and Peppermint (*Eucalyptus nova-anglica* or *Eucalyptus radiata* or *Eucalyptus nicholii*) woodland/forest ■ A moderate sized patch of montane Stringybark –Gum woodland/forest	**Possible** **EPBC Act:** ■ Box – Gum Grassy Woodland and Derived Grassland communities in NSW ■ New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands **BC Act:** ■ New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion ■ Box Gum Woodland in New England Tablelands

4.2 Field Results

The following section summaries the findings of the Spring field surveys conducted by two ecologists between 8 November 2019 and 21 November 2019.

4.2.1 Overview

A large proportion of the area within the project boundary is currently and has historically been subject to grazing from livestock, predominantly sheep and cattle. Consequently, large expanses have been converted to non-native grasslands.

It is likely that these areas were historically dominated by *Eucalyptus* woodland and forest communities. It is also likely these areas still contain some large to moderate sized patches of *Eucalyptus* woodland and forest communities as well as many small vegetation patches and treelines. In addition to the *Eucalyptus* woodland and forest communities, there are also rocky outcrops, escarpments, native sedgelands, rolling hills, gullies and artificial dam habitats.

A large proportion of the lands within the project boundary have been subject to environmental degradation, most of which is likely attributable to anthropogenic actions. Major biodiversity impacts already impacting the area include: habitat clearing, proliferation of invasive flora and fauna, dieback, native fauna mortality events (roadkill and hunting), overgrazing, exclusion fencing and changes to natural hydrology.

4.2.2 Aquatic Values

The project is located within the Macleay River catchment. Due to the elevated nature of turbine infrastructure and the presence of existing access tracks, the majority of the project's infrastructure will avoid watercourses, most drainage features, wetlands and artificial dams. Therefore, these preliminary field surveys did not aim to assess aquatic fauna and flora communities. However, field ecologists did investigate aquatic areas of high biodiversity value.

During the field surveys, aquatic habitats assessed were exclusively in the form of artificial dams created for livestock. These dams were generally small (<0.5 hectares) and had few microhabitat features (e.g. woody debris). These dams provided habitat for aquatic-associated bird species and are considered likely to be important for local macropod populations.

4.2.3 Habitat and Landscape Features

During the field surveys, ecologists aimed to identify habitat and landscape features important for threatened and migratory fauna species. The locations of large hollows (> 20 centimetre diameter), den habitat, rocky outcrops and possum dreys were recorded.

Hollow bearing trees were identified within the project boundary. Many Eucalyptus trees contained fauna scratch marks, mostly likely from native arboreal fauna. Woody debris was abundant throughout, which may be attributable to the severe storm (190 km/hr winds) the Walcha region experienced in December 2018. Den habitats were identified in rocky areas and outcrops that were common on hilltop areas. Several species of Eucalyptus identified within the project boundary are considered food sources for Koalas (Phascolarctos cinereus), which included:

- Yellow Box (*Eucalyptus melliodora*);
- Blakely's Red Gum (*Eucalyptus blakelyi*);
- Mountain Gum (*Eucalyptus dalrympleana*);
- Candle Bark (*Eucalyptus rubida*);
- Messmate (*Eucalyptus obliqua*); and
- Manna Gum (*Eucalyptus viminalis*).

4.2.4 Threatened Ecological Communities

Two vegetation communities were identified, which conformed to the criteria of two TECs under the BC Act:

- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion (BC Act).
- Box Gum Woodland in New England Tablelands (BC Act).

Six vegetation patches (14.4 hectares) aligned with the species composition and community structure of the Box Gum Woodland in accordance with the BC Act based on the following reasons:

- Located within NSW New England Tablelands.
- Vegetation patches would likely respond to assisted natural regeneration.
- White Box, Yellow Box or Blakely's Red Gum, or a combination of these species, are or were present.
- The site is predominantly grassy.

At this preliminary stage of assessment, it is not confirmed if these six vegetation patches are considered Box Gum Woodland in accordance with the EPBC Act. Further field surveys will be required to determine if the vegetation patches have a predominantly native understorey (a key criteria for EPBC Box-Woodland TEC).

Three vegetation patches (24.2 hectares) aligned the species composition and community structure of the New England Peppermint Woodland in accordance with the BC Act based on the following reasons:

- Located within NSW New England Tablelands.
- Vegetation is an open grassy forest or woodland with sparse or no shrubs.
- The tree layer contains mainly New England Peppermint.

Again, at this preliminary stage of assessment it is not confirmed if these three vegetation patches are considered New England Peppermint Woodland in accordance with the EPBC Act. Further field surveys will be required to determine if the vegetation patches have a predominantly native understorey[1] (a key criteria for EPBC New England Peppermint TEC).

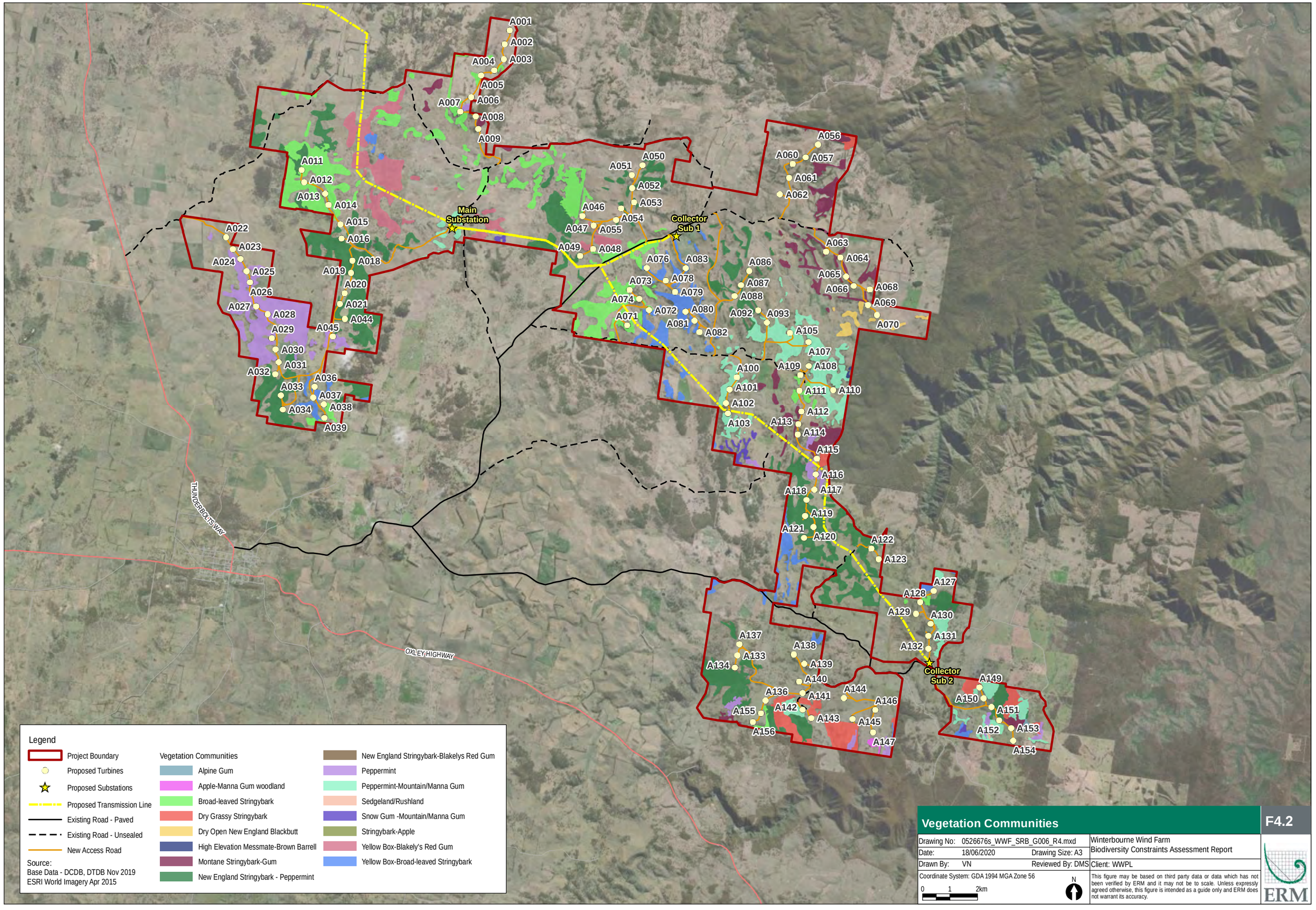
4.2.5 Flora and Vegetation Communities

The majority of the areas within the project boundary are characterised by non-native grasslands resulting from vegetation clearing and livestock farming. A variety of Eucalyptus woodland and forest communities exist as tree lines and small, moderate and large patches. These communities are the dominant native extant vegetation communities in the project boundary. Paddock trees (*Eucalyptus* spp.) are common throughout the non-native grasslands. Vegetation communities within the project boundary are outlined in **Figure 4.2**.

To date, flora species were only counted during BAM Plot Surveys, which only cover a limited extent of the area within the project boundary. A total of 36 flora species were identified and of the 36 species, 30 are considered native species. A full list of species recorded during the field surveys is provided in **Appendix B** of this report.

One threatened flora species was identified during the field surveys, *Eucalyptus nicholli*. *Eucalyptus nicholli* was recorded 15 times as isolated individuals within the project boundary, as well as six records within vegetation communities (more than one individual present).

[1] A predominantly native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species.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A152
A153
A154
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A156
Main Substation
Collector Sub 1
Collector Sub 2
THUNDERBOLTS WAY
OXLEY HIGHWAY
Legend
Project Boundary
Proposed Turbines
Proposed Substations
Proposed Transmission Line
Existing Road - Paved
Existing Road - Unsealed
New Access Road
Source:
Base Data - DCDB, DTDB Nov 2019
ESRI World Imagery Apr 2015
Vegetation Communities
Alpine Gum
Apple-Manna Gum woodland
Broad-leaved Stringybark
Dry Grassy Stringybark
Dry Open New England Blackbutt
High Elevation Messmate-Brown Barrell
Montane Stringybark-Gum
New England Stringybark - Peppermint
New England Stringybark-Blakelys Red Gum
Peppermint
Peppermint-Mountain/Manna Gum
Sedgeland/Rushland
Snow Gum -Mountain/Manna Gum
Stringybark-Apple
Yellow Box-Blakely's Red Gum
Yellow Box-Broad-leaved Stringybark
Vegetation Communities
F4.2
Drawing No: 0526676s_WWF_SRB_G006_R4.mxd
Winterbourne Wind Farm
Biodiversity Constraints Assessment Report
Date: 18/06/2020
Drawing Size: A3
Drawn By: VN
Reviewed By: DMS
Client: WWPL
Coordinate System: GDA 1994 MGA Zone 56
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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
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4.2.6 Native Fauna

A total of 50 bird species and eight mammal species were recorded during the Spring Surveys (November 2019) and are described below. No reptile species or amphibian species were recorded during these surveys.

4.2.6.1 Birds

A combined total of 50 bird species were identified during the Spring Surveys (November 2019) (refer to **Appendix A** of this report). Birds were recorded in a variety of habitats including, roadsides, dams, Eucalyptus woodland and forest communities, sedgelands and non-native grasslands.

No EPBC listed Marine species were identified during the Spring Surveys (November 2019). The project is not located or likely to impact any Commonwealth Marine Protected Areas. Therefore, an impact assessment under the EPBC Act of these marine species is not required.

One threatened bird species was identified during the field surveys, Scarlet Robin (*Petroica boodang).* The Scarlet Robin was detected within Eucalyptus woodland habitat at three locations within the project boundary, as depicted in **Image 4.1**

The majority of bird species identified during the field surveys were woodland species. Five bird of prey species were identified during the surveys, which included the Wedge-tailed Eagle (*Aquila audax* – refer to **Figure 4.3**), Brown Falcon (*Falco berigora*), Australian Hobby (*Falco longipennis*), Nankeen Kestrel (*Falco cenchroides*) and Black Kite (*Milvus migrans*). The Wedge-tailed Eagle (refer to **Image 4.2)** and Nankeen Kestrel were regularly recorded during the survey period. These five bird of prey species are considered vulnerable to turbine strikes.

Nine parrot species were detected during the surveys, which included the King Parrot (*Alisterus scapularis*), Little Corella (*Cacatua sanguinea*), Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*), Sulphur-crested Cockatoo (*Cacatua galerita*), Galah (*Eolophus roseicapilla*), Crimson Rosella (*Platycercus elegans*), Eastern Rosella (*Platycercus eximius*), Red-rumped Parrot (*Psephotus haematonotus*) and Musk Lorikeet (*Glossopsitta concinna*, refer to **Image 4-3)**

Eight aquatic-associated species were detected during the surveys, which included the Masked Lapwing (*Vanellus mil*es), Pacific Black Duck (*Anas superciliosa*), Hard Head Duck (*Aythya australis*), Australian Wood duck (*Chenonetta jubata*), White-faced Heron (*Egretta novaehollandiae*), Purple Swamphen (*Porphyrio porphyrio*), Straw-necked Ibis (*Threskiornis spinicollis*), and Australasian Grebe (*Tachybaptus novaehollandiae*, refer to **Image 4.4**).

Image 4-1 Scarlet Robin

Observed during Spring Surveys (November 2019)

Image 4-2 Wedge-tailed Eagles

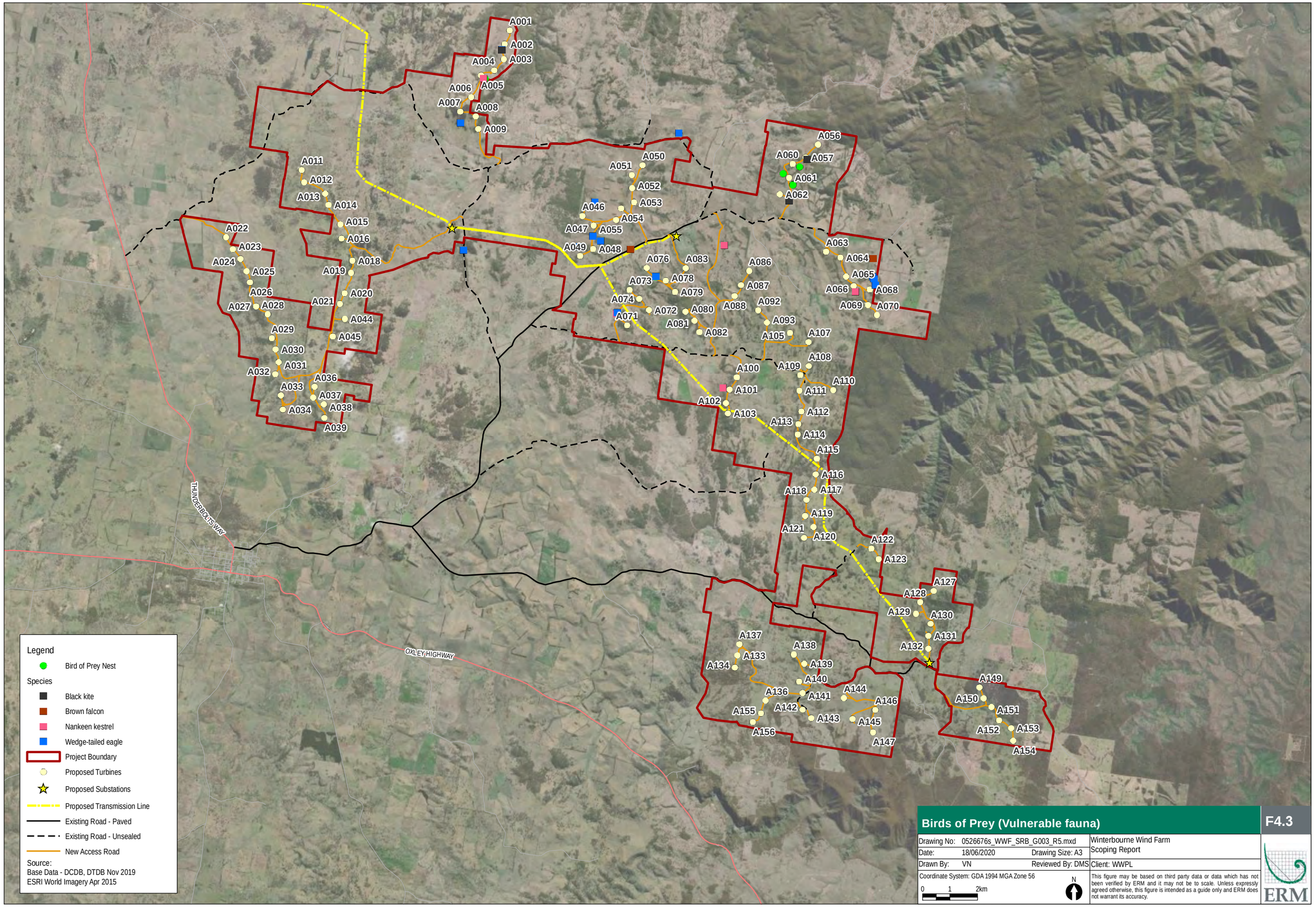
Observed during Spring Surveys (November 2019)

Image 4-3 Musk Lorikeet

Observed during Spring Surveys (November 2019)

Image 4-4 Australasian Grebe

Observed during Spring Surveys (November 2019)



Birds of Prey (Vulnerable fauna)

F4.3

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Coordinate System: GDA 1994 MGA Zone 56

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4.2.6.2 Mammals

Six native mammal species were detected within the project boundary during the Spring Surveys (November 2019). Three Macropod species were detected, which included Eastern Grey Kangaroo (*Macropus giganteus*), Wallaroo (*Macropus robustus*) and Red-necked Wallaby (*Macropus rufogriseus*).

Macropod species were regularly identified during the surveys. A Tiger Quoll (*Dasyurus maculatus*) and Brushtail Possum (*Trichosurus vulpecula*) were also identified via camera traps as shown in image 4-5.

Image 4-5 Tiger Quoll

Observed during Spring Surveys (November 2019)

4.2.6.3 Amphibians

Zero amphibian species were recorded during the Spring Surveys (November 2019), though these surveys did not include targeted fauna surveys.

4.2.6.4 Reptiles

Zero reptile species were recorded during the Spring Surveys (November 2019), though these surveys did not include targeted fauna surveys.

4.2.7 Introduced Species

4.2.7.1 Flora

Eight introduced flora species were identified during the field surveys. One of these introduced flora species, Sweet Briar (*Rosa rubiginosa*), is a restricted species in accordance with the *NSW Biosecurity Act 2015* and considered a Noxious Weed as outlined in **Table 4.5**.

Table 4.5 Invasive Flora known within Project Boundary

Scientific name	Common name	Weed of National Significance	NSW Noxious Weed
Cirsum virgue	Creeping Thistle	No	No
Hyacinthoides non-scripta	Blue Bell	No	No
Hypochaeris radicata	Flatweed	No	No
Onopordum sp.	Thistle	No	n/a
Rosa rubiginosa	Sweet Briar	No	Yes
Cirsum virgue	Creeping Thistle	No	No
Hyacinthoides non-scripta	Blue Bell	No	No

4.2.7.2 Fauna

Four introduced fauna species were identified during the Spring Surveys (November 2019). These included the Red Fox (*Vulpes vulpe*s), Hare (*Lepus*), Common Starling (*Sturnus vulgaris*) and the European Rabbit (*Oryctolagus cuniculus*). These species are likely to have a negative impact on native species through predation, habitat degradation and resource competition.

4.2.8 Threatened and Migratory Species

Of the 50 threatened and migratory species considered in this constraints assessment, six are known to occur and 14 are considered likely to occur within the project boundary. Three of these likely species are considered vulnerable to turbine strikes (**Table 4.6**). Threatened Species recorded within the Project Area are displayed in **Figure 4.6.**

There are also 18 threatened species considered to have the potential to occur within the project boundary. The remaining 25 threatened species are considered to be unlikely to occur within the project boundary. Threatened species that are known or considered likely to occur within the project boundary are detailed in **Table 4.6**.

Table 4.6 Threatened Species: Known or Likely to occur within the Project Boundary

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Habitat within Project Boundary	Vulnerability to impact
Petroica boodang	Scarlet Robin	V	-	Known[1]	Areas within the project boundary contain preferred habitat for the Scarlet Robin, which is characterised by the grassy *Eucalyptus* woodlands (minimal shrub cover). The ridges, hills and foothills provide breeding habitat for the Scarlet Robin. It is likely that the grazed grasslands with scattered paddock trees would be considered suitable habitat for this species.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	Known[1]	Areas within the project boundary contain suitable vegetation communities for this species to grow amongst (e.g. sclerophyll woodland or dry grassy woodland). The project boundary contains slopes and ridges and infertile soils, which is preferred by this species.	■ Loss of native vegetation ■ Edge effects
Dasyurus maculatus	Tiger Quoll	V	E	Known[1]	The Tiger Quoll utilises a variety of habitat types, several of which are present within the project boundary (e.g. open forest, woodland). Surveyed areas within the project boundary contained an abundance of fallen logs and many rocky outcrops, which could be used as denning habitat.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects
Thesium australe	Austral Toadflax	V	V	Known[2]	The Austral Toadflax has potential to utilise shrubland, grassland or woodland ecosystems, particularly damp areas. These ecosystems are dispersed throughout the majority of the project area.	■ Loss of native vegetation ■ Edge effects

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Habitat within Project Boundary	Vulnerability to impact
Phascolarctos cinereus	Koala	V	V	Known[2,3]	The *Eucalyptus* woodlands and forest within the project boundary are considered suitable habitat for the Koala. In addition, several trees abundant in the project boundary (e.g. Ribbon Gum, Blakely's Red Gum, Mountain White Gum, Yellow Box, Apple Box and New England Peppermint) are considered feed trees for Koalas.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects
Petauroides volans	Greater Glider	E	V	Likely[3]	The Greater Glider would be associated with the *Eucalyptus* forest communities within the project boundary. The forests in close proximity to Oxley Wild Rivers National Park would be important for this species.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Likely	This species is able to utilise existing dry *Eucalyptus* woodlands and farmland within the project boundary. Areas within the project boundary contain also provide artificial waterbodies and an abundance of prey (invertebrates).	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light (during construction) and vibration impacts ■ Edge effects
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Likely	The Glossy Black-cockatoo can utilise the *Eucalyptus* woodlands. Notably, areas within the project boundary contain *Casuarinas*, which is a critical food source for the species.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Habitat within Project Boundary	Vulnerability to impact
Chthonicola sagittata	Speckled Warbler	V	-	Likely	The Speckled Warbler would utilise the grassy *Eucalyptus* woodlands. The species is associated with rocky ridges and gullies, which are common within the project boundary. The species requires large areas of undisturbed remnant vegetation, which is present in the region (e.g. Oxley Wild Rivers National Park).	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Likely	This species is associated with Box-Gum Woodlands, which are present within the project boundary. It is also found within open forest communities along the inland slopes.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects
Daphoenositta chrysoptera	Varied Sittella	V	-	Likely	The Varied Sittella would utilise the remnant *Eucalyptus* woodlands and forest communities. It would likely be associated with the rough barked species like *Eucalyptus calignosa*.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Likely	The Eastern False Pipistrelle would likely be associated with *Eucalyptus* forest in close proximity to Oxley Wild Rivers National Park. It would roost in large hollow-bearing trees.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from turbine strikes ■ Mortality and injury from vehicle strikes and vegetation clearing

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Habitat within Project Boundary	Vulnerability to impact
Hieraaetus morphnoide	Little Eagle	V	-	Likely	The Little Eagle would utilise farmland, roadsides and *Eucalyptus* woodlands. Farmland and roadsides could provide carrion and *Eucalyptus* woodlands could provide hunting opportunities and nesting habitat.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from turbine strikes ■ Mortality and injury from vehicle strikes and vegetation clearing
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Likely	This species would be restricted to open woodlands within the project boundary. The abundance of fallen timber would provide important refuge habitat.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effect
Ninox strenua	Powerful Owl	V	-	Likely	The Powerful Owl could utilise a range of *Eucalyptus* woodland and forest habitats within the project boundary. It may be associated with habitat in close proximity to the Oxley Wild Rivers National Park. The project boundary contains suitable prey (e.g. possums).	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects
Stagonopleura guttata	Diamond Firetail	V	-	Likely	The Diamond Firetail would be able to utilise most *Eucalyptus* woodlands, farmland and grasslands. Nesting habitat is restricted to dense areas, which are restricted to forest communities.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Noise, light and vibration impacts ■ Edge effects

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Habitat within Project Boundary	Vulnerability to impact
Bertya ingramii	Narrow-leaved Bertya	E	E	Likely	The Narrow-leaved Bertya individuals could propagate and establish along rocky ledges and crevices within gullies within the project boundary.	■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects
Grevillea beadleana	Beadle's Grevillea	E	E	Likely	The Beadle's Grevillea has been identified over 2000 times within the locality. It would establish within *Eucalyptus* woodland communities.	■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Likely	This species utilises forested areas for hunting, therefore, it is likely to inhabit areas in close proximity to Oxley Wild Rivers National Park. The rocky escarpments and ledges could provide roosting habitat for the species.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury turbine strikes ■ Mortality and injury from vehicle strikes and vegetation clearing
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Likely	This species could use a variety of habitats within the project boundary. It would be closely associated with the rocky escarpments, outcrops and cliffs. It could occasionally use farmland and forest and woodland communities.	■ Loss of native vegetation ■ Increased habitat fragmentation ■ Mortality and injury from vehicle strikes and vegetation clearing ■ Edge effects

1 = Visual observation; 2 = BioNet Record; 3 = confirmed from scat analysis E = Endangered; V = Vulnerable

5. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

This chapter provides a summary of the assessment against the MNES relevant to the project. Based on the results of the desktop assessment and the field survey, a preliminary assessment of MNES within the project boundary has been provided in **Table 5.1**.

Table 5.1 MNES within the Project Boundary (Known and Likely)

MNES	Relevance to the Project
World heritage properties	Gondwana Rainforests of Australia located within 3.5 kilometres of the project boundary
National heritage properties	
Wetlands of international importance	Not identified within the project boundary or within 50-kilometre radius
Threatened species and ecological communities	**Known species include:** ■ Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) ■ Tiger Quoll (*Dasyurus maculatus*) ■ Koala (*Phascolarctos cinereus*) ■ Austral Toadflax (*Thesium australe*) ■ Greater Glider (*Petauroides volans*) **Likely species include:** ■ Narrow-leaved Bertya (*Miniopterus orianae oceanensis*) ■ Beadle's Grevillea (*Grevillea beadlea*na) ■ Brush-tailed Rock-wallaby (*Petrogale penicillata*)
Migratory species	Migratory species are likely to occur within the project boundary
Commonwealth marine area	Not identified within the project boundary or within 50-kilometre radius
The Great Barrier Reef Marine Park	Not identified within the project boundary or within 50-kilometre radius
Nuclear actions	Not applicable
Water resources	Not applicable

5.1 Outcomes

Under the EPBC Act a referral is required to the Australian Government DoEE for projects, or 'actions', that are likely to have a significant impact on a MNES or the environment on Commonwealth land. The Australian Government Minister for the Environment and Energy determines whether the approval of the Minister would be required for a referred project. If so, that project is a controlled action under the EPBC Act.

The findings of preliminary environmental investigations carried out to date have confirmed the presence of threatened species listed under the EPBC Act in the project boundary. Therefore, the project should be referred to the Australian Government Minister for the Environment and Energy through the preparation of a separate referral.

6. PRELIMINARY IMPACT ASSESSMENT

This chapter provides an overview of the potential preliminary impacts to areas of known ecological significance within the project boundary.

This project has the potential to cause impacts to threatened species and communities listed under the BC Act and the EPBC Act. Therefore, they will need to be considered as part of the EIS to be prepared under Part 5 of the NSW EP&A Act.

As the Biodiversity Offsets Scheme applies to Part 5 projects and based on the confirmed presence of biodiversity values within the project boundary, application of the BAM and the preparation of a BDAR would be required.

Species will be selected for further assessment by considering how they and their habitats might be affected by the project. In this instance the main potential impacts of the project (during construction and operation) that would need to be assessed include:

- Clearing of the following TECs:
  - EPBC Act TECs:
    - New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands;
    - Box – Gum Grassy Woodland and Derived Grassland communities in NSW;
  - BC Act TECs:
    - New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion; and
    - Box Gum Woodland in New England Tablelands.
- Loss of extant native vegetation communities and associated fauna habitat and the subsequent impacts to local population of native species, particularly threatened and migratory species.
- Increased habitat fragmentation.
- Mortality and injury of avian and microchiropteran bat species from turbine strikes.
- Mortality and injury from vehicle strikes and vegetation clearing.

Potential indirect impacts to biodiversity that may result from the project include:

- Changes to hydrology through run off and sedimentation and erosion from construction works.
- Construction and operational noise, light and vibration impacts.
- Increased edge effects (specifically spread of weeds) and any inadvertent impacts on adjacent habitat or vegetation.

Mitigation measures relevant to threatened species, TECs, native vegetation communities, species vulnerable to turbine strikes, hydrology and construction impacts will be addressed within the EIS. Given the potential disturbance within the project boundary, there is also a risk that weeds may be transported off-site. Mitigation measures to reduce the chance of weed spread will be considered within the EIS.

7. SUMMARY, RECOMMENDATIONS AND NEXT STEPS

This chapter provides a summary of the recommendations that are to be considered to reduce and manage impacts to areas of known ecological significance. The recommendations are established on the basis of the Spring Surveys (November 2019) and the Summer Surveys (February 2020). Summer Survey (February 2020) results are detailed **Appendix D** of this report. The key constraints identified within the project boundary from the Spring Surveys (November 2019) are listed below.

Three threatened species were recorded within the Project Boundary during the biodiversity surveys, which included:

- Scarlet Robin (*Petroica boodang*);
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*); and
- Tiger Quoll (*Dasyurus maculatus*).

In addition to these field records, BioNet records and scat analyses indicate that the following threatened species occur or have occurred within the project boundary:

- Koala (*Phascolarctos cinereus*);
- Greater Glider (*Petauroides volans*); and
- Austral Toadflax (*Thesium australe*).

All of the threatened species are listed under the BC Act, except for the Greater Glider. All of the threatened species except the Scarlet Robin are also listed under the EPBC Act. It is expected that an additional 14 threatened species are 'likely' to occur within the project boundary. All 14 likely threatened species are listed under the BC Act, while only five of them are listed under the EPBC Act.

Two TECs listed under the BC Act were recorded, which include:

- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion.
- Box Gum Woodland in New England Tablelands.

Five bird of prey species were recorded and are considered vulnerable to turbine strikes. In addition to these five species, there are three bird of prey species considered likely to occur that are considered vulnerable to turbine strikes.

The species listed above would need to be addressed in detail within the EIS.

7.1 Recommendations

The desktop assessment and field surveys have highlighted a range of known and potential biodiversity constraints. To effectively avoid and minimise impacts to these constraints the following biodiversity management recommendations are suggested:

- Commit to a nil net loss of TECs within the project boundary.
- Minimise removal of existing native vegetation.
- Aim to minimise habitat loss for threatened and migratory species within the project boundary.

The authors of this report acknowledge that the project design and layout is only at a preliminary stage, but effort to avoid these constraints has already occurred and will continue to occur as part of future design revisions.

7.2 Next Steps

The following steps are considered essential to ensure an adequate assessment of ecological features is continued throughout future stages of the project:

- Conduct a detailed assessment of potential Koala habitat in accordance within the requirements of the Koala Habitat Protection SEPP.
- Prepare and submit an EPBC referral to address MNES.
- Prepare and submit a BDAR in accordance with the Biodiversity Assessment Methodology to address Matters of State Environmental Significance.
- Conduct detailed habitat mapping and native vegetation community mapping for all direct impact areas.
- Conduct further targeted fauna and flora surveys for species considered likely or potentially occurring within the project boundary in accordance with relevant Federal or State survey guidelines.

8. REFERENCES

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Appendix A FAUNA SPECIES OBSERVED DURING FIELD SURVEYS

Type	Scientific name	Common name	EPBC Act	BC Act
Birds	*Acanthiza nana*	Yellow Thornbill	-	-
	Alisterus scapularis	King Parrot	-	-
	Anas superciliosa	Pacific Black Duck	-	-
	Anthus novaeseelandiae	Australasian Pipit	-	-
	Aquila audax	Wedgetail Eagle	-	-
	Artamus personatus	Masked Woodswallow	-	-
	Artamus superciliosus	White-browed Woodswallow	-	-
	Aythya australis	Hard Head Duck	-	-
	Cacatua sanguinea	Little Corella	-	-
	Calyptorhynchus funereus	Yellow-tailed Black Cockatoo	-	-
	Cacatua galerita	Sulphur-crested cockatoo	-	-
	Chenonetta jubata	Australian Wood Duck	-	-
	Colluricincla harmonica	Grey Shrike Thrush	-	-
	Corcorax melanorhamphos	White winged choughs	-	-
	Cormobates leucophaea	White-throated Treecreeper	-	-
	Corvus orru	Toresian Crow	-	-
	Cracticus tibicen	Australian Magpie	-	-
	Cracticus torquatus	Grey Butcherbird	-	-
	Dacelo novaeguineae	Laughing Kookaburra	-	-
	Egretta novaehollandiae	White-faced Heron	-	-
	Eolophus roseicapilla	Galah	-	-
	Eopsaltria griseogularis	Yellow Breasted Robin	-	-
	Eurystomus orientalis	Dollar Bird	-	-
	Falco berigora	Brown Falcon	-	-
	Falco cenchroides	Nankeen Kestrel	-	-
	Falco longipennis	Australian Hobby	-	-
	Gerygone olivacea	White-throated Greygone	-	-
	Glossopsitta concinna	Musk Lorikeet	-	-
	Grallina cyanoleuca	Magpie Lark	-	-
	Hirundo neoxena	Welcome Swallow	-	-
	Lalage tricolor	White-winged Triller	-	-
	Manorina melanocephala	Noisy Miner	-	-
	Melithreptus lunatus	White naped honeyeater	-	-

Type	Scientific name	Common name	EPBC Act	BC Act
Birds	*Milvus migrans*	Black Kite	-	-
	Myzomela sanguinolenta	Scarlet Honeyeater	-	-
	Ocyphaps lophotes	Crested Pigeon	-	-
	Pardalotus striatus	Striated Pardalote	-	-
	Petroica boodang	Scarlet Robin	-	V
	Platycercus elegans	Crimson Rosella	-	-
	Platycercus eximius	Eastern Rosella	-	-
	Porphyrio porphyrio	Purple Swamphen	-	-
	Psephotus haematonotus	Red-rumped Parrot	-	-
	Rhipidura leucophrys	Willie Wagtail	-	-
	Strepera	Currawong	-	-
	Sturnus vulgaris	Common Starling	*	-
	Tachybaptus novaehollandiae	Australasian Grebe	-	-
	Threskiornis spinicollis	Straw-necked Ibis	-	-
	Todiramphus macleayii	Forest Kingfisher	-	-
	Todiramphus sanctus	Sacred Kingfisher	-	-
	Vanellus miles	Masked Lapwing	-	-
Mammals	*Dasyurus maculatus*	Tiger Quoll	E	V
	Macropus giganteus	Eastern Grey Kangaroo	-	-
	Macropus robustus	Wallaroo	-	-
	Macropus rufogriseus	Red-necked Wallaby	-	-
	Trichosurus vulpecula	Brushtail Possum	-	-
	*Vulpes vulpes**	Red Fox*	-	-
	*Lepus europaeus**	European Hare*	-	-
	*Oryctolagus cuniculus**	European Rabbit*	-	-

*CE = Critically Endangered; E = Endangered; V = Vulnerable; - = not listed, * = introduced species.*

Appendix B FLORA SPECIES OBSERVED DURING FIELD SURVEYS

Scientific name	Common name	EPBC Act	BC Act
Acacia implexa	Hickory Wattle	-	-
Acaena ovina	Sheep's Burr	-	-
Allocausurina littoralis	Black She-oak	-	-
Bursaria spinosa	Blackthorn	-	-
Cheilanthes sp.	Fern	-	-
Dichondra Inglewood or repens	n/a	-	-
Eucalyptus andrewsii	New England Blackbutt	-	-
Eucalyptus blakelyi	Blakely's Red Gum	-	-
Eucalyptus bridgesiana	Apple Box	-	-
Eucalyptus calignosa	Broad-leaved Stringybark	-	-
Eucalyptus cameronii	Diehard Stingybark	-	-
Eucalyptus dalrympleana	Mountain Gum	-	-
Eucalyptus malacoxylon	Apple Box	-	-
Eucalyptus mellidora	Yellow Box	-	-
Eucalyptus nicholii	Narrow-leaved Peppermint	V	V
Eucalyptus nortonii	Bundy	-	-
Eucalyptus nova-angelica	New England Peppermint	-	-
Eucalyptus obliqua	Messmate	-	-
Hypochaeris radicata	Flatweed	-	-
Juncus filicaulis	Thread Rush	-	-
Lissanthe strigose	Peach Heath	-	-
Lomandra filiformis	Wattle Mat-rush	-	-
Lomandra multiflora	Many-flowered Mat-rush	-	-
Melichrus urceolatus	Urn-heath	-	-
Mistletoe sp.	n/a	-	-
Olearia viscidula	Wallaby Weed	-	-
Pimelea neo-angelica	Poison Pimelea	-	-
Poa sieberiana	Grey Tussock Grass	-	-
Pteridium esculentum	Bracken Fern	-	-
Solancea sp.	n/a	-	-
*Cirsum virgue**	Creeping Thistle*	-	-
*Hyacinthoides non-scripta**	Blue Bell*	-	-
*Hypochaeris radicata**	Flatweed*	-	-
*Onopordum sp.**	Thistle*	-	-
*Rosa rubiginosa**	Sweet Briar*	-	-

*V = Vulnerable; - = not listed, * = introduced species.*

Appendix C LIKELIHOOD OF OCCURRENCE

Type	Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	BioNet Records with 10 km	Habitat Summary	Likelihood of Occurrence	Recorded during field surveys
Amphibians	*Litoria piperata*	Peppered Tree Frog	CE	V	0	The Peppered Tree Frog occupies rocky streams in open forest and wet sclerophyll forest at altitudes of 800 to 1120m. The general area in which this species has been recorded has been referred to as the 'dry eastern escarpment'. Common streamside vegetation at sites where records of this species were made includes *Lomandra, Leptospermum* and *Casuarina.*	Considering the lack of records within the locality yet the presence of preferred habitat, the species has the **potential** to occur in the project boundary.	No
	Mixophyes balbus	Stuttering Frog	E	V	0	The Stuttering Frog is typically found on the eastern side of the Great Dividing Range often in association with permanent streams throughout temperate and sub-tropical rainforest and wet sclerophyll forest. The species is rarely found in dry open tableland riparian vegetation or in moist gullies in dry forest. The species shows a preference for the interiors of large forest tracts in areas with relatively cool mean annual temperatures, sites typically free from any disturbance with a thick canopy and relatively simple understorey. The species occurs along first order streams and is occasionally associated with springs. The species is not associated with ponds or ephemeral pools. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	Considering the lack of records within the locality and lack of preferred habitat, the species is **unlikely** to occur in the project boundary.	No

Birds	*Actis hypoleucos*	Common Sandpiper	-	Mi	0	The Common Sandpiper is a migratory bird inhabiting coastal habitats and sometimes freshwater wetlands. It also occurs in non-tidal swamps, streams, lakes and lagoons on the coast and sometimes inland. In Australia, the Common Sandpiper is a non-breeding visitor. It is found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No
rds	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	0	The Regent Honeyeater mainly inhabits temperate woodlands and open forests, particularly Box – Ironbark woodland and riparian forests of River She-oak. The species inhabits woodlands that support a significantly high abundance and species richness of birds. These types of woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The species can also be found in drier coastal woodlands and forests in some years. Non-breeding flocks of the species can be seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests. Although the species is a generalist forager, it feeds mainly on the nectar from a small number of eucalypts that produce high volumes of nectar (e.g. Mugga Ironbark, Yellow Box, White Box and Swamp Mahogahy).	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Birds	*Apus pacificus*	Fork-tailed Swift	-	Mi	0	The Fork-tailed Swift is a migratory bird that visits Australia during its non-breeding season. The species is almost exclusively aerial, flying up to hundreds of metres above ground, but also less than 1 m above open areas or over water. It is an aerial eater believed to forage on insects. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur in areas of updraughts around cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. They sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Birds	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	9	The Dusky Woodswallow primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. The species forages on invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. It builds an open, cup-shape nest made of twigs, grass, fibrous rootlets and occasionally casuarina needles. Generally, nests are located on shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Calidris acuminata*	Sharp-tailed Sandpiper	-	Mi	0	The Sharp-tailed Sandpiper is a migratory wader bird that occurs across Australia, including inland and coastal areas during its non-breeding season. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beachcast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Calidris ferrunginea*	Curlew Sandpiper	E	CE, Mi	0	The Curlew Sandpiper is a small migratory shorebird that visits Australia during its non-breeding season. The species is present in Australia between August and November. The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Calidris melanotos*	Pectoral Sandpiper	-	Mi, Ma	0	In Australasia, the Pectoral Sandpiper 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. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No
Birds	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V	-	2	The glossy black-cockatoo lives in coastal woodlands and drier forest areas, open inland woodlands, or timbered watercourses where its main food source, the casuarina (she-oak) is common. The glossy black-cockatoo generally prefers to feed from the seeds of mature casuarina trees. The bird's presence is often indicated by a layer of cracked cones and fragments that have accumulated under favoured casuarina trees. The glossy black-cockatoo prefers to nest in the hollows of large, old eucalypt trees, alive or dead. The typical nest site will be around 3 to 30 metres above the ground, and the nest hollow is generally lined with decayed debris.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Chthonicola sagittata*	Speckled Warbler	V	-	5	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 typically located in a slight hollow in the ground or at the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside. A clutch of 3-4 eggs is laid, between August and January, and both parents feed often the nestlings. Speckled Warblers join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V	-	1	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; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding. Gregarious and usually observed in pairs or small groups of 8 to 12 birds; terrestrial and arboreal in about equal proportions; active, noisy and conspicuous while foraging on trunks and branches of trees and amongst fallen timber; spend much more time foraging on the ground and fallen logs than other treecreepers.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Cuculus optatus*	Oriental Cuckoo	-	Mi	0	The Oriental Cuckoo is a full migrant found in northern America, eastern Asia and Australasia. The species inhabits hill country within forest canopy, open wooded areas and orchards. It also utilises forest edges, riversides, ravines, wetland fringes and slopes of wooded hills and mountains.	Considering the lack of records within the locality and the lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No
Birds	*Daphoenositta chrysoptera*	Varied Sittella	V	-	14	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Varied Sittella inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. It feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.The time between two consecutive generations in Varied Sittelas' is estimated to be 5 years.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Erythrotriorchis radiates*	Red Goshawk	CE	V	0	The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Riverine forests are also used frequently. The Red Goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water. Breeding is likely to be in spring and summer in southern Queensland and NSW. In winter in eastern Australia, the birds appear to move from nesting sites in the ranges to coastal plains, where they are associated with permanent wetlands. This species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. Forests of intermediate density are favoured, or ecotones between habitats of differing densities. Immature birds have been reported from mangroves, open river floodplains, low open woodland, agricultural land and pasture, but such habitats are not used regularly.	Considering the lack of records within the locality and the project boundary is outside its known distribution the species is **unlikely** to occur within the project boundary.	No
Birds	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	1	The Eastern False Pipistrelle prefers moist habitats, with trees taller than 20m. Generally roosts in Eucalypt hollows and under loose bark on trees or buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.	Considering the record within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Gallinago hardwickii*	Latham's Snipe	V	-	0	Latham's Snipe is a wader and the largest snipe in Australia. It is a non-breeding visitor to south-eastern Australia and an occasional visitor to Norfolk Island, Lord Howe Island and possibly to Macquarie Island. It usually occurs singly or in small, loose groups of less than a dozen birds. Migrating flocks may contain up to 200 birds when they arrive in Australia. In Australia, Latham's Snipe occurs in temperate and tropical regions. It inhabits permanent and ephemeral wetlands from sea level up to 2000 m above sea-level. They usually occupy 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. Other freshwater habitats that can be used by the species include bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Glossopsitta pusilla*	Little Lorikeet	V	-	0	Little Lorikeets forage primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country 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 They roost in treetops, often distant from feeding areas however nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Nest entrances are 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 are often chosen, including species like Allocasuarina.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the **potential** to occur within the project boundary.	No
Birds	*Grantiella picta*	Painted Honeyeater	V	V	0	The Painted Honeyeater inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) 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 nests hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Birds	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V	Ma	1	The White-bellied Sea-eagle is a large eagle that occurs around the Australian coast, including most of NSW and its oceanic waters. The species may be solitary or live in pairs or small family groups consisting of a pair of adults and dependent young. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or seashore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.	Considering the record within the locality and the presence of suitable habitat, this species has the **potential** to occur within the project boundary.	No

Birds	*Hieraaetus morphnoide*	Little Eagle	V	-	2	The Little Eagle is found throughout the Australian mainland except in the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. She-oak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. It nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Females lay two or three eggs during spring, and young fledge in early summer. The species preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Considering the records within the locality and the presence of preferred habitat, this species has the **likely** to occur within the project boundary.	No
Birds	*Hirundapus caudacutus*	White-throated Needletail	-	V, Mi	11	The White-throated Needletail is a large swift species widespread in eastern and south-eastern Australia during its non-breeding season. The species is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They almost always forage aerially, above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats.	Considering the records within the locality and the presence of suitable habitat, this species is **potential** to occur within the project boundary	No

Birds	*Lathamus discolor*	Swift Parrot	E	CE	0	The Swift Parrot breeds in Tasmania and migrates to south-east Australia during its non-breeding stage (March to October). In the mainland, the species occurs in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. Favoured feed trees include Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*) and White Box (*E. albens*).	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No
Birds	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	V	-	2	The Hooded Robin (south-eastern form) prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. This species 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. Small nests are built in tree forks less than 1m to 5m above ground.	Considering the records within the locality and the presence of preferred habitat, this species has the **likely** to occur within the project boundary.	No

Birds	*Monarcha melanopsis*	Black-faced Monarch	-	Mi	0	The Black-faced Monarch is an insectivorous bird widespread in eastern Australia. In New South Wales and the Australian Capital Territory, the species occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park, Wombeyan Caves and Canberra. It is rarely recorded farther inland. The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. The species also occurs in selectively logged and 20—30 years old regrowth rainforest. It is also sometimes found in nearby open eucalypt forests (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as in dry sclerophyll forests and woodlands, often with a patchy understorey. The species especially occurs in 'marginal' habitats during winter or during passage (migration).	Considering the lack of records within the locality and presence of suitable habitat, this species has the **unlikely** to occur within the project boundary.	No

Birds	*Motacila flava*	Yellow Wagtail	-	Mi	0	The Yellow Wagtail is a non-breeding bird in Australia. It is insectivorous and inhabits open country near water. This species occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra. In the north of its range it is also found in large forest clearings. It breeds from April to August, although this varies with latitude. The nest is a grass cup lined with hair and placed on or close to the ground in a shallow scrape. Normally it lays four to six eggs. It feeds on a wide variety of terrestrial and aquatic invertebrates as well as some plant material, particularly seeds.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Ninox strenua*	Powerful Owl	V	-	2	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The species requires large tracts of forest or woodland habitat but can also occur in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black She-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart *(Exocarpus cupressiformis*) and a number of eucalypt species. Most prey species, gliders and possums, require hollows and a shrub layer, therefore making these important habitat components for the owl. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Birds	*Numenius madagascariensis*	Far Eastern Curlew	-	CE	0	The Eastern Curlew is a wader bird with primarily coastal distribution in Australia. 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. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. The Eastern Curlew is carnivorous, mainly eating crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects.	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No
	Pandion cristatus	Eastern Osprey	V	Mi,Ma	0	The Eastern Osprey favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. The species breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Petroica boodang*	Scarlet Robin	V	-	0	The Scarlet Robin 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. Its habitat usually contains abundant logs and fallen timber. It 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. It breeds between July and January. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. It builds nests in the fork of branches, usually more than 2 metres above the ground.	This species was recorded during the Spring Surveys (November 2019). Known	Yes

Birds	*Petroica phoenicea*	Flame Robin	V	-	0	The Flame Robin is a small insectivorous robin endemic to south eastern Australia. 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 ground layer 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 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.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Birds	*Rhipidura rufifrons*	Rufous Fantail	-	Mi	0	The Rufous Fantail occurs in coastal and near coastal districts of northern and eastern Australia. *Rhipidura rufifrons* has breeding populations occurring from about the South Australia-Victoria border, through south and central Victoria, on and east of the Great Divide in New South Wales (NSW), and north to about the NSW-Queensland border. In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests; for example near Bega in south-east NSW, where they are recorded in temperate Lilly Pilly (*Acmena smithi*) rainforest, with Grey Myrtle (*Backhousia myrtifolia*), Sassafras (*Doryphora sassafras*) and Sweet Pittosporum (*Pittosporum undulatum*) subdominants. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including Spotted Gum (*Eucalyptus maculata*), Yellow Box (*E. melliodora*), Ironbarks or Stringybarks, often with a shrubby or heath understorey.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Birds	*Rostratula australis*	Australian Painted-snipe	E	E	0	The Australian Painted Snipe is small freshwater wader. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is all undertaken by the male only. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No
Birds	*Stagonopleura guttata*	Diamond Firetail	V	-	5	Diamond Firetails are found in open grassy woodland, heath and farmland or grassland with scattered trees. They generally eat ripe or partially ripe seeds and can be seen hopping around on the ground to forage. They occasionally eat insects and their larvae. The Diamond Firetail builds a nest with green grass blades and stems and lines it with fine grasses and feathers. The nest can be found in trees and shrubs with dense foliage and has sometimes been known to build in the base of a hawk's nest.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No
Birds	*Symposiachrus trivirgatus*	Spectacled Monarch	-	Mi,Ma	0	This species is a full migrant and distributed throughout southern Indonesia and Papua New Guinea and eastern Australia. The species utilises subtropical and tropical lowland forest and montane forest.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Tringa nebularia*	Common Greenshank	-	Mi,Ma	0	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. During breeding seasons the species is known to forage at edges of wetlands, in soft mud on mudflats, in channels, or in shallows around the edges of water often among pneumatophores of mangroves or other sparse, emergent or fringing vegetation, such as sedges or saltmarsh. It will occasionally feed on exposed seagrass beds.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Birds	*Turnix melanogaster*	Black-breasted Button-quail	CE	V	0	The Black-breasted Button-quail is restricted to rainforests and forests, mostly in areas with 770-1200 mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest. They may also be found in low, dense acacia thickets and, in littoral area, in vegetation behind sand dunes. Deep leaf litter layers are fundamental to the foraging requirements of the species. Many reports are from dry forest described as Bottletree Scrub, comprising Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*) and Bottletree (*Brachychiton rupestris*), with or without emergent Hoop Pine (*Araucaria cunninghamii*), with a shrub understorey and thick litter layer. In littoral areas, the species associates with vegetation behind dunes, namely vine scrubs and thickets, acacia thickets and areas densely covered in shrubs, particularly Midgen Berry *Austromyrtus dulcis* and Lantana. In the Great Sandy region of southeast Queensland, Black-breasted button-quail occur in Brush Box (*Tristania conferta*), Pink Bloodwood (*Eucalyptus intermedia*) and Forest Red Gum (*E. tereticornis*) forest, with an understorey of Black She-oak (*Allocasuarina littoralis*), acacias, lantana and berry-bearing shrubs. The species has also been recorded from vine forest remnants between Hoop Pine plantations and agricultural land	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No

						and occasionally in areas of pasture grass adjacent to habitat areas.		
Flora	*Bertya ingramii*	Narrow-leaved Bertya	E	E	90	*Bertya ingramii* grows on rocky ledges and in crevices in gorge country on the edge of the east coast escarpment in an area with an average annual rainfall of 730mm. Grows among rocks or in thin soils close to cliff-edges in dry woodland with she-oaks, wattles and tea-trees. It occurs on shallow loamy soils (in dense heathland, shrubland or low forest. Male and female flowers occur on the same plant. Female flowers have about 8 weeks of intermittent synchrony with male flowers. Flowers from August to November. Capable of self-pollination, although fruit set is higher when outcrossed pollination occurs. Seed viability is high but seedling establishment is low. Individuals can live in excess of 20 years. Native ants move close to 100% of seeds to their nests	Considering the records within the locality and presence of suitable habitat, this species is **likely** to occur within the project boundary.	No
Flora	*Callistemon pungens*	-	-	V	0	Habitats range from riparian areas dominated by Casuarina cunninghamiana subsp. cunninghamiana to woodland and rocky shrubland. Often in rocky watercourses, usually with sandy granite (occasionally basalt) creek beds. Flowers over spring and summer, mostly in November.	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No
Flora	*Chiloglottis platyptera*	Barrington Tops Ant Orchid	V	-	0	Grows in moist areas in tall open eucalypt forest with a grassy understorey, and also around rainforest edges. It generally occurs in rich brown loam soils.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Flora	*Cynanchum elegans*	White-flowered Wax Plant	V	-	0	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree Leptospermum laevigatum – Coastal Banksia Banksia integrifolia subsp. integrifolia coastal scrub; Forest Red Gum (*Eucalyptus tereticornis*) aligned open forest and woodland; Spotted Gum (*Corymbia maculate*) aligned open forest and woodland; and Bracelet Honeymyrtle (*Melaleuca armillaris*) scrub to open scrub. Flowering occurs between August and May, with a peak in November. Flower abundance on individual plants varies from sparse to prolific. The fruit can take up to six months to mature. Seed production is variable and unreliable. Seeds are wind dispersed. It is considered to be unlikely that a soil seed bank for this species exists.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Flora	*Dichanthium setosum*	Bluegrass	V	V	0	*Dichanthium setosum* is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. It is often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched. The species may tolerate or benefit from disturbance, otherwise, disturbance is indicative of threatening processes in its habitat. *Dichanthium setosum* is associated with heavy basaltic black soils and red-brown loams with clay subsoil. Associated species include *Eucalyptus albens, Eucalyptus melanophloia, Eucalyptus melliodora, Eucalyptus viminalis, Myoporum debile, Aristida ramosa, Themeda triandra, Poa sieberiana, Bothriochloa ambigua, Medicago minima, Leptorhynchos squamatus, Lomandra aff. longifolia, Ajuga australis, Calotis hispidula and Austrodanthonia, Dichopogon, Brachyscome, Vittadinia, Wahlenbergia* and *Psoralea species*	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

	Diuris eborensis	-	E	E	0	*Diuris eborensis* is found mainly in damp grassland and woodland habitat or in areas of sedge and swamps of the tablelands. Main locations are higher altitude sites in the eastern New England Plateau, with known locations in the Ebor, Yarrowitch and Backwater areas. Typically in brown clay loam soil over an igneous substrate (basalt most commonly in the sites visited, but not always), but the soil may have large amounts of organic matter.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No
Flora	*Eucalyptus magnificata*	Northern Blue Box	E	-	0	Usually found in grassy open forest or woodland on shallow, sandy or loamy soils. Occurs on moderately hilly sites and at the edge of gorges, usually at altitudes from 900 - 1050 m. Known populations are small, numbering 5-400 plants per location.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No
Flora	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	0	Typically grows in sclerophyll woodland or dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire. Tends to grow on lower slopes in the landscape. Often found in association with other eucalypts that grow in the region, including New England Blackbutt (*E. andrewsii*) and many of the stringybarks, such as Broad-leaved Stringybark (*E. caliginosa*)	This species was recorded during the Spring Surveys (November 2019). **Known**	Yes

Flora	*Euphrasia arguta*	-	*CE*	*CE*	*0*	Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance. The number of plants at a given site may vary over time depending on the season and disturbance history. Near Nundle, local populations had apparently declined at sites that had been disturbed twice within three years, in contrast with sites that were disturbed only once. Euphrasia arguta has an annual habit and has been observed to die off over the winter months, with active growth and flowering occurring between January and April. As with other species of Euphrasia, this species is semi-parasitic and attaches to the roots of other associated plants	Considering the lack of records within the locality and presence of suitable habitat, this species is **unlikely** to occur within the project boundary.	No
Flora	*Grevillea beadleana*	Beadle's Grevillea	E	E	2300	Often found in open eucalypt forest with a shrubby understorey. It is usually found on steep granite slopes at high altitudes, although the population at Shannon Creek is at a lower elevation on sandstone.	Considering the extensive records within the locality and presence of preferred habitat, this species is **likely** to occur within the project boundary.	No

Flora	*Hakea fraseri*	Gorge Hakea	V	V	0	Mainly occurs in woodlands and on the dry and steep rocky slopes of river gorges. Sometimes grows in open woodland on gorge rims.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No
Flora	*Haloragis exalata subsp. velutina*	Tall Velvet Sea-berry	V	V	0	Grows in damp places near watercourses. This subspecies also occurs in woodland on the steep rocky slopes of gorges.	Considering the lack of records within the locality and presence of suitable habitat, this species is **unlikely** to occur within the project boundary.	No
Flora	*Picris evae*	Hawkweed	V	V	0	Where collected, the species abundance has been rare, locally occasional and locally frequent. All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora, E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa* , and/or *Casuarina cunninghamiana* with a Dichanthium grassy understory. Soils are black, dark grey or red-brown (specified as shallow, stony soil over basalt for one collection) and reddish clay-loam or medium clay soils. The flowering and fruiting period is mainly October to January, with a few plants collected in flower or fruit until May.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No

Flora	*Pimelea cremnophila*	-	CE	-	0	Occurs in open forest along the rim of the Macleay River gorge at approximately 1,000 m altitude. Grows on exposed cliff tops or more sheltered cliff-side sites with south-westerly to south-easterly aspects in shallow skeletal loam soils over metasediments. Known to flower in October. Likely to flower throughout spring.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No
Flora	*Prostanthera cineolifera*	Singleton Mint Bush	V	V	0	Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands. Fire response is unknown, but other Prostanthera species are fire sensitive, with recruitment occurring from the soil seed bank following a fire. Life span is unknown but is expected to be in the vicinity of 10-20 years while the estimated minimum time to produce seed is approximately 3-4 years.	Considering the lack of records within the locality and lack of preferred habitat, this species is **unlikely** to occur within the project boundary.	No

Flora	*Thesium australe*	Austral Toadflax	V	V	0	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass (*Themeda triandra*). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams. It occurs in shrubland, grassland or woodland, often on damp sites. Vegetation types include open grassy heath dominated by Swamp Myrtle (*Leptospermum myrtifolium*), Small-fruit Hakea (*Hakea microcarpa*), Alpine Bottlebrush (*Callistemon sieberi*), Woolly Grevillea (*Grevillea lanigera*), Coral Heath *(Epacris microphylla*) and Poa spp.; Kangaroo Grass grassland surrounded by Eucalyptus woodland; and grassland dominated by Barbed-wire Grass (*Cymbopogon refractus*).	According to BioNet, Austral Toadflax has been within the project boundary on two occasions. Records are in the southern portion of the Project Area. This species is **known**.	No

Mammals	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	0	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	Considering the lack of records within the locality but the presence of preferred habitat, this species has the potential to occur within the project boundary.	No
Mammals	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	192	The Tiger Quollis 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 outcrops and rocky-cliff faces as den sites. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares. Are known to traverse their home ranges along densely vegetated creeklines.	This species was recorded during the Spring Surveys (November 2019). **Known**	Yes

Mammals	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-	1	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No
Mammals	*Petauroides volans*	Greater Glider	E	V	1	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevation range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. During the day it shelters in tree hollows, with a particular selection for large hollows in large, old trees. The greater glider is considered to be particularly sensitive to forest clearance.	Considering the records within the locality and the presence of preferred habitat, this species has the **likely** to occur within the project boundary.	No

Mammals	*Petrogale penicillata*	Brush-tailed rock-wallaby	E	V	70	In NSW the Brush-tailed rock-wallaby occurs from the Queensland border in the north to Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when foraging. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Considering the records within the locality and the presence of preferred habitat, this species is **likely** to occur within the project boundary.	No
Mammals	*Phascolarctos cinereus*	Koala	V	V	0	The Koala is an arboreal marsupial that inhabits eucalypt woodlands and forests. The species feed on the foliage of more than 70 species of eucalypt and 30 non-eucalypt species.	According to BioNet Records and scat analysis, this species has been recorded within the project area. This species is therefore considered **known**.	No

Mammals	*Potorous tridactylus*	Long-nosed Potoroo	V	V	0	The Long-nosed Potoroo (SE Mainland) is sparsely distributed along the coast and Great Dividing Range of south-east Queensland through NSW. The species inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours.	Considering the lack of records within the locality and lack of suitable habitat, this species is **unlikely** to occur within the project boundary.	No

Mammals	*Pseudomys novaehollandiae*	New Holland Mouse	-	V	0	The New Holland Mouse has been found from coastal areas and up to 100 km inland on sandstone country. The species has been recorded from sea level up to around 900 m above sea level. Soil type may be an important indicator of suitability of habitat for the New Holland Mouse, with deeper top soils and softer substrates being preferred for digging burrows. In Victoria, the species has been recorded on deep siliceous podsols, sandy clay, loamy sands, sand dunes and coastal dunes. Other factors such as slope, geology and the amount of sun received in an area may also influence site selection. Across the species' range, the New Holland Mouse is known to inhabit open heathland, open woodland with a heathland understorey and vegetated sand dunes. Due to the largely granivorous diet of the species, sites where the New Holland Mouse is found are often high in floristic diversity, especially leguminous perennials.	Considering the lack of records within the locality, and despite the presence of suitable habitat, this species is **unlikely** to occur within the project boundary.	No

Mammals	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	0	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. 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 and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	Considering the lack of records within the locality and the presence of preferred habitat, this species has **potential** to occur within the project boundary.	No

Reptiles	*Wollumbinia belli*	Bell's Turtle	E	V	0	The Bell’s Turtle is restricted to upland streams (between 600 and 1100 m altitude) that contain permanent pools deeper than about 2 m, granite boulders and bedrock. Its habitat is often complex, with underwater caverns formed by boulders, logs and overhanging banks. In areas of lower velocity, the typical substratum is coarse granitic sand overlain by fine silt, algal growth, and dense beds of macrophytes. It is absent from areas away from flowing streams, such as farm ponds and natural wetlands. Bell’s Turtles prefer narrow stretches of river, 30 to 40 m wide, with shallow to deep pools. Pools most commonly occupied by Bell's Turtle are less than 3 m deep with rock or sandy riverbed bottoms and small patches of weed. Nests are dug out in riverbanks of sand or loam.	Considering the lack of records within the locality and the presence of suitable habitat, this species is **unlikely** to occur within the project boundary.	No

CE = Critically Endangered; E = Endangered; V = Vulnerable; Mi = Migratory

Appendix D SUMMER SURVEY (INTERIM) SUMMARY

Type	EPBC Listed Species	BC Listed Species	Native Species	Introduced Species
Birds	2	8	104	2
Mammals	2	1	11	5
Reptiles	0	0	3	0
Amphibians	0	0	10	0
Fish	0	0	0	0

Type	Scientific name	Common name	EPBC Act	BC Act
Birds	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	-	V
	Neophema pulchella	Turquoise Parrot	-	V
	Petroica boodang	Scarlet Robin	-	V
	Stagonopleura guttata	Diamond Firetail	-	V
	Apus pacificus	Fork-tailed Swift	Mi	-
	Calyptorhynchus lathami	Glossy Black Cockatoo	-	V
	Glossopsitta pusilla	Little Lorikeet	-	V
	Chthonicola sagittata	Speckled Warbler	-	V
	Hieraaetus morphnoides	Little Eagle	-	V
	Hirundapus caudacutus	White-throated Needletail	Mi	V
Mammals	*Dasyurus maculatus*	Tiger Quoll	E	V
	Petauroides volans	Greater Glider	V	-

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