

## ECOLOGICAL ASSESSMENT

132 Mafeking Road,  
Goonengerry



A Report Prepared for  
Mr T. E. Nabung and Ms T. M. Fumagall

FEBRUARY 2024

**JWA Pty Ltd**

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**DOCUMENT CONTROL****Document**

Title	Ecological Assessment - 132 Mafeking Road, Goonengerry
Job Number	N23030
File Reference	2023 CLIENTS\N23030_132 Mafeking Road, Goonengerry\Report
Version and Date	RW2 19/02/24
Client	Mr T. E. Nabung and Ms T. M. Fumagall

**Revision History** (office use only)

Version	Draft/ Final	Date	Distributed To	No. Copies	Media	Delivery Method
RW1	DRAFT	11/02/24	Client	1	PDF	Email
RW2	FINAL	19/02/24	Client	1	PDF	Email

**Client Issue**

Version	Date Sent	Author		Approved by	
		Name	Initials	Name	Initials
RW1	11/02/24	Belinda Whyburn / Adam McArthur	BW	Adam McArthur	AM
RW2	19/02/24	Belinda Whyburn / Adam McArthur	BW	Adam McArthur	AM

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## ABBREVIATIONS

Abbreviation	Description
AHD	Australian Height Datum
AWTS	Aerated wastewater treatment system
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BC Act	NSW Biodiversity Conservation Act 2016
BCCKPOM	Byron Coast Comprehensive Koala Plan of Management
BCR	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BSC	Byron Shire Council
BV Map	Biodiversity Values Map
Byron DCP	Byron Shire Development Control Plan 2014
CM Act	Coastal Management Act 2016
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DotE	Department of the Environment
EA	Ecological Assessment
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EP & A Act	Environmental Planning and Assessment Act 1979
ETA	Evapo-Transpiration Absorption
Ha	Hectare
HEV	High Environmental Value
JWA	JWA Pty Ltd
Km	Kilometre
LAA	Land Application Area
LEP	Local Environmental Plan
LGA	Local Government Area
LLS Act	Local Land Services Act 2013
m	Metres
MNES	Matters of National Environmental Significance
NSW	New South Wales
NVR Map	Native Vegetation Regulatory Map
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
QLD	Queensland
SEPP	State Environmental Protection Policy
SEQ	South East Queensland
TEC	Threatened Ecological Community
VIS	Vegetation Information System
VZ	Vegetation Zone



# 1 INTRODUCTION

## 1.1 Background

JWA Pty Ltd (JWA) was engaged by Mr T. E. Nabung and Ms T. M. Fumagall to complete an Ecological Assessment (EA) for 132 Mafeking Road, Goonengerry; formally described as Lot 11 on DP1202684 (the subject site).

A development application (10.2023.123.1) was previously lodged with Byron Shire Council (BSC) for the construction of a residential dwelling at the subject site. BSC have subsequently requested further information in a letter dated 7<sup>th</sup> September 2023. In relation to ecological matters the information request states:

*Council's Ecologist has reviewed the proposal and requires the following further information:*

- 3. The proposed 100kl water tank, any other rainwater tanks, Land Application Area (LAA) and trenching requirements for both utilities require further assessment with regard to determining whether native vegetation will be impacted. This includes noting the proximity to any nearby threatened flora species and/or if any threatened species may be impacted.*
- 4. If native tree/vegetation do require removal for these matters, then offsets must be identified as appropriate.*
- 5. Chapter B1 of the Development Control Plan (DCP) should be addressed with regard to 'red flag' setbacks to High Environmental Value (HEV) vegetation (which is mapped in the central portion of the site).*
- 6. Tests of significance should be completed as necessary to satisfy Section 7.3 of the Biodiversity Conservation Act 2016 (BC Act).*

This assessment has been prepared in response to the information request and has involved the following:

- Mapping and ground truthing vegetation units and determining their conservation status;
- Searching for and recording threatened and regionally significant flora and fauna species;
- Determining the suite of threatened fauna that occurs in the locality and assessing their potential occurrence on the subject site based on habitat suitability;
- Assessing the corridor value of the subject site in relation to patch-scale and landscape-scale fauna movements;
- Addressing statutory requirements of relevant Commonwealth and State legislation including the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Biodiversity Conservation Act 2016* (BC Act), *State Environmental Planning Policy (Biodiversity and Conservation) 2021*, *State Environmental Planning Policy (Resilience and Hazards) 2021*; and

- Assessment of the proposed development against the relevant BSC planning and development controls.

## 1.2 The Subject Site

The subject site is located at 132 Mafeking Road, Goonengerry and is formally described as Lot 11 on DP1202684 (FIGURE 1). The subject site is approximately 9,988 m<sup>2</sup> in area and is surrounded by rural residential lots. It is located approximately 11 km west of the Pacific Highway, 18 km northwest of Byron Bay and 1 km southeast of the township of Goonengerry. Whian Whian State Forest occurs approximately 3 km to the east of the subject site and Goonengerry and Nightcap National Parks occurs approximately 3.5 km to the north-west.

The registered Deposited Plan for the subject site contains a nominated building envelope located adjacent to Mafeking Road in the southeast of the subject site on a previously cleared elevated knoll. The Section 88B for the subject site contains restrictions limiting the erection of a dwelling to the area within the nominate building envelope and requires any dwelling to be constructed to Bushfire Attack Level (BAL) 29 and BAL 40. The northern section of the subject site is affected by an easement for electricity supply. This easement has been previously cleared and overhead powerlines are located within it.

While the cleared building envelope subject site does not contain any dwellings an existing sealed driveway has been constructed to this location, as well as a number of rock retaining walls (PLATES 1 and 2). A cleared grassland area occurs in the northwest and is linked to the dwelling location via an existing vehicular track (PLATES 3 and 4). The remaining portions of the subject site are substantially vegetated. Vegetation in the western portion consists predominantly of Brushbox Forest with a dense rainforest understorey, while vegetation in the eastern portion is comprised of subtropical rainforest vegetation. Vegetation through the northern portion of the subject site is generally dominated by the introduced Camphor laurel (*Cinnamomum camphora*).

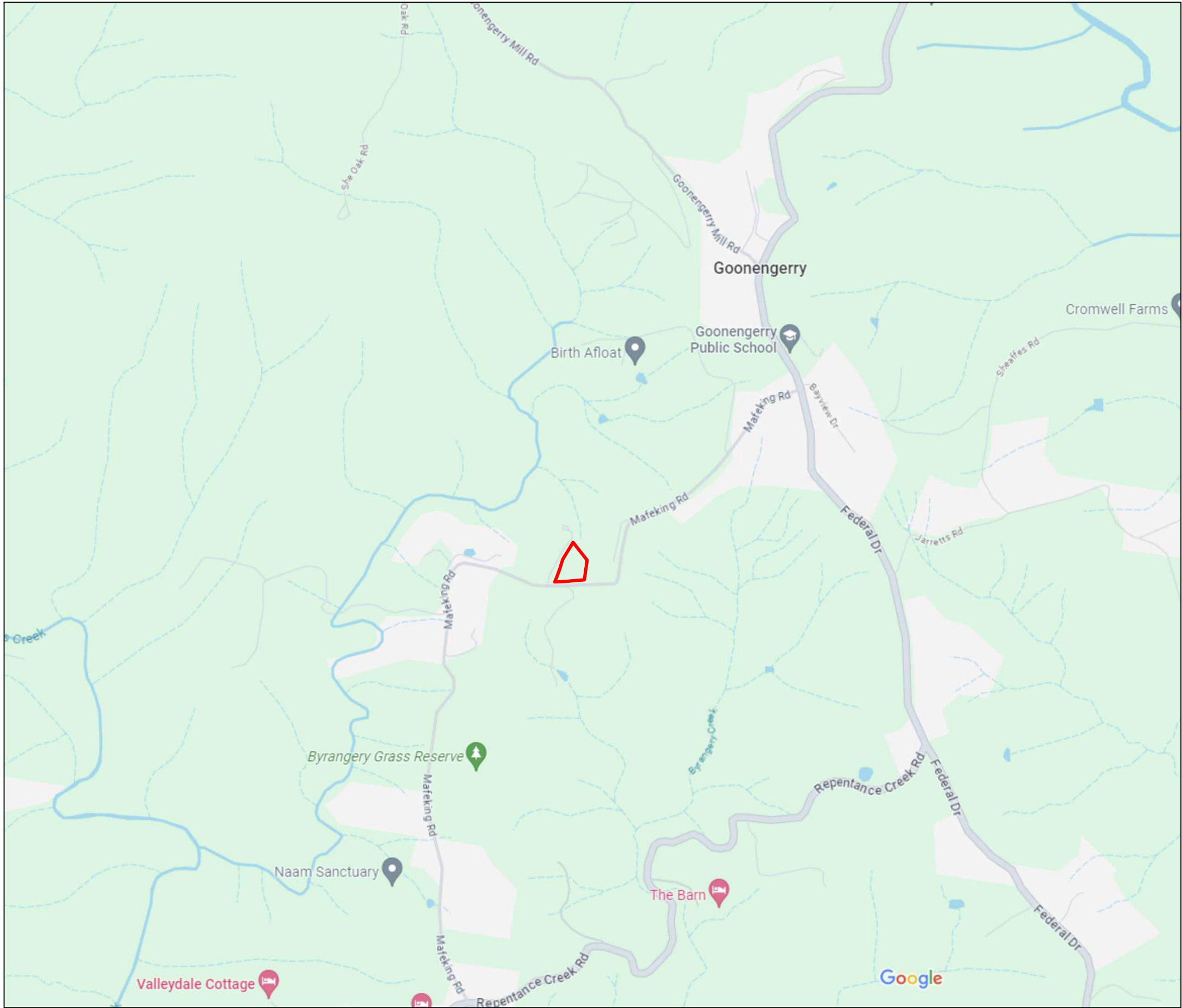
Site elevation ranges from 210 m Australian Height Datum (AHD) to the southeast to 180 m AHD to the southwest. No waterways occur on the subject site.

An aerial photograph is shown in FIGURE 2.

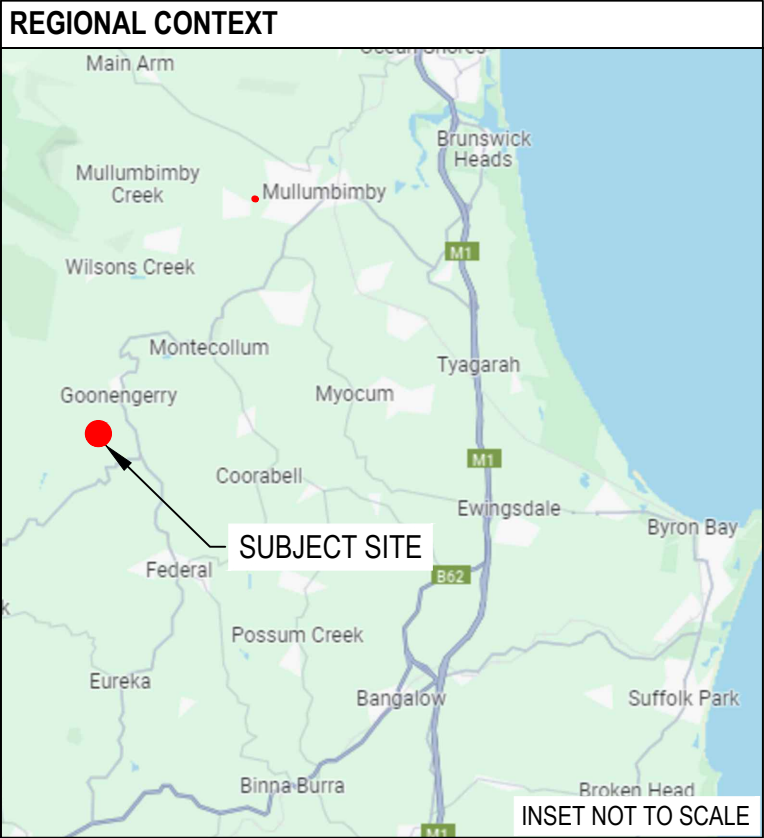
## 1.3 Planning Context

The subject site is located within the BSC Local Government Area (LGA). Under the Byron Local Environmental Plan (LEP) 2014 the subject site is zoned as (FIGURE 3):

- C2 - Environmental Conservation; and
- RU2 - Rural Landscape.



**LEGEND**  
Subject Site



Scale 1 : 15 000  
0 200m 400m 600m

SOURCE: Google Maps

SCALE: 1 : 6000 @ A3

JWA PTY LTD  
Ecological Consultants

CLIENT  
Mr T. E. Nabung and Ms T. M. Fumagall  
PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeking Road, Goonengerry NSW  
Byron Shire Council LGA

**FIGURE 1**

PREPARED: BW  
DATE: 13 December 2023  
FILE: N23030\_EA\_20240205.dwg



TITLE

**LOCALITY  
PLAN**



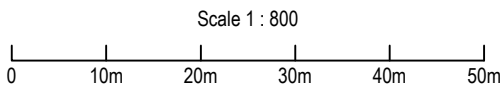


**LEGEND**

-  Subject Site
-  Cadastre



Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: NSW DCS Spatial Services - Six Maps NSW Imagery (unknown Date)

SCALE: 1 : 800 @ A3

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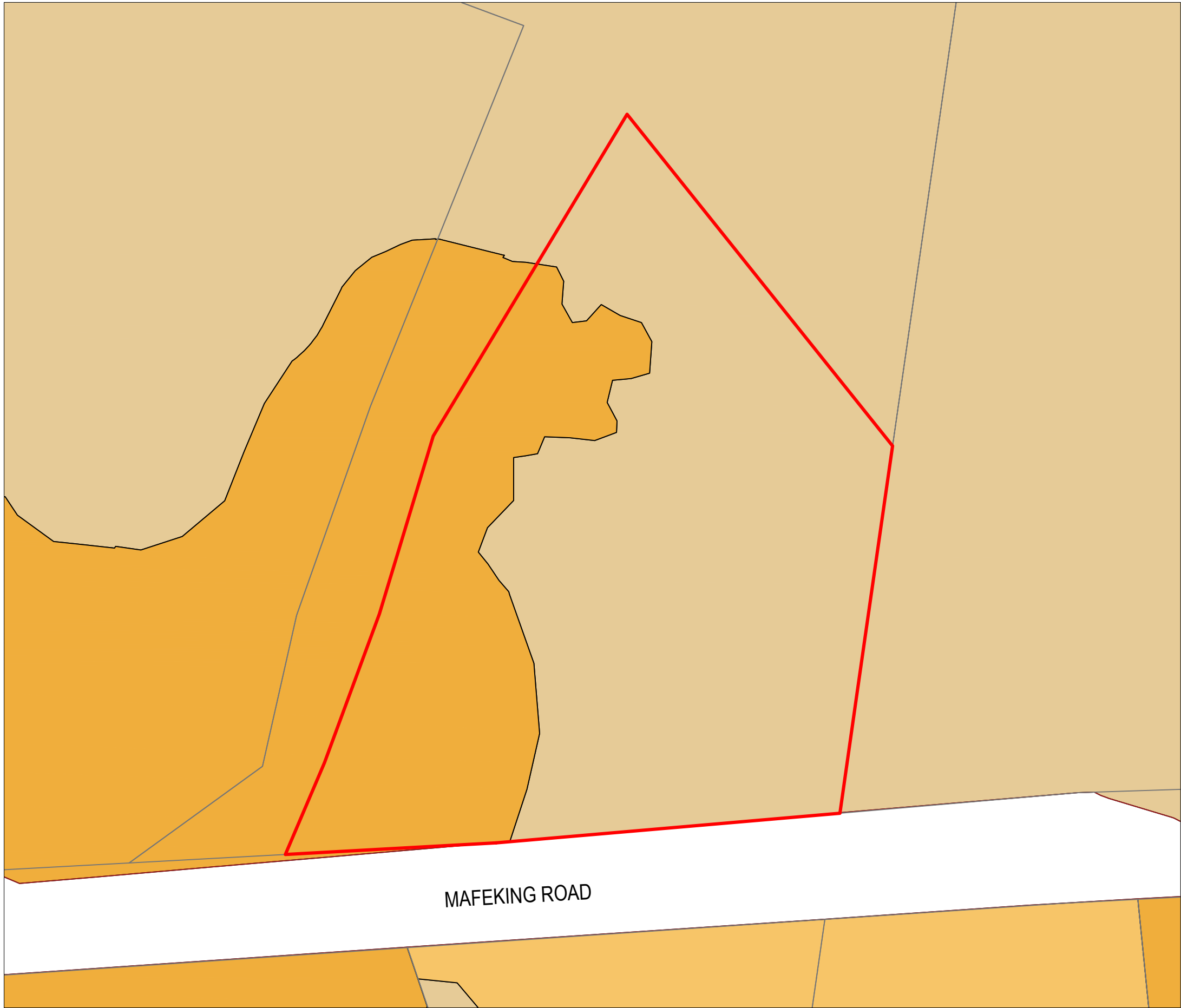
**FIGURE 2**

PREPARED: BW  
DATE: 6 February 2024  
FILE: N23030\_EA\_20240205.dwg

TITLE

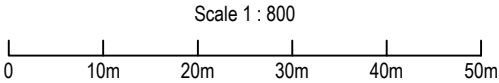
**AERIAL  
PHOTOGRAPH**





- LEGEND**
- Subject Site
  - Cadastre
  - BSC LEP 2014 - Land Zoning**
  - RU2 - Rural Landscape
  - C2 - Environmental Conservation
  - DM - Deferred Matter

Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: NSW DPHI - Environmental Planning Instrument - Land Zoning ArcGIS REST Service (accessed 06/02/24)

SCALE: 1 : 800 @ A3

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CLIENT  
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PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 3

PREPARED: BW  
DATE: 7 February 2024  
FILE: N23030\_EA\_20240205.dwg

TITLE

ZONING  
PLAN





PLATE 1 - view towards dwelling location from existing sealed driveway



PLATE 2 - view of dwelling location and retaining wall



PLATE 3 - top of existing track leading down from dwelling location





PLATE 4 - existing track leading down from dwelling location

## 1.4 The Proposed Development

The proposed development is for the construction of a new dwelling house and associated infrastructure on the subject site. The proposed dwelling is to be sited within the southeastern section of the site, within the nominated building envelope that is identified in the Deposited Plan and Section 88B for the property. The dwelling is proposed to be accessed via the existing driveway from Mafeking Road. Minor earthworks are required to prepare the building pad and a boulder wall is to be constructed in the eastern corner of the building envelope. An existing retaining wall at the end of the driveway is to be excavated and related to allow for widening of the driveway to 5 m.

A proposed 100KL water tank is to be installed in the northwestern portion of the subject site with downpipes installed between the tank and the proposed dwelling along the existing track. A 10KL firefighting tank is also proposed to be installed adjacent to the driveway access and proposed dwelling.

An on-site sewerage management system is to be installed on the site. This will consist of an aerated wastewater treatment system (AWTS) for secondary treatment of effluent with subsurface disposal through a LAA. The AWTS will be located to the west of the building envelope and effluent will be pumped to the LAA in the northwestern portion of the site. The LAA will consist of three (3) Evapo-Transpiration Absorption (ETA) beds approximately 2 m x 14 m x 0.45 m each with two (2) distribution laterals. An upslope surface water diversion bund and drain are to be constructed on the eastern side of the LAA.

Access to the proposed LAA and water tank will be via an existing vehicle access track linking to the existing driveway. Vehicle barriers are proposed adjacent to the access track in the vicinity of the LAA.

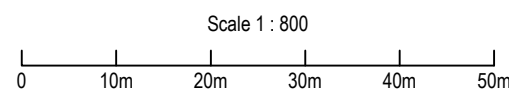
The proposed layout is provided in FIGURE 4.



# LEGEND

- Subject Site
- Cadastre
- Proposed Development Layout
  - Proposed dwelling
  - Building envelope
  - Vegetation drip line
  - Proposed water tank or AWTS
  - Proposed LAA
  - Proposed downpipe to water tank
  - Proposed pumped lilac HDPE

Note:  
Site boundary taken from proposed development layout/survey plan.  
The positional accuracy of any boundaries or critical features shown  
on this plan requires confirmation prior to its use in design or construction.



SOURCE: Eco Essence Homes - Location Plan Rev I (Ref: 132 Mafeking Road Goonengary (I) WD's (2).pdf) SCALE: 1 : 800 @ A3 JWA PTY LTD Ecological Consultants	CLIENT Mr T. E. Nabung and Ms T. M. Fumagall PROJECT Ecological Assessment Lot 11 on DP1202684 132 Mafeking Road, Goonengerry NSW Byron Shire Council LGA	FIGURE 4	TITLE PROPOSED DEVELOPMENT LAYOUT
		PREPARED: BW DATE: 19 February 2024 FILE: N23030_EA_20240216.dwg	



## 2 DESKTOP ASSESSMENT

### 2.1 Introduction

A desktop assessment was completed to highlight any potential conservation significant vegetation communities, habitat for threatened flora and fauna, and ecologically sensitive areas on the subject site. The desktop assessment included a review of:

- State and commonwealth databases;
- Commonwealth legislation;
- State legislation and mapping;
- BSC environmental mapping.

### 2.2 Methods

#### *2.2.1 Commonwealth Database Searches*

The Protected Matters Search Tool (PMST) was used to generate a list of the following Matters of National Environmental Significance (MNES) protected under the Commonwealth EPBC Act that may occur within 10 km of the subject site:

- World heritage and national heritage areas;
- Wetlands of international significance (Ramsar wetlands);
- Threatened ecological communities;
- Threatened species; and
- Migratory species.

The PMST database incorporates information from a range of sources, including government agencies, research, and community organisations. It should be noted that there are limitations on the accuracy of some matters reported by the PMST. Database records of threatened and migratory species are based on their current known distribution and do not necessarily correlate to an actual observation. As a result, these records are an indicator of potential presence only and do not consider if suitable vegetation, geology, soil, climate, or habitat types are present to support the occurrence of a species or community.

#### *2.2.2 State Database Searches*

The New South Wales (NSW) BioNet online database is based on collated biodiversity data acquired by the NSW Government through a range of sources including specimen collections, research and monitoring programs, and community wildlife groups. A BioNet database search was used to generate a list of threatened flora and fauna species listed under the NSW BC Act that may occur within 10 km of the subject site.

### 2.2.3 State Government Legislation and Mapping

#### 2.2.3.1 Background

The following State environmental legislation and mapping was reviewed as part of the desktop assessment:

- *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP);
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP);
- Biodiversity Values Map (BV Map); and
- Native Vegetation Regulatory Map (NVR Map).

#### 2.2.3.2 Resilience and Hazards SEPP

The Resilience and Hazards SEPP came into effect on the 1<sup>st</sup> March 2022. For the purposes of this EA, Chapter 2 - Coastal Management of the Resilience and Hazards SEPP is relevant:

Chapter 2 - Coastal Management of the Resilience and Hazards SEPP contains planning provisions for land use planning within the coastal zone consistent with the *Coastal Management Act 2016* (CM Act). Chapter 2 - Coastal Management gives effect to the objectives of the CM Act from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.

Part 2.1, Clause 2.4 of Chapter 2 - Coastal Management defines the following four (4) coastal management areas through detailed mapping and specifies assessment criteria that are tailored for each coastal management area:

- Coastal wetlands and littoral rainforests area - defined as areas with particular hydrological and ecological characteristics;
- Coastal vulnerability area - defined as the area affected by any one of seven coastal hazards;
- Coastal environment area - defined as the coastal waters of the state / estuaries / coastal lakes and foreshores including beaches / dunes / headlands and rock platforms as well as surrounding land; and
- Coastal use area - defined as land adjacent to the coast / where development is or may be carried out.

Councils and other consent authorities must apply these criteria when assessing proposals for development that fall within one or more of the mapped areas.

#### 2.2.3.3 Biodiversity and Conservation SEPP

The Biodiversity and Conservation SEPP commenced on 1<sup>st</sup> March 2022. For the purposes of this EA, the following three (3) chapters in the Biodiversity and Conservation SEPP are relevant:

- Chapter 2 - Vegetation in Non-Rural Areas contains planning rules and controls relating to the clearing of native vegetation in NSW on land zoned for urban and environmental purposes that is not linked to a development application. The policy works together with the BC Act and the *Local Land Services Amendment Act 2016* to create a framework for the regulation of clearing of native vegetation in NSW. It aims to ensure the biodiversity offset scheme (established under the Land Management and Biodiversity reforms) will apply to all clearing of native vegetation that exceeds the offset thresholds in urban areas and environmental conservation zones that does not require development consent.
- Chapter 3 - Koala Habitat Protection 2020 contains land-use planning and assessment framework for koala habitat within the rural zones of RU1, RU2 and RU3, except within the Greater Sydney and Central Coast areas.
- Chapter 4 - Koala Habitat Protection 2021 contains the land-use planning and assessment framework for koala habitat within Metropolitan Sydney and the Central Coast and applies to all zones except RU1, RU2 and RU3.

#### 2.2.3.4 Biodiversity Values Map (BV Map)

The BV Map identifies land with high biodiversity value, as defined by clause 7.3(3) of the *Biodiversity Conservation Regulation 2017* (BCR). The Biodiversity Offsets Scheme (BOS) applies to all clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the BCR (i.e. all local developments, major projects or the clearing of native vegetation where Chapter 2 - Vegetation in Non-Rural Areas of the Biodiversity and Conservation SEPP applies) on land identified on the map.

#### 2.2.3.5 Native Vegetation Regulatory Map (NVR Map)

The NVR Map was prepared by the NSW Office of Environment and Heritage (OEH) under Part 5A of the amended *Local Land Services Act 2013* (LLS Act) and supporting regulation. The NVR Map generally covers rural land in NSW. It categorises land where management of native vegetation can occur without approval or where management of native vegetation may be carried out in accordance with Part 5A of the LLS Act.

#### 2.2.4 Local Government Mapping

The following BSC environmental mapping was reviewed as part of the desktop assessment:

- *Byron Coast Comprehensive Koala Plan of Management (BCCKPoM) (BSC 2015)* - was adopted by BSC in August 2016 on the back of a Byron Coast Koala Habitat Study prepared in 2012 (Biolink 2012). In accordance with the objectives of the Koala SEPP 2021 (now part of the Biodiversity and Conservation SEPP) and the approved NSW Koala Recovery Plan, the overarching vision of the BCCKPoM is that the Byron Coast koala population will be recovered to more sustainable levels over the next two decades.
- The purpose of the BSC Development Control Plan 2010 (DCP 2010) and the BSC Development Control Plan 2014 (DCP 2014) are to specify Council's requirements for quality development and sustainable environmental outcomes on land in the Shire.

DCP 2010 applies to land to which the Byron LEP 1988 applies i.e. all land deferred from LEP 2014, with the exception of the West Byron urban release area (where DCP 2014 applies). DCP 2014 applies to land to which the Byron LEP 2014 applies.

- BSC Environmental Mapping - contains mapping for other significant environmental features mapped across the Byron LGA includes:
  - Vegetation communities;
  - Endangered ecological communities (EECs);
  - HEV vegetation;
  - Open forest restoration potential;
  - Big Scrub Rainforest Remnants;
  - Flying-fox camp locations; and
  - Koala habitat, management precincts and planning areas.

## 2.3 Results

### 2.3.1 Database Searches

#### 2.3.1.1 Threatened Ecological Communities (TECs)

Database searches using the Commonwealth PMST revealed that six (6) TECs listed under the EPBC Act may occur within 10 km of the subject site:

- Coastal Swamp oak (*Casuarina glauca*) forest of NSW and South East Queensland (SEQ) ecological community - Endangered;
- Coastal swamp sclerophyll forest of NSW and SEQ - Endangered;
- Dunn's white gum (*Eucalyptus dunnii*) moist forest in north-east NSW and SEQ - Endangered;
- Grey box-grey gum wet forest of subtropical eastern Australia - Endangered;
- Lowland rainforest of Subtropical Australia - Critically Endangered; and
- Subtropical eucalypt floodplain forest and woodland of the NSW North Coast and SEQ bioregions - Endangered.

#### 2.3.1.2 Threatened Flora Species

Threatened flora species detected in the database searches are listed in TABLE 1. The conservation status of each species listed in TABLE 1 is shown in accordance with the EPBC Act and BC Act.

**TABLE 1**  
**DATABASE RECORDS OF THE THREATENED FLORA SPECIES**

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act <sup>#</sup>
<i>Acacia bakeri</i>	Marblewood	V	-
<i>Acalypha eremorum</i>	Acalypha	E	-
<i>Archidendron hendersonii</i>	White Lace Flower	V	-
<i>Bosistoa transversa</i>	Three-leaved Bosistoa	V	V
<i>Bulbophyllum globuliforme</i>	Miniature Moss-orchid	V	V
<i>Clematis fawcettii</i>	Stream Clematis	V	V
<i>Coleus nitidus</i>	Nightcap Plectranthus	E	E
<i>Corchorus cunninghamii</i>	Native Jute	E	E
<i>Corokia whiteana</i>	Corokia	E	E
<i>Cryptocarya foetida</i>	Stinking Cryptocarya, Stinking Laurel	V	V
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	V
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E
<i>Cyperus semifertilis</i>		E	V
<i>Davidsonia jerseyana</i>	Davidson's Plum	E	E
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	E	E
<i>Desmodium acanthocladum</i>	Thorny Pea	V	V
<i>Diospyros mabacea</i>	Red-fruited Ebony	E	E
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E	E
<i>Doryanthes palmeri</i>	Giant Spear Lily	V	-
<i>Eidothea hardeniana</i>	Nightcap Oak	E	CE
<i>Elaeocarpus sedentarius</i>	Minyon Quandong	E	E
<i>Elaeocarpus williamsianus</i>	Hairy Quandong	E	E
<i>Endiandra floydii</i>	Floyd's Walnut	E	E
<i>Endiandra hayesii</i>	Rusty Rose Walnut	V	V
<i>Endiandra muelleri</i> subsp. <i>bracteata</i>	Green-leaved Rose Walnut	E	-
<i>Floydia praealta</i>	Ball Nut	V	V
<i>Fontainea australis</i>	Southern Fontainea	V	V
<i>Gossia fragrantissima</i>	Sweet Myrtle	E	E
<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E	-
<i>Hicksbeachia pinnatifolia</i>	Bopple Nut	V	V
<i>Isoglossa eranthemoides</i>	Isoglossa	E	E
<i>Lepiderema pulchella</i>	Fine-leaved Tuckeroo	V	-
<i>Lindsaea brachypoda</i>	Short-footed Screw Fern	E	-
<i>Macadamia integrifolia</i>	Macadamia Nut	-	V
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V
<i>Marsdenia longiloba</i>	Slender Marsdenia	E	V
<i>Melicope vitiflora</i>	Coast Euodia	E	-
<i>Niemeyera whitei</i>	Rusty Plum	V	-
<i>Ochrosia moorei</i>	Southern Ochrosia	E	E
<i>Owenia cepiodora</i>	Onionwood	V	V
<i>Ozothamnus vagans</i>	Wollumbin Dogwood	E	V
<i>Persicaria elatior</i>	Knotweed, Tall Knotweed	V	V
<i>Phaius australis</i>	Lesser Swamp-orchid	E	E
<i>Phyllanthus microcladus</i>	Brush Sauropus	E	-
<i>Psilotum complanatum</i>	Flat Fork Fern	E	-

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act <sup>#</sup>
<i>Randia moorei</i>	Spiny Gardenia	E	E
<i>Rhodamnia maideniana</i>	Smooth Scrub Turpentine	CE	CE
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE
<i>Rhodomyrtus psidioides</i>	Native Guava	CE	CE
<i>Sarcochilus fitzgeraldii</i>	Ravine Orchid	V	V
<i>Sarcochilus hartmannii</i>	Waxy Sarcochilus	V	V
<i>Sophora fraseri</i>		V	V
<i>Symplocos baeuerlenii</i>	Small-leaved Hazelwood	V	V
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	V	V
<i>Syzygium moorei</i>	Coolamon	V	V
<i>Thesium australe</i>	Austral Toadflax	V	V
<i>Tinospora tinosporoides</i>	Arrowhead Vine	V	-
<i>Uromyrtus australis</i>	Peach Myrtle	E	E
<i>Vincetoxicum woollsii</i>		E	E
<sup>^</sup> NSW Biodiversity Conservation Act 2016 (BC Act) <sup>#</sup> Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) CE - Critically Endangered, E - Endangered and V - Vulnerable			

### 2.3.1.3 Threatened Fauna Species

Threatened fauna species detected in the database searches are listed in TABLE 2. The conservation status of each species listed in TABLE 2 is shown in accordance with the EPBC Act and BC Act. Species that will clearly not occur on the subject site (i.e. whales, dolphins, sharks, marine turtles and marine/shore birds) have been omitted.

TABLE 2  
DATABASE RECORDS OF THREATENED FAUNA SPECIES

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act <sup>#</sup>
<b>Birds</b>			
<i>Amaurornis moluccana</i>	Pale-vented Bush-hen	V	-
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-
<i>Atrichornis rufescens</i>	Rufous Scrub-bird	V	E
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V	V
<i>Carterornis leucotis</i>	White-eared Monarch	V	-
<i>Circus assimilis</i>	Spotted Harrier	V	-
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	V	V
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	-
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-Parrot	CE	CE
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-
<i>Erythrorhynchus radiatus</i>	Red Goshawk	CE	E
<i>Falco hypoleucos</i>	Grey Falcon	V	V

Scientific Name	Common Name	BC Act^	EPBC Act#
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	-	V
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-
<i>Lathamus discolor</i>	Swift Parrot	E	CE
<i>Menura alberti</i>	Albert's Lyrebird	V	-
<i>Pachycephala olivacea</i>	Olive Whistler	V	-
<i>Petroica boodang</i>	Scarlet Robin	V	-
<i>Podargus ocellatus</i>	Marbled Frogmouth	V	-
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V	-
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V	-
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V	-
<i>Rostratula australis</i>	Australian Painted Snipe	E	E
<i>Stagonopleura guttata</i>	Diamond Firetail	V	V
<i>Sternula nereis nereis</i>	Australian Fairy Tern	-	V
<i>Turnix melanogaster</i>	Black-breasted Button-quail	CE	V
<i>Tyto novaehollandiae</i>	Masked Owl	V	-
<i>Tyto tenebricosa</i>	Sooty Owl	V	-
<b>Frogs</b>			
<i>Assa darlingtoni</i>	Pouched Frog	V	V
<i>Litoria olongburensis</i>	Wallum Sedge Frog	V	V
<i>Mixophyes balbus</i>	Stuttering Frog	E	V
<i>Mixophyes fleayi</i>	Fleay's Frog	E	E
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	V
<i>Philoria loveridgei</i>	Loveridge's Frog	E	-
<b>Insects/Invertebrates/Gastropods</b>			
<i>Argynnis hyperbius inconstans</i>	Australian Fritillary	-	CE
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle	V	-
<i>Phyllodes imperialis smithersi</i>	Pink Underwing Moth	E	E
<i>Thersites mitchelliae</i>	Mitchell's Rainforest Snail	E	CE
<b>Mammals</b>			
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V	-
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	-
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-
<i>Myotis macropus</i>	Southern Myotis	V	-
<i>Notamacropus parma</i>	Parma Wallaby	V	V
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	V	-
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	-
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	E
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	-	V
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V
<i>Phascolarctos cinereus</i>	Koala	E	-

Scientific Name	Common Name	BC Act^	EPBC Act#
<i>Planigale maculata</i>	Common Planigale	V	-
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (northern)	-	V
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-
<i>Thylogale stigmatica</i>	Red-legged Pademelon	V	-
<i>Xeromys myoides</i>	Water Mouse	-	V
<b>Reptiles</b>			
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	V
<i>Delma torquata</i>	Adorned Delma, Collared Delma	-	V
<i>Harrisoniascincus zia</i>	Rainforest Cool-skink	-	V
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	-
^ NSW Biodiversity Conservation Act 2016 (BC Act) # Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) CE - Critically Endangered, E - Endangered and V - Vulnerable			

#### 2.3.1.4 Migratory Species

Migratory species identified in database searches are listed in TABLE 3. Species that are heavily reliant on marine environments and will clearly not occur on the subject site have been omitted (e.g. cetaceans, sea turtles, wading and marine/coastal birds).

TABLE 3  
DATABASE RECORDS OF COMMONWEALTH LISTED MIGRATORY SPECIES

Scientific Name	Common Name	Status#
<i>Apus pacificus</i>	Fork-tailed Swift	M
<i>Cuculus optatus</i>	Oriental Cuckoo	M
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, M
<i>Monarcha melanopsis</i>	Black-faced Monarch	M
<i>Motacilla flava</i>	Yellow Wagtail	M
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M
<i>Pandion haliaetus</i>	Osprey	M
<i>Rhipidura rufifrons</i>	Rufous Fantail	M
<i>Symposiachrus trivirgatus</i>	Spectacled Monarch	M
# Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) CE - Critically Endangered, E - Endangered, V - Vulnerable and M - Migratory		

#### 2.3.2 State Government Legislation and Mapping

##### 2.3.2.1 Resilience and Hazards SEPP

The subject site is located outside the coastal zone and contains no coastal values mapped under the Resilience and Hazards SEPP.



#### 2.3.2.2 Biodiversity and Conservation SEPP

The subject site is zoned under the Byron LEP 2014 as (FIGURE 3):

- C2 - Environmental Conservation; and
- RU2 - Rural Landscape.

Chapter 3 - Koala Habitat Protection 2020 of the Biodiversity and Conservation SEPP applies to areas mapped as RU2. Chapter 4 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP applies to all other areas of the site. This is further addressed in SECTIONS 6.4 and 6.5.

#### 2.3.2.3 Biodiversity Values Map (BV Map)

No areas of Biodiversity Values are mapped on the subject site.

#### 2.3.2.4 Native Vegetation Regulatory Map (NVR Map)

The NVR Map shows areas of the site as containing areas of Vulnerable Regulated Land (FIGURE 5).

### 2.3.3 *Local Government Mapping*

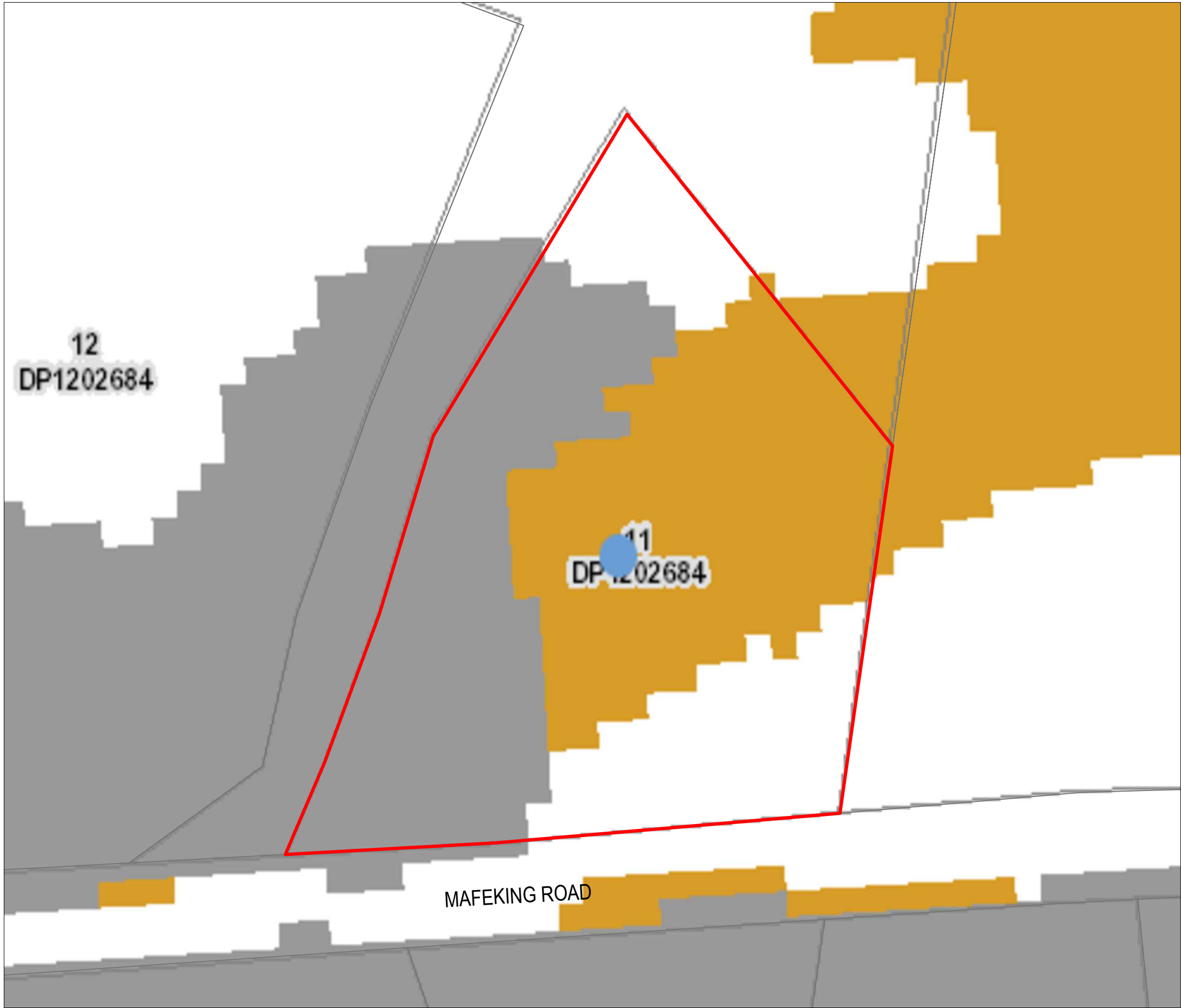
#### 2.3.3.1 BCCKPoM 2015

The subject site is not mapped as occurring within the Koala Planning Area as identified in the BCCKPoM.

#### 2.3.3.2 BSC Environmental Mapping

The following relevant BSC environmental layers are mapped on the subject site:

- HEV Vegetation (FIGURES 6);
- Lowland Rainforest EEC (FIGURE 7);
- Vegetation Communities (FIGURE 8):
  - Camphor Laurel 51-80%;
  - North Coast Wet Sclerophyll Forests; and
  - Planted Landscaping, Mixed.
- Wildlife corridor (FIGURE 9).



**LEGEND**

- Subject Site
- Cadastre
- Native Vegetation Regulatory Map
- Land excluded from the LLS Act
- Steep or highly erodible land, protected riparian land or special category land (Category 2 - vulnerable regulated land)

Scale 1 : 800

0 10m 20m 30m 40m 50m

SOURCE: NSW Govt. Transitional Native Vegetation Reulatory Map Viewer (accessed 08/12/23)

SCALE: 1 : 800 @ A3

JWA PTY LTD  
Ecological Consultants

CLIENT  
Mr T. E. Nabung and Ms T. M. Fumagall

PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 5

PREPARED: BW  
DATE: 6 February 2024  
FILE: N23030\_EA\_20240205.dwg

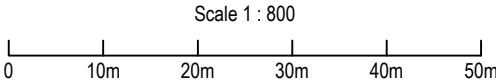
TITLE

NATIVE  
VEGETATION  
REGULATORY  
MAP



- LEGEND**
- Subject Site
  - Cadastre
  - BSC Environmental Layers
  - High Environmental Value (HEV) vegetation (2023)

Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: Byron Shire Council web map  
(accessed 06/02/24)

SCALE: 1 : 800 @ A3

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Ecological Consultants

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PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
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Byron Shire Council LGA

FIGURE 6




PREPARED: BW  
DATE: 7 February 2024  
FILE: N23030\_EA\_20240205.dwg

TITLE  
  
BSC  
HEV VEGETATION



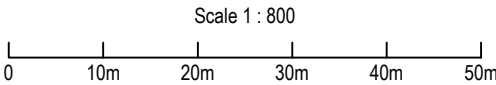


**LEGEND**

-  Subject Site
-  Cadastre
- BSC Environmental Layers
-  Lowland Rainforest EEC (2023)



Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: Byron Shire Council web map  
(accessed 06/02/24)

SCALE: 1 : 800 @ A3

*JWA PTY LTD*  
*Ecological Consultants*

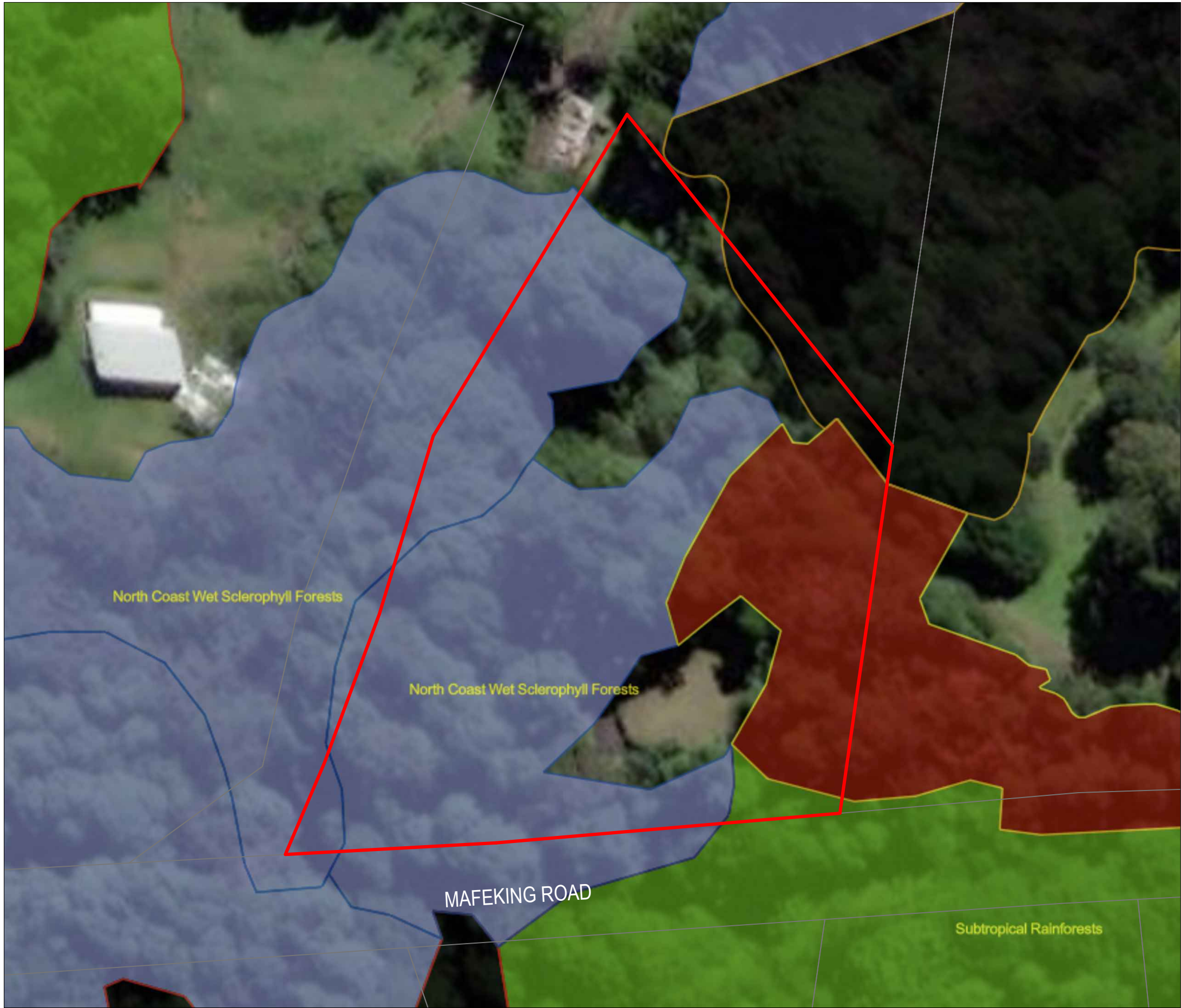
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PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 7

PREPARED: BW  
DATE: 7 February 2024  
FILE: N23030\_EA\_20240205.dwg

TITLE  
BSC  
ENDANGERED  
ECOLOGICAL  
COMMUNITIES

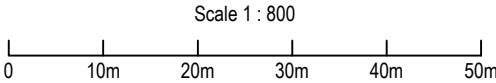




- LEGEND**
- Subject Site
  - Cadastre
  - BSC Vegetation Communities (2023)
    - Camphor Laurel 51-80%
    - North Coast Wet Sclerophyll Forests
    - Planted Landscaping, Mixed
    - Subtropical Rainforests



Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: Byron Shire Council web map  
(accessed 06/02/24)

SCALE: 1 : 800 @ A3

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Ecological Assessment  
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FIGURE 8

PREPARED: BW  
DATE: 7 February 2024  
FILE: N23030\_EA\_20240205.dwg




TITLE

BSC  
VEGETATION  
COMMUNITIES

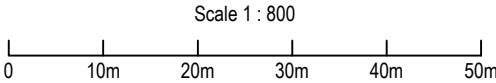




**LEGEND**

-  Subject Site
-  Cadastre
- BSC Environmental Layers
-  Wildlife Corridors (2023 Adopted)

Note:  
The positional accuracy of any boundaries or critical features shown on this plan requires confirmation prior to its use in design or construction.



SOURCE: Byron Shire Council web map  
(accessed 06/02/24)

SCALE: 1 : 800 @ A3

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*Ecological Consultants*

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PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 9

PREPARED: BW  
DATE: 7 February 2024  
FILE: N23030\_EA\_20240205.dwg

TITLE  
**BSC  
WILDLIFE  
CORRIDORS**

## 3 FIELD ASSESSMENT

### 3.1 Introduction

This section discusses the methods and results of the field assessments completed on the subject site. Site surveys were completed by two (2) senior ecologists on the 14<sup>th</sup> December 2023 for a total of approximately 5 hours.

### 3.2 Methods

#### 3.2.1 Flora Assessment

A detailed flora assessment was completed for the subject site. The random meander technique (Cropper 1993) was used to identify changes in landform, identify vegetation community boundaries and to prepare a flora species list. The floral characteristics of each vegetation community that was evident from detailed aerial photographs were examined by 'on foot' inspections.

Targeted threatened plant surveys were also completed in accordance with the NSW threatened plants survey guideline (DPIE 2020). The targeted surveys utilised the parallel field-traverse method which involved searching along a grid of parallel traverses, whereby the surveyor walked at a reasonable pace while making a visual sweep either side of the traverse. The location of threatened plants was recorded.

#### 3.2.2 Fauna Assessment

A brief fauna survey was completed for the subject site and included both active searches for fauna and opportunistic sightings. The random meander technique (Cropper 1993) was used to traverse the subject site. Any logs, sheets of tin, cardboard, bark and leaves were overturned in search of reptiles and amphibians while traversing the site. Searches were undertaken for diggings, scats, and bones. Active observation of bird and amphibian activity, both aurally and visually, was undertaken during the field assessment. All incidental records of fauna utilising the site were recorded. habitats were also assessed during the field assessment to determine their value for native fauna species.

### 3.3 Results

#### 3.3.1 Flora

A total of one hundred and seventy-six (176) flora species were recorded at the subject site. A full list of species recorded at the subject site is included as APPENDIX 1. Weed species are indicated throughout this document using an asterisk\*.

Fifty-five (55) threatened plant specimens were recorded on the site. These specimens consisted of the following three (3) threatened species (FIGURE 10):

- Bopple nut (*Hicksbeachia pinnatifolia*) - Vulnerable under the EPBC Act and the BC Act - a total of thirty-nine (39) records;





**LEGEND**

- Subject Site
- Cadastral

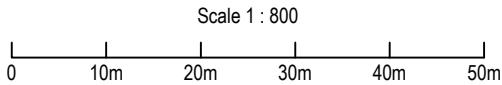
**Threatened Flora**

- Arrowhead vine (*Tinospora tinctoria*)
- Bopple nut (*Hicksbeachia pinnatifolia*)
- Rough-shelled Queensland Nut (*Macadamia tetraphylla*)

**Vegetation Zones (VZ)**

- VZ1 - Tall closed wet sclerophyll forest (*Lophostemon confertus*) to 25m (PCT 3148)
- VZ2 - Mid-high to tall subtropical rainforest (mixed species) to 20m (PCT 3002)
- VZ3 - Mid-high to tall Camphor laurel forest (*Cinnamomum camphora*) to 20m
- VZ4 - Disturbed / cleared land

Note:  
Site boundary taken from proposed development layout/survey plan.  
The positional accuracy of any boundaries or critical features shown  
on this plan requires confirmation prior to its use in design or construction.



SOURCE: JWA Site Investigations; Eco Essence  
Homes - Location Plan Rev H; NSW DCS Spatial  
Services - Six Maps NSW Imagery (unknown Date)  
SCALE: 1 : 800 @ A3  
JWA PTY LTD  
Ecological Consultants

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Mr T. E. Nabung and Ms T. M. Fumagall  
PROJECT  
Ecological Assessment  
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FIGURE 10  
PREPARED: BW  
DATE: 8 February 2024  
FILE: N23030\_EA\_20240208.dwg

TITLE  
VEGETATION ZONES  
& THREATENED  
FLORA RECORDS



- Rough-shelled Queensland Nut (*Macadamia tetraphylla*) - Vulnerable under the EPBC Act and the BC Act - a total of twelve (12) records; and
- Arrowhead vine (*Tinospora tinosporoides*) - Vulnerable under the BC Act - a total of four (4) records.

FIGURE 10 shows the locations of the threatened plants and TABLE 4 provides the details of each specimen.

**TABLE 4**  
**THREATENED PLANTS RECORDED ON SITE**

ID	Common Name	Botanical Name	Description
1	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1 x sub-mature plant @2.5m in height
2	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1x sapling @1.5m in height
3	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1 x sub-mature plant @3m in height
4	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @5.5m in height
5	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	Clump of 9x plants ranging from 1.5 - 8m in height
6	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1x sapling @2m in height
7	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	3x plants ranging from 2 - 5m in height
8	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	2x plants @2m and 1.2m in height respectively
9	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	2x mature plants @10m
10	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @6m in height
11	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @9m in height
12	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @4.5m in height
13	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @5m in height
14	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @9m in height
15	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1 x mature plant @7m in height
16	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1 x sub-mature plant @3m in height
17	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x mature plant @9m in height
18	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1 x mature plant @7m in height
19	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	11x plants ranging from 1.5 - 5m in height
20	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x mature plant @6m in height
21	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x mature plant @5m in height
22	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x mature plant @5m in height
23	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x sub-mature plant @2.5m in height
24	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x sub-mature plant @3m in height

ID	Common Name	Botanical Name	Description
25	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1x mature plant @8m in height
26	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1x mature plant @4.5m in height
27	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x mature plant @6.5m in height
28	Rough-shelled Queensland Nut	<i>Macadamia tetraphylla</i>	1x sub-mature plant @2.5m in height
29	Bopple nut	<i>Hicksbeachia pinnatifolia</i>	1x mature plant @6m in height
30	Arrowhead vine	<i>Tinospora tinoporoides</i>	4x plants

### 3.3.2 Vegetation Zones

A total of four (4) vegetation zones (VZ) were identified across the subject site. Descriptions of each of these vegetation zones is provided below and their location is shown on FIGURE 10. The status of these communities is discussed below with reference to Plant Community Types (PCTs) as described in the NSW BioNet Vegetation Information System (VIS) and also Threatened Ecological Community (TEC) descriptions in accordance with the EPBC Act and BC Act where relevant. Weed species are indicated by the use of an asterisk\*.

VZ1 - Tall closed wet sclerophyll forest ( <i>Lophostemon confertus</i> ) to 25 m		
Applicable PCT	3148 - Far North Brush Box-Walnut Wet Forest	
Location	This VZ occurs over the majority of the western half of the subject site associated with moderate south to south-western facing slopes (FIGURE 10).	
Description	<p>The canopy of this community is generally dominated by mature Brushbox (<i>Lophostemon confertus</i>) up to 25m in height, with mature rainforest trees also occurring occasionally including Guioa (<i>Guioa semiglauc</i>), Red kamala (<i>Mallotus philippensis</i>), Native Olive (<i>Olea paniculata</i>) and White bolly gum (<i>Neolitsea dealbata</i>), and scattered Camphor laurel* (<i>Cinnamomum camphora</i>).</p> <p>The mid-dense sub-canopy and mid-stratum include a mixture of small rainforest trees and shrubs the most common of which include Blackwood Wattle (<i>Acacia melanoxylon</i>), Scentless Rosewood (<i>Synoum glandulosum</i>), Bangalow Palm (<i>Archontophoenix cunninghamiana</i>), Cheese Tree (<i>Glochidion ferdinandi</i>), Macaranga (<i>Macaranga tanarius</i>), Large Mock-olive (<i>Notelaea longifolia</i>), Plum Myrtle (<i>Pilidiostigma glabrum</i>), Sweet Pittosporum (<i>Pittosporum undulatum</i>) and Steelwood (<i>Sarcopetera stipata</i>).</p> <p>The mid-dense to sparse lower stratum/groundcover commonly includes Native Ginger (<i>Alpinia caerulea</i>), Blue Flax Lily (<i>Dianella caerulea</i>), Rough Maidenhair Fern (<i>Adiantum hispidulum</i>), Long-leaved Matrush (<i>Lomandra longifolia</i>), <i>Oplismenus aemula</i> and <i>Ottochloa gracillima</i>.</p> <p>Vines occur throughout the most common of which include Barbed Wire Vine (<i>Smilax australis</i>), Scrambling lily (<i>Geitonoplesium cymosum</i>), Carronia Vine (<i>Carronia multiseptata</i>), Water Vine (<i>Cissus antarcticus</i>) and Burny Vine (<i>Trophis scandens</i>).</p>	
Conservation Status	EPBC Act	This VZ is considered to be representative of the TEC - Lowland Rainforest of Subtropical Australia - which is listed as Critically Endangered within schedules of the EPBC Act (refer SECTION 3.3.3).
	BC Act	This VZ is considered to be representative of the TEC - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions - which is listed as Endangered within schedules of the BC Act (refer SECTION 3.3.4).

VZ1 - Tall closed wet sclerophyll forest (*Lophostemon confertus*) to 25 m




PLATE 5 - Example of VZ1 in the south-western portion of the subject site

VZ2 - Mid-high to tall subtropical rainforest (mixed species) to 20m

Applicable PCT	3002 - Lower Richmond Hills Dry-Subtropical Rainforest	
Location	This VZ occurs in the eastern portion of the site on (FIGURE 10).	
Description	<p>The canopy of this community is comprised of a mixture of native rainforest species the most common of which include Pepperberry (<i>Cryptocarya obovata</i>), Cudgerie (<i>Flindersia schottiana</i>), Foambark (<i>Jagera pseudorhus</i>), Native tamarind (<i>Diploglottis australis</i>), Red bean (<i>Dysoxylum mollissimum</i> subsp. <i>molle</i>), Strangling fig (<i>Ficus watkinsiana</i>), Guioa, Red kamala and White bolly gum. There are also scattered Camphor laurel*.</p> <p>The mid-dense sub-canopy and mid-stratum include a mixture of small rainforest trees and shrubs the most common of which include Blackwood Wattle, Coffee bush (<i>Breynia oblongifolia</i>), Hairy Walnut (<i>Endiandra pubens</i>), Creek Sandpaper Fig (<i>Ficus coronata</i>), Blue Lilly Pilly (<i>Syzygium oleosum</i>), Bangalow Palm, Broad-leaved Palm Lily (<i>Cordyline petiolaris</i>), Macaranga, Orange Thorn (<i>Pittosporum multiflorum</i>), Sweet Pittosporum, Bolwarra (<i>Eupomatia laurina</i>) and Blunt-leaved Steelwood (<i>Toeckima dasyrrhache</i>).</p> <p>The sparse lower stratum/groundcover commonly includes Native Ginger, Blue Flax Lily, Rough Maidenhair Fern, Climbing fern (<i>Arthropteris tenella</i>), Gristle fern (<i>Blechnum cartilagineum</i>) and Bird's Nest Fern (<i>Asplenium australasicum</i>).</p> <p>Vines occur throughout the most common of which include Giant Blood Vine (<i>Austrosteenisia glabristylis</i>), Whip vine (<i>Flagellaria indica</i>), Barbed Wire Vine, Carronia Vine, Native Wisteria (<i>Callerya megasperma</i>), Water Vine and Burny Vine.</p>	
Conservation Status	EPBC Act	This VZ is considered to be representative of the TEC - Lowland Rainforest of Subtropical Australia - which



VZ2 - Mid-high to tall subtropical rainforest (mixed species) to 20m		
		is listed as Critically Endangered within schedules of the EPBC Act (refer SECTION 3.3.3).
	BC Act	This VZ is considered to be representative of the TEC - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions - which is listed as Endangered within schedules of the BC Act (refer SECTION 3.3.4).
		
PLATE 6 - Example of VZ2 in the eastern portion of the subject site		

VZ3 - Mid-high to tall Camphor laurel forest ( <i>Cinnamomum camphora</i> ) to 20 m		
Applicable PCT	N/A. The structure and composition of this VZ have been modified to the point that is no longer considered to be representative of any of the PCT's described within the NSW BioNet VIS.	
Location	This VZ occurs in the northern portion of the subject site in the vicinity of overhead powerlines (FIGURE 10).	
Area	0.53 hectares (6.5% of total site area).	
Description	The canopy of this community is generally dominated by the introduced Camphor laurel*, indicating a history of disturbance/vegetation clearing.	
Conservation Status	EPBC Act	This VZ is not considered to be representative of any of the TECs listed within schedules of the EPBC Act (refer SECTION 3.3.3).
	BC Act	This VZ is not considered to be representative of any of the TECs listed within schedules of the BC Act (refer SECTION 3.3.4).

VZ4 - Disturbed/cleared land with maintained grassland	
Applicable PCT	N/A. The structure and composition of this VZ have been modified to the point that is no longer considered to be representative of any of the PCT's described within the NSW BioNet VIS.
Location	Patches of this VZ are scattered throughout the subject site and have historically been cleared (FIGURE 10). This includes the proposed dwelling location, existing sealed driveway, and rock retaining walls (Plates 1 and 2), a cleared grassland area in the northwest and existing vehicular track linked to the dwelling location (Plates 3 and 4).

VZ4 - Disturbed/cleared land with maintained grassland		
Description	The canopy and midstorey components of this vegetation community have historically been removed. The groundcover component is now generally comprised of a mixture of exotic grass and common agricultural weed species and appears to be regularly maintained via mowing/slashing.	
Conservation Status	EPBC Act	This VZ is not considered to be representative of any TEC's listed within schedules of the EPBC Act (refer SECTION 3.3.3).
	BC Act	This VZ is not considered to be representative of any TEC's listed within schedules of the BC Act (refer SECTION 3.3.4).

### 3.3.3 Threatened Ecological Communities (EPBC Act)

#### 3.3.3.1 Lowland Rainforest of Subtropical Australia - Critically Endangered

##### *Introduction*

When making a determination as to whether this nationally listed ecological community is present at a particular site, the 'Description' (including the 'General Features' and 'Key Diagnostic Characteristics') and 'Condition Thresholds' of the listed ecological community as outlined in the Conservation Advice for the TEC must be used as the primary factor for determination rather than any other classification system.

As outlined in the Commonwealth Listing Advice on the Lowland Rainforest of Subtropical Australia (TSSC 2011), key diagnostic characteristics and condition thresholds provide guidance as to whether a patch of a TEC retains sufficient conservation values to be considered as a MNES.

An assessment of the Vegetation Zones occurring on the subject site (FIGURE 10) against the description and condition thresholds included within the Commonwealth Listing Advice for the Lowland Rainforest of Subtropical Australia TEC has been completed below.

##### *Key diagnostic characteristics*

Based on interrogation of Section 5 of the Commonwealth Listing Advice (TSSC 2011), the diagnostic characteristics within TABLE 5 below apply to the Lowland Rainforest of Subtropical Australia TEC listed within schedules of the EPBC Act.

VZ's 1 and 2 are considered to meet all diagnostic characteristics and further investigation into their classification as the Lowland Rainforest of Subtropical Australia TEC is completed below.

VZ's 3 and 4 have been highly disturbed by past clearing activities and do not satisfy all the diagnostic characteristics (i.e. structural layers and species richness) to be classified as the Lowland Rainforest of Subtropical Australia TEC.

##### *Condition thresholds*

The listed Lowland Rainforest of Subtropical Australia ecological community comprises those patches that meet the key diagnostic characteristics (TABLE 5) and the condition thresholds (TABLE 6). TABLE 6 provides an assessment against the condition thresholds for

each patch of vegetation on site that is considered to meet the key diagnostic characteristics for Lowland Rainforest of Subtropical Australia ecological community.

VZ1 and VZ2 on the subject site meet the condition thresholds for Patch Type B of the Lowland Rainforest of Subtropical Australia TEC. Key factors include:

- Residual rainforest trees are present as well as evidence of natural regeneration;
- The patches are greater than 1 ha in size;
- The canopy cover is greater than 70%;
- The patches contain greater than 30 native woody species from the listing; and
- Greater than 50% of the vegetation is native.



TABLE 5

## ASSESSMENT OF VZ'S AGAINST KEY DIAGNOSTIC CHARACTERISTICS FOR LOWLAND RAINFOREST OF SUBTROPICAL AUSTRALIA

Diagnostic characteristic	Relevance VZ's recorded on the subject site			
	VZ1	VZ3	VZ3	VZ4
Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions	Yes	Yes	Yes	Yes
The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.	Yes	Yes	Yes	Yes
The ecological community generally occurs at an altitude less than 300 m above sea level.	Yes	Yes	Yes	Yes
The ecological community typically occurs in areas with high annual rainfall (>1300 mm).	Yes	Yes	Yes	Yes
The ecological community is typically more than 2 km inland from the coast.	Yes	Yes	Yes	Yes
The structure of the ecological community is typically a tall (20 m-30 m) closed forest, often with multiple canopy layers.	Yes	Yes	No	No
Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A).	Yes	Yes	No	No

TABLE 6  
ASSESSMENT OF VZ'S AGAINST CONDITION THRESHOLD FOR LOWLAND RAINFOREST OF SUBTROPICAL AUSTRALIA

Condition Threshold		VZ1:	VZ2:
Patch Type (evidence of remnant vegetation & regeneration status)	A Natural remnant evident by the persistence of mature residual trees from Appendix B.	-	-
	B Some residual trees from Appendix B are present plus evidence of either; natural regeneration <sup>*1</sup> AND/OR regeneration with active management <sup>*2</sup>	The canopy of this community is comprised of a mixture of native rainforest species with some residual trees present as well as evidence of natural regeneration.	The canopy of this community is comprised of a mixture of native rainforest species and the introduced Camphor laurel* indicating a history of disturbance/vegetation clearing. Some residual trees are present as well as evidence of natural regeneration and active management.
	C A non-remnant patch that has recovered through a) natural regeneration <sup>*1</sup> AND/OR b) supplementary planting that has stature and quality that is reflective of the Description <sup>*3</sup>	-	-
Patch Size (excludes buffer zone)	A ≥ 0.1 ha	-	-
	B ≥ 1 ha	Yes	Yes

Condition Threshold		VZ1:	VZ2:
	C ≥ 2 ha	-	-
Canopy Cover (over entire patch) *4	A/ B/ C Emergent/canopy/ subcanopy <sup>*4</sup> cover is ≥ 70%	Yes	Yes
Species Richness (over entire patch)	A contains ≥ 40 native woody species <sup>*5</sup> from Appendix A	-	-
	B / C contains ≥ 30 native woody species <sup>*5</sup> from Appendix A	Yes	Yes
Percent of total vegetation cover that is native <sup>*6</sup> (use sample plot)	A ≥70% of vegetation <sup>*6</sup> is native	-	-
	B / C ≥50% of vegetation <sup>*6</sup> is native	Yes	Yes
Condition Category:		Type B	Type B

### 3.3.4 Threatened Ecological Communities (BC Act)

As per the NSW Scientific Committee - Final Determination (TSSC 2012), Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions is the name given to the ecological community of subtropical rainforest and some related, structurally complex forms of dry rainforest, excluding Littoral Rainforest (as described in the Final Determination gazetted on 4<sup>th</sup> June 2004) and Lowland Rainforest on Floodplain in the NSW North Coast Bioregion (as described in the Final Determination gazetted on 13<sup>th</sup> August 1999). Lowland Rainforest may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. In the north of its range, Lowland Rainforest is found up to 600m above sea level.

Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes, give the canopy an irregular appearance (Floyd 1990). The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergents (e.g. *Eucalyptus grandis*, *E. saligna*) may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines. Although every stand of rainforest is unique in terms of its biota, Lowland Rainforest can be characterised by a variety of species listed in the Final Determination.

Based on interrogation of NSW Scientific Committee - Final Determination and the TEC Community Profile (OEH 2022), VZ1 and VZ2 contain the relevant characteristic species, alliances, or sub alliances to be classified as the TEC - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions.

### 3.3.5 Fauna

#### 3.3.5.1 Amphibians

No species of amphibian were recorded.

#### 3.3.5.2 Reptiles

Two (2) reptile species were recorded during the field assessment:

- Cream-striped shinning-skink (*Cryptoblepharus virgatus*); and
- Dark-flecked garden sunskink (*Lampropholis delicata*).

No threatened reptile species were recorded.

### 3.3.5.3 Birds

The field assessment recorded 33 native bird species (TABLE 7). One (1) threatened species - the Rose-crowned fruit-dove (*Ptilinopus regina*) was heard calling from adjoining land to the south-east of the subject site.

TABLE 7  
BIRD SPECIES RECORDED DURING FIELD ASSESSMENTS

Common Name	Scientific Name
Brown Thornbill	<i>Acanthiza pusilla</i>
Australian Brush-Turkey	<i>Alectura lathamii</i>
Australian King-Parrot	<i>Alisterus scapularis</i>
Sulphur-Crested Cockatoo	<i>Cacatua galerita</i>
Fan-Tailed Cuckoo	<i>Cacomantis flabelliformis</i>
Emerald Dove	<i>Chalcophaps indica</i>
Grey Shrike-Thrush	<i>Colluricincla harmonica</i>
White-Headed Pigeon	<i>Columba leucomela</i>
Black-Faced Cuckoo-Shrike	<i>Coracina novaehollandiae</i>
Torresian Crow	<i>Corvus orru</i>
Pied Butcherbird	<i>Cracticus nigrogularis</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Spangled Drongo	<i>Dicrurus bracteatus</i>
Eastern Yellow Robin	<i>Eopsaltria australis</i>
Bar-shouldered Dove	<i>Geopelia humeralis</i>
Brown Gerygone	<i>Gerygone mouki</i>
Australian Magpie	<i>Gymnorhina tibicen</i>
Wonga Pigeon	<i>Leucosarcia melanoleuca</i>
Brown Cuckoo-Dove	<i>Macropygia phasianella</i>
Variegated Fairy-wren	<i>Malurus lamberti</i>
Lewin's Honeyeater	<i>Meliphaga lewinii</i>
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>
Striated Pardalote	<i>Pardalotus striatus</i>
Eastern Whipbird	<i>Psophodes olivaceus</i>
<b>Rose-crowned fruit-dove</b>	<b><i>Ptilinopus regina</i></b>
Grey Fantail	<i>Rhipidura albiscapa</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
White-Browed Scrubwren	<i>Sericornis frontalis</i>
Australasian Figbird	<i>Sphecotheres vieilloti</i>
Pied Currawong	<i>Strepera graculina</i>
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Silvereye	<i>Zosterops lateralis</i>

#### 3.3.5.4 Mammals

One (1) native and one (1) exotic mammal species were recorded during the field survey:

- Red-necked wallaby (*Notamacropus rufogriseus*); and
- Dog (*Canis familiaris*).

No threatened mammal species were recorded.

## 4 HABITAT SUITABILITY ASSESSMENT

### 4.1 Background

The suitability of the habitats on the subject site for listed threatened fauna species identified in database searches was assessed to determine those species could potentially occur.

The impacts associated with current land uses, vegetation clearing, land, and waterway erosion/degradation, weed and feral invasion and previous fire regimes were all considered when completing habitat suitability assessments. Particular attention was paid to habitat features such as:

- mature trees with hollows, fissures and/or other suitable roosting/nesting places;
- Preferred Koala Food Trees and/or glossy black cockatoo feed trees (forest oak and/or black she-oak);
- characteristic signs of foraging (e.g. chewed cones or glider feeding scars);
- condition, flow and water quality of drainage lines and bodies of water;
- areas of dense vegetation;
- hollow logs/debris and areas of dense leaf litter;
- fruiting and/or blossoming flora species;
- connectivity and proximity to neighbouring areas of intact vegetation; and
- caves and man-made structures suitable as microchiropteran bat roost sites.

Potential occurrences of threatened flora species are discussed as *unlikely*, *possible*, or *likely* to occur in habitats on the subject site. Possible occurrences are species which may occur sporadically or are provided with small areas of potentially suitable habitat. Likely occurrences are provided with habitat of high quality.

### 4.2 Applicability to the Subject Site

#### 4.2.1 Amphibians

The habitat requirements of most species are strongly influenced by factors such as climate, distance to water bodies, riparian vegetation, hydrological and morphological characteristics of water bodies and the availability of suitable micro-habitat for aestivation and shelter.

Many species that occur within the region lay eggs in or near temporary or permanent water bodies and rely on free water for larval development and metamorphosis. Of these species, a few are dependent on forested habitats beyond the riparian zone or beyond areas of temporary inundation. These species include the Red-eyed tree frog (*Litoria chloris*), Leseuer's frog (*Litoria leseueri*), Fletchers frog (*Lechriodus fletcheri*) and the Barred frogs of the *Mixophyes* genus.

Grasslands, provide suitable habitat for a range of amphibian species, particularly along drainage depressions and soaks. Species commonly encountered in grassland communities include the Common eastern froglet, Eastern sign bearing froglet (*Crinia parinsignifera*), Striped marsh frog (*Limnodynastes peronii*), Spotted grass frog (*Limnodynastes tasmaniensis*), Eastern dwarf tree frog, Striped rocket frog (*Litoria nasuta*), Whistling tree frog (*Litoria verreauxii*) and Cane toad\* (*Rhinella marina*).

The highest quality habitat features for amphibians in the broader locality are likely to be associated with areas of dense groundcover, intact vegetation, and low-lying areas/drainage lines. There is an absence of suitable breeding or preferred habitat to suggest that any of the threatened frog species listed in TABLE 2 would be present on the subject site (see APPENDIX 2 for habitat suitability assessments).

#### 4.2.2 Birds

The significance of near coastal environments of the NSW Far North Coast and South-East Queensland as over-wintering habitat for migratory birds has been established by many observers and bird banders including Keast (1968), Robertson (1973), Gravatt (1974), Porter (1982) and Robertson and Woodall (1983). These patterns may be attributable to the relatively high winter temperatures and long growing season of this region compared with the rest of south-eastern Australia (Fitzpatrick and Nix 1973; Edwards 1979; Nix 1982).

Many insectivorous birds from higher latitudes and elevation over-winter in the locality. These include species such as the Fantail cuckoo (*Cacomantis flabelliformis*), Sacred kingfisher (*Todiramphus sanctus*), Rainbow bee-eater (*Merops ornatus*), Noisy pitta (*Pitta versicolor*), Tree martin (*Petrochelidon nigricans*), Black-faced cuckoo-shrike (*Coracina novaehollandiae*), Cicada bird (*Coracina tenuirostris*), Golden whistler (*Pachycephala pectoralis*), Rufous whistler (*Pachycephala rufiventris*), Rose robin (*Petroica rosea*), Grey fantail (*Rhipidura albiscapa*), White-throated gerygone (*Gerygone olivacea*), Silvereye (*Zosterops lateralis*), Olive-backed oriole (*Oriolus sagittatus*) and Spangled drongo (*Dicrurus bracteatus*).

Birds such as honeyeaters and lorikeets are Blossom nomads (*ibid.*). These birds move locally in response to variation in the availability of nectar and or pollen, important components in their diet. Porter (1982) highlights the importance of Forest red gum, Broad-leaved paperbark, and Coast banksia for Scaly-breasted (*Trichoglossus chlorolepidotus*) and Rainbow (*Trichoglossus moluccanus*) lorikeets as these species flower during the lorikeet's winter breeding period. A sequence of important nectar bearing plants in the genera Eucalyptus, Banksia, Melaleuca and Callistemon provide a continuity of food for nectarivorous birds.

Studies of bird usage in rainforest remnants by Holmes (1987), Connelly and Specht (1988) and Lott & Duigan (1993) indicate that the diversity and abundance of birds is related to the size of the rainforest patches and their degree of isolation from major areas of native forest. Lott & Duigan (1993) and Howe *et al* (1981) also note that sites with a higher diversity of vegetation and those which are closer to water generally support a greater diversity of birds. Locally nomadic and migratory rainforest species such as the Wompoo (*Ptilinopus magnificus*), Rose-crowned (*Ptilinopus regina*) and Superb fruit-doves



(*Ptilinopus superbis*), Common koel (*Eudynamys orientalis*) and Black-faced cuckoo-shrike are known to use scattered areas of habitat as “stepping-stones” between more intact areas of forest (Date *et al* 1992; Lott & Duigan 1993).

A number of Threatened rainforest birds are considered a possible occurrence on the subject site based on the available habitat on site (see APPENDIX 2 for habitat suitability assessments). The presence of these species is likely to be influenced by the availability of seasonal food sources (i.e., ripening fruit).

#### 4.2.3 Mammals

Small terrestrial mammals generally occur in highest densities in association with complex vegetation structures. A dense understorey layer, which provides shelter from predators and provides nesting opportunities, is particularly important. In general, medium-large terrestrial mammals such as macropods select habitats which provide a dense cover for shelter and refuge and open areas for feeding. The larger species tend to occupy drier more open habitats: the smaller species, moister and more densely vegetated habitats.

Arboreal mammals that occur in the region (apart from the koala) utilise tree hollows for nesting and shelter (although the common ringtail possum *Pseudocheirus peregrinus* is not dependent on hollows). Smith and Lindenmeyer (1988) consider that shortage of nest hollows is likely to limit arboreal mammal populations where density of hollow bearing trees is less than 2 to 8 trees per hectare.

Arboreal folivores are widespread and abundant but exhibit local variation in response to such factors as tree species composition, foliage protein and fibre levels, leaf toughness, toxins, forest structure and the availability of shelter sites. Arboreal folivores are expected to be most abundant in areas of high productivity, high soil fertility and moderate climate, in conjunction with adequate shelter and suitable foraging substrate.

Arboreal nectarivore/insectivores feed on a wide variety of plant and insect exudates including the nectar of flowering eucalypts, and shrubs such as Banksia and Acacia sp. These species also feed extensively on insects, particularly under the shedding bark of eucalypts. The distribution of nectarivore/insectivores is considered to be related to the abundance of nectar and pollen producing plants, the abundance of bark shedding eucalypts which harbour insect prey, and the occurrence of sap and gum exudate producing trees and shrubs (*e.g.* Acacia sp.). Arboreal nectarivores and insectivores are generally hollow dependent species.

Habitat on the subject site (and surrounds) is considered suitable to providing foraging and breeding opportunities for a range of common native terrestrial and arboreal mammal species. The absence of abundant large hollows suggests that hollow-dependant species are likely to be absent.

Fruiting trees and flowering species may provide forage habitat for local flying fox species - Black flying-fox (*Pteropus alecto*) and the EPBC Act listed Grey-headed flying fox (*Pteropus poliocephalus*) (see APPENDIX 2 for habitat suitability assessments).

#### 4.2.4 Reptiles

Reptile distributions are strongly influenced by structural characteristics of the vegetation, climate and other factors affecting thermoregulation such as shade and availability of shelter and basking sites (Smith *et al* 1994). The availability of microhabitats, of varying thermal properties is particularly important for most reptile species, as behavioural thermoregulation (regulation of body heat) is important in controlling critical body functions such as digestion, foraging activity, and reproduction.

Reptile diversity and abundance is often (but not always) significantly higher in drier habitat types, particularly those with a wide variety of ground substrate microhabitats. This contrasts markedly with the distribution patterns of birds, and most mammals. The single limiting factor in terms of species diversity in coastal vegetation is the lack of shelter sites (e.g. logs, tree hollows and decorticated bark). Such habitat components characterise eucalypt forests and woodlands, where species diversity may be much higher, depending on disturbance factors.

The subject site provides suitable habitat for a range of native and commonly occurring reptile species due to the availability of basking sites, and patches of vegetation with a relatively high abundance of microhabitats provided by leaf litter and fallen timber.

### 4.3 Summary

Based on field assessments and/or habitat suitability twenty-three (23) threatened species are considered possible occurrences based on the presence of suitable habitat (see APPENDIX 2 for habitat suitability assessments). These species include:

- Albert's Lyrebird (*Menura alberti*);
- Barred Cuckoo-shrike (*Coracina lineata*);
- Black-breasted Button-quail (*Turnix melanogaster*);
- Common Planigale (*Planigale maculata*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Eastern Long-eared Bat (*Nyctophilus bifax*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Marbled Frogmouth (*Podargus ocellatus*);
- Olive Whistler (*Pachycephala olivacea*);
- Pink Underwing Moth (*Phyllodes imperialis smithersi*);
- Red-legged Pademelon (*Thylogale stigmatica*);
- Rose-crowned fruit-dove (*Ptilinopus regina*);

- Shorter Rainforest Ground-beetle (*Nurus brevis*);
- Sooty Owl (*Tyto tenebricosa*);
- Spotted-tailed Quoll (*Dasyurus maculatus*);
- Stephens' Banded Snake (*Hoplocephalus stephensi*).
- Superb Fruit-Dove (*Ptilinopus superbus*);
- White-eared Monarch (*Carterornis leucotis*);
- White-throated Needletail (*Hirundapus caudacutus*); and
- Wompoo Fruit-Dove (*Ptilinopus magnificus*).

## 5 POTENTIAL IMPACTS AND RECOMMENDATIONS

### 5.1 Introduction

The following sections examine the potential direct and indirect impacts of the proposed development and recommends amelioration measures to minimise and mitigate impacts on the biodiversity and habitat values of the subject site.

### 5.2 Impacts of the Proposed Development

#### *5.2.1 Impacts on Vegetation Communities*

The proposed development will generally be located within cleared areas of the subject site. However, there are potential impacts on site vegetation associated with (FIGURE 11):

- The positioning of the proposed 10kl firefighting tank;
- The positioning of the proposed 100kl rainwater tank; and
- The locations of the proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area.

Recommendation to avoid/minimise these impacts are provided in SECTION 5.3.1 below.

Indirect impacts on vegetation communities may potentially include:

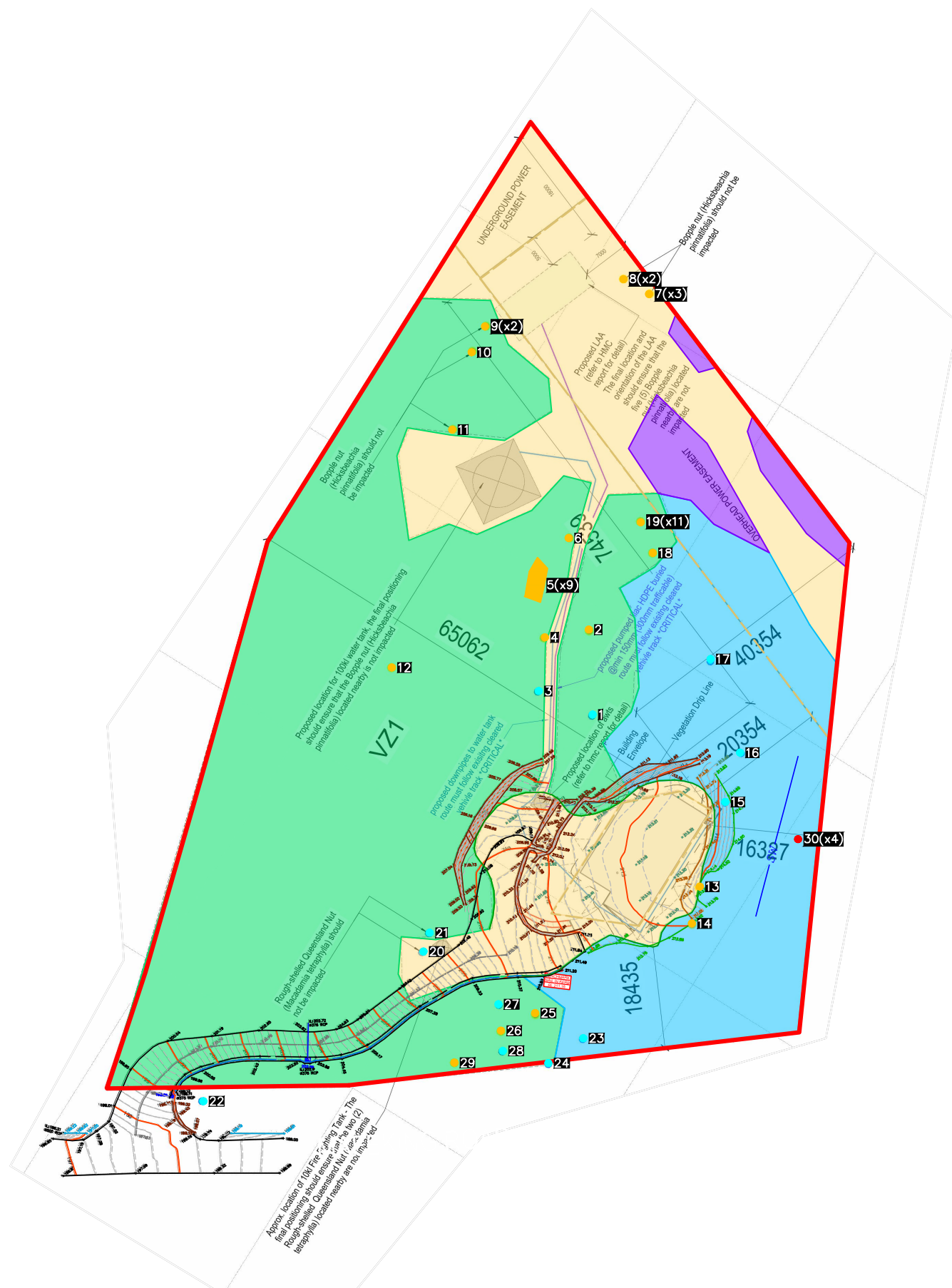
- Disturbance to the subject site creates opportunities for weeds to colonise. Weeds may be introduced to the subject site in construction materials or by vehicles. Continued occupation of the subject site creates opportunities for weeds to become established. Landscape species may escape to retained areas of vegetation.
- Any removal of vegetation from the subject site represents the loss of organic material from the site.

Recommendation to avoid/minimise these potential indirect impacts are provided in SECTION 5.3.1 below.

#### *5.2.2 Impacts on Threatened Flora*

The proposed development will generally be located within cleared areas of the subject site. However, there are potential impacts on threatened flora species associated with (FIGURE 11):

- The positioning of the proposed 10kl firefighting tank;
- The positioning of the proposed 100kl rainwater tank;
- The location of the land application area;
- The locations of the proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area; and
- Inadvertent damage to threatened plants during construction of the dwelling.



## LEGEND

- Subject Site
- Cadastre

### Threatened Flora

- Arrowhead vine (*Tinospora tinosporoides*)
- Bopple nut (*Hicksbeachia pinnatifolia*)
- Rough-shelled Queensland Nut (*Macadamia tetraphylla*)

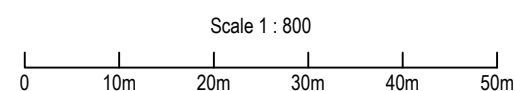
### Vegetation Zones (VZ)

- VZ1 - Tall closed wet sclerophyll forest (*Lophostemon confertus*) to 25m (PCT 3148)
- VZ2 - Mid-high to tall subtropical rainforest (mixed species) to 20m (PCT 3002)
- VZ3 - Mid-high to tall Camphor laurel forest (*Cinnamomum camphora*) to 20m
- VZ4 - Disturbed / cleared land

### Proposed Development Layout

- Proposed dwelling
- Building envelope
- Vegetation drip line
- Proposed water tank or AWTS
- Proposed LAA
- Proposed downpipe to water tank
- Proposed pumped lilac HDPE

Note:  
Site boundary taken from proposed development layout/survey plan.  
The positional accuracy of any boundaries or critical features shown  
on this plan requires confirmation prior to its use in design or construction.



SOURCE: JWA Site Investigations;  
Eco Essence Homes - Location Plan Rev I  
(132 Mafeking Road Goonengary (I) WD's (2).pdf)

SCALE: 1 : 800 @ A3

JWA PTY LTD  
Ecological Consultants

CLIENT  
Mr T. E. Nabung and Ms T. M. Fumagall  
PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 11

PREPARED: BW  
DATE: 19 February 2024  
FILE: N23030\_EA\_20240216.dwg

TITLE  
IMPACT ON  
THREATENED  
FLORA  
RECORDS

Recommendation to avoid/minimise these impacts are provided in SECTION 5.3.2 below.

#### *5.2.3 Impacts on Fauna*

The impact of the proposed development on fauna species and/or their habitat is considered to be insignificant when considering the availability of suitable and better-quality habitat in other parts of the subject site and across the locality.

#### *5.2.4 Impacts on Threatened Fauna*

The impact of the proposed development on threatened fauna species and/or their habitat is considered to be insignificant when considering the availability of suitable and better-quality habitat in other parts of the subject site and across the locality.

### **5.3 Amelioration/Recommendations**

#### *5.3.1 Amelioration/Recommendations for Vegetation Communities*

To ensure the proposed development will not result in any significant direct impacts to retained native vegetation on the subject site, the following recommendations are provided:

- The final positioning of the proposed 10kl firefighting tank should ensure that no trees require removal. There may be some loss of shrubs and groundcovers however this is not considered likely to result in any significant ecological impacts.
- The final positioning of the proposed 100kl rainwater tank should ensure that no trees require removal or that tree clearing is kept to a minimum. There may be some loss of shrubs and groundcovers however this is not considered likely to result in any significant ecological impacts.
- The proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area should be installed within the existing cleared vehicle track.

A suitably qualified ecologist should be onsite during the planning phase of the above works to ensure compliance.

Amelioration measures to reduce potential indirect impacts on retained vegetation include:

- Weeds should be controlled during construction;
- Vegetation removed during construction should be mulched for use on the site. This will prevent the introduction of weeds from seeds in mulch brought in from elsewhere.

#### *5.3.2 Amelioration/Recommendations for Threatened Flora*

To ensure the proposed development will not result in any direct impacts to Threatened flora species on the subject site, the following recommendations are provided:

- The final positioning of the proposed 10kl firefighting tank should ensure that the two (2) Rough-shelled Queensland Nut (*Macadamia tetraphylla*) located nearby are not impacted;
- The final positioning of the proposed 100kl rainwater tank should ensure that the three (3) Bopple nut (*Hicksbeachia pinnatifolia*) located nearby are not impacted;
- The final location and orientation of the LAA should ensure that the five (5) Bopple nut (*Hicksbeachia pinnatifolia*) located nearby are not impacted; and
- The proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area should be installed within the existing cleared vehicle track.

A suitably qualified ecologist should clearly mark the above Threatened flora, and any other specimens in close proximity to proposed works and be onsite during the planning phase of the above works to ensure compliance.

As a contingency, in the event that a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.

#### *5.3.3 Amelioration for Fauna*

The following amelioration measures should be employed to reduce potential indirect impacts to native fauna species:

- Appropriate disposal of rubbish and food scraps reduces opportunities for non-native predators and disturbance adapted competitors;
- Landscape plantings should include a majority of native species that will provide forage habitat for nectarivorous and frugivorous birds and bats; and
- Landscape and landfill materials should be sourced from a supplier where Cane toads do not occur.

## 6 CONSIDERATION OF STATUTORY REQUIREMENTS

### 6.1 Introduction

This section includes an assessment of the likely impacts of the proposed development with regard relevant commonwealth, state, and local legislation. Amelioration measures recommended to minimise and mitigate these impacts on the biodiversity and habitat values of the subject site and/or adjacent areas have also been detailed where applicable. Detailed assessment of compliance with relevant legislative requirements is provided in the following sections.

### 6.2 EPBC Act (Commonwealth)

#### 6.2.1 Background

The EPBC Act provides a mechanism for assessing the environmental impact of activities and development on MNES. A person must not, without an approval under the Act, take an action that has or will have, or is likely to have, a significant impact on any of the following MNES:

- World heritage properties or national heritage places;
- Declared Ramsar wetlands;
- Listed threatened species or ecological community;
- Listed migratory species; and
- Commonwealth marine area or commonwealth land.

The Act also prohibits the taking, without an approval under the Act, of:

- A nuclear action; and
- An action in a commonwealth marine area or on commonwealth land that has or will have, or is likely to have, a significant impact on the environment.

MNES in NSW include:

- Declared World Heritage areas;
- Declared Ramsar wetlands;
- Listed threatened species (Schedule 1 and 2 of the *Commonwealth Endangered Species Protection Act 1992*);
- Listed ecological communities; and
- Listed migratory species (JAMBA and CAMBA).

An action includes a project, development, undertaking or an activity or series of activities. An action does not require approval if it is a lawful continuation of a use of land, sea or seabed that was occurring before the commencement of the Act. An enlargement, expansion or intensification of a use is not a continuation of a use.



A commonwealth assessment will be required for proposed activities on the subject site if they affect a MNES. The Commonwealth Department of the Environment has prepared EPBC Act Policy Statements, including the *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (DotE 2013), which provides a self-assessment process to assist in determining whether an action should be referred to the commonwealth for a decision on whether assessment and approval is required.

Where a project or action is believed to potentially cause a significant impact on a MNES, it is to be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment as to whether the action is a 'controlled action' requiring commonwealth approval for the proposed action. The proposed development has been considered against the Principal Significant Impact Guidelines for each of the MNES identified on the subject site. This assessment is provided in the following sections.

#### *6.2.2 Declared World Heritage Areas*

Part of the declared World Heritage Gondwana Rainforests of Australia is located approximately 3.5 km to the north-west of the subject site. The proposed development will not result in any direct or indirect impacts this World Heritage area.

#### *6.2.3 Declared Ramsar Wetlands*

No wetlands of international significance (Ramsar wetlands) occur on or within 10 km of the subject site.

#### *6.2.4 Threatened Ecological Communities (TECs)*

##### *6.2.4.1 Significant Impact Criteria*

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- Assisting invasive species, that are harmful to the listed ecological community, to become established; or
- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community.

#### 6.2.4.2 Applicability to the Subject Site

With the implementation of recommendations in SECTION 5.3, there will be no direct impacts to the Lowland Rainforest of Subtropical Australia (Critically Endangered TEC under the EPBC Act) community on the subject site as result of the proposed development and potential indirect impacts are not considered to represent a significant impact with consideration of the above criteria.

### 6.2.5 *Commonwealth Listed Threatened Flora and Fauna Species*

#### 6.2.5.1 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered, endangered, or vulnerable species if it results in the following:

- A long-term decrease in the size of a population;
- Reduction in the area of occupancy of the species;
- Fragments an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupts the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduces disease that may cause the species to decline; or
- Interferes with the recovery of the species.

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to a geographically distinct regional population, or collection of local populations, or a population, or collection of local populations that occur within a particular bioregion.

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources, or which is a predator of native species. Introducing an invasive species into an area may result in that species

becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

#### 6.2.5.2 Applicability to the Subject Site

Fifty-one (51) EPBC listed threatened plant specimens were recorded on the site. These specimens consisted of the following four (4) threatened species (FIGURE 10):

- Bopple nut (*Hicksbeachia pinnatifolia*) - Vulnerable under the EPBC Act and the BC Act - a total of thirty-nine (39) records; and
- Rough-shelled Queensland Nut (*Macadamia tetraphylla*) - Vulnerable under the EPBC Act and the BC Act - a total of twelve (12) records.

With the implementation of recommendations in SECTION 5.3, these threatened plants will not be directly impacted by the clearing associated with the proposed development. Conversely, as a contingency, in the event that a Threatened plants is inadvertently impacted/damaged during site works, each plant will be replaced on site at a ratio of 10:1.

No threatened fauna species listed within schedules of the EPBC Act were confirmed to be utilising habitat on the subject site. Notwithstanding this, habitat suitability assessments (APPENDIX 2) identified the Grey-headed flying fox, White-throated needletail and Pink underwing moth as species listed within schedules of the EPBC Act that are considered to be a possible occurrence due to the presence of suitable habitat. Regardless, with the implementation of recommendations in SECTION 5.3, there will be no direct impacts to available habitat for these species. No significant impacts (as listed in the criteria above), to these species or their habitat are considered likely to occur as a result of the proposed development.

#### 6.2.6 *Listed Migratory Species*

##### 6.2.6.1 Significant Impact Criteria

An action will require approval if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The significant impact criteria below are relevant to migratory species that are not threatened.

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

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles); or
- Alter hydrological cycles, destroy, or isolate an area of important habitat for a migratory species; or
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

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

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

- Habitat used by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- Habitat that is of critical importance to the species at life-cycle stages; and/or
- Habitat utilized by a migratory species which is at the limit of the species range; and/or
- Habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, the definition of what an 'ecologically significant proportion' of the population is varies with the species (each circumstance needs to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness, and species-specific behavioural patterns (for example, site fidelity and dispersal rates).

The term 'population' in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one (1) or more national jurisdictional boundaries including Australia.

#### 6.2.6.2 Applicability to the Subject Site

No significant impacts (as listed in the criteria above), to any listed migratory species or their habitat are considered likely to occur as a result of the proposed development.

#### 6.2.7 *Requirement for Commonwealth Referral*

Based on the assessment above, a referral under the EPBC Act is not considered necessary. No offsets are required under the Commonwealth *EPBC Act Environmental Offsets Policy* (2012).

### 6.3 BC Act (NSW)

#### 6.3.1 *Background*

The NSW BC Act commenced on the 25<sup>th</sup> August 2017. The BC Act, together with the *Biodiversity Conservation Regulation 2017* (BCR), outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the BOS.

The BOS creates a transparent, consistent, and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant

impact on biodiversity. It also establishes biodiversity stewardship agreements, which are voluntary in-perpetuity agreements entered into by landholders, to secure offset sites.

There are five (5) key steps to participating in the BOS for developers or landholders ('proponents') who want to undertake development or clearing.

- Step 1 - The proponent determines whether the BOS applies.
- Step 2 - An accredited assessor applies the Biodiversity Assessment Method (BAM) and offsetting rules to the activity.
- Step 3 - The consent authority assesses the application and determines whether to approve or refuse the application.
- Step 4 - The consent authority determines the application and sets the offset obligation.
- Step 5 - The proponent satisfies its credit obligation and can begin the approved activity.

Step 1 of this process has been completed in the following sections as part of this EA to determine if the BOS applies to the proposed development. Additional steps (if required) will be completed separately, and in addition, to this EA report.

### *6.3.2 Biodiversity Offsets Scheme (BOS)*

#### *6.3.2.1 Background*

The BOS applies to:

1. Local development assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP & A Act) that triggers the BOS threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the BC Act;
2. State significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning and Environment and the Chief Executive of OEH determine that the project is not likely to have a significant impact;
3. Biodiversity certification proposals;
4. Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent;
5. Clearing of native vegetation that requires approval by the Native Vegetation Panel under the LLS Act; and
6. Activities assessed and determined under Part 5 of the EP & A Act (generally, proposals by government entities), if proponents choose to 'opt in' to the BOS.

Point 1 above applies to the proposed development.

#### 6.3.2.2 The BOS threshold

The BOS Threshold is a test used to determine when is necessary to engage an accredited assessor to apply the BAM to assess the impacts of a proposal. It is used for local developments (development applications submitted to councils) and clearing that does not require development consent in urban areas and areas zoned for environmental conservation *i.e.* under the Biodiversity and Conservation SEPP.

The BCR sets out threshold levels for when the BOS will be triggered. The threshold has two (2) elements:

1. Whether the amount of native vegetation being cleared exceeds a threshold area set out below; and
2. Whether the impacts occur on an area mapped on the BVM published by the Minister for the Environment.

If clearing and other impacts exceeds either trigger, the BOS applies to the proposed development including biodiversity impacts prescribed by clause 6.1 of the BCR.

#### Area Clearing Threshold

The area threshold varies depending on the minimum lot size (shown in the lot size maps made under the relevant LEP), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP) as shown in TABLE 8 below.

TABLE 8  
BOS AREA CLEARING THRESHOLD

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

The minimum lot size associated with the subject property is 40 ha. An area clearing threshold of 1 ha or more therefore applies for entry into the BOS.

The proposed development will not result in the removal 1 ha or more of native vegetation and entry into the BOS is not triggered based on the area clearing threshold.

#### 6.3.2.3 Biodiversity Values Map (BV Map) Threshold

The BVM identifies land with high biodiversity value, as defined by clause 7.3(3) of the BCR. The BOS applies to all clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the BCR on land identified on the map.

No areas of Biodiversity Values are mapped on the subject site, therefore entry into the BOS is not triggered by the BV Map threshold.

### 6.3.3 *Test of Significance*

#### 6.3.3.1 Background

In addition to the BOS Threshold, proponents are also required to carry out a ‘test of significance’ for all local development proposals. The test of significance is set out in section 7.3 of the BC Act and is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

In determining the nature and magnitude of an impact, it is important to consider matters such as:

- Pre-construction, construction and occupation/maintenance phases;
- All on-site and offsite impacts, including location, installation, operation and maintenance of auxiliary infrastructure and fire management zones;
- All direct and indirect impacts;
- The frequency and duration of each known or likely impact/action;
- The total impact which can be attributed to that action over the entire geographic area affected, and over time;
- The sensitivity of the receiving environment; and
- The degree of confidence with which the impacts of the action are known and understood.

Recovery and threat abatement plans, priorities action statements and threatened species profiles may provide further guidance on whether an action/activity is likely to be significant.

Application of the precautionary principle requires that a lack of scientific certainty about the potential impacts of an action does not itself justify a decision that the action is not likely to have a significant impact. If information is not available to conclusively determine that there will not be a significant impact on a threatened species, population or ecological community, or its habitat, then it should be assumed that a significant impact is likely.

#### 6.3.3.2 Endangered Ecological Communities (EECs)

With the implementation of recommendations in SECTION 5.3, there will be no direct impacts to the Lowland Rainforest EEC as result of the proposed development and potential indirect impacts are not considered to represent a significant impact. Regardless, the precautionary principle has been applied and a ‘Test of Significance’ has been completed in accordance with the requirements of Section 7.3 of the BC Act (APPENDIX 3) and has concluded that no significant impacts are likely.

#### 6.3.3.3 Flora

Fifty-five (55) threatened plant specimens were recorded on the site. These specimens consisted of the following three (3) threatened species (FIGURE 10):

- Bopple nut (*Hicksbeachia pinnatifolia*) - Vulnerable under the EPBC Act and the BC Act - a total of thirty-nine (39) records;
- Rough-shelled Queensland Nut (*Macadamia tetraphylla*) - Vulnerable under the EPBC Act and the BC Act - a total of twelve (12) records; and
- Arrowhead vine (*Tinospora tinosporoides*) - Vulnerable under the BC Act - a total of four (4) records.

With the implementation of recommendations in SECTION 5.3, these threatened plants will not be directly impacted by the clearing associated with the proposed development. Conversely, as a contingency, in the event that a Threatened plants is inadvertently impacted/damaged during site works, each plant will be replaced on site at a ratio of 10:1.

A precautionary principle has been applied and a ‘Test of Significance’ has been completed in accordance with the requirements of Section 7.3 of the BC Act (APPENDIX 3) and has concluded that no significant impacts are likely.

#### 6.3.3.4 Fauna

One (1) threatened fauna species, Rose-crowned fruit dove, listed under the BC Act was recorded adjacent to the subject site and is considered likely to utilise habitat on the subject site from time to time. Twenty-two (22) additional species were considered possible occurrences based on the presence of suitable habitat (APPENDIX 2). These species included:

- Albert's Lyrebird (*Menura alberti*);
- Barred Cuckoo-shrike (*Coracina lineata*);
- Black-breasted Button-quail (*Turnix melanogaster*);
- Common Planigale (*Planigale maculata*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Eastern Long-eared Bat (*Nyctophilus bifax*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Marbled Frogmouth (*Podargus ocellatus*);
- Olive Whistler (*Pachycephala olivacea*);
- Pink Underwing Moth (*Phyllodes imperialis smithersi*);
- Red-legged Pademelon (*Thylogale stigmatica*);
- Shorter Rainforest Ground-beetle (*Nurus brevis*);
- Sooty Owl (*Tyto tenebricosa*);



- Spotted-tailed Quoll (*Dasyurus maculatus*);
- Stephens' Banded Snake (*Hoplocephalus stephensi*).
- Superb Fruit-Dove (*Ptilinopus superb*);
- White-eared Monarch (*Carterornis leucotis*);
- White-throated Needletail (*Hirundapus caudacutus*); and
- Wompoo Fruit-Dove (*Ptilinopus magnificus*).

With the implementation of recommendations in SECTION 5.3, there will be no direct impacts to available habitat for these species. No significant impacts (as listed in the criteria above), to these species or their habitat are considered likely to occur as a result of the proposed development. Regardless, the precautionary principle has been applied and a 'Test of Significance' has been completed in accordance with the requirements of Section 7.3 of the BC Act (APPENDIX 3). The assessment has concluded that no significant impacts are likely.

#### 6.3.4 Summary

In accordance with the requirements of the BCR it is not necessary to engage an accredited assessor to apply the BAM to assess the impacts of the proposal or prepare a Biodiversity Development Assessment Report (BDAR) to accompany the development application as entry into the BOS is not triggered based on the area clearing threshold, the BV mapping or by the test of significance.

## 6.4 Biodiversity and Conservation SEPP - Koala Habitat Protection 2020

### 6.4.1 Background

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) commenced on 1<sup>st</sup> March 2022. Chapter 3 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP contains provisions from the Koala SEPP 2020 and, as an interim measure, applies in the NSW core rural zones of RU1, RU2 and RU3, except within the Greater Sydney and Central Coast areas. This is an interim measure while new land management and private native forestry codes are developed.

The principles of Chapter 3 - Koala Habitat Protection 2020 is to “*encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline*” -

- a) By requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- b) By encouraging the identification of areas of core koala habitat, and
- c) By encouraging the inclusion of areas of core koala habitat in environment protection zones.

#### 6.4.2 Applicability to the Subject Site

Under the Byron LEP 2014 part of the subject site is zoned RU2 - Rural Landscape. This SEPP therefore applies to RU2 areas of the subject site.

In accordance with the requirements of Part 3.2, Clause 3.5 of Chapter 3 - Koala Habitat Protection 2020 of the Biodiversity and Conservation SEPP, as the site is more than 1 ha in size (including adjoining land in the same ownership), before a Council may grant consent to a development application, it must assess whether the development is likely to have any impact on koalas or koala habitat based on the following steps.

##### Step 1 - is the land potential koala habitat?

Part 3.1, Clause 3.2 of Chapter 3 - Koala Habitat Protection 2020 of the Biodiversity and Conservation SEPP “potential koala habitat” is defined as follows:

*“Potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.”*

Species listed in Schedule 1 (Feed Tree Species) of the Biodiversity and Conservation SEPP are not present on site. Because the subject site does not contain potential koala habitat, Step 2 is not necessary.

## 6.5 Biodiversity and Conservation SEPP - Koala Habitat Protection 2021

### 6.5.1 Background

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) commenced on 1<sup>st</sup> March 2022. Chapter 4 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP contains the land-use planning and assessment framework for koala habitat within Metropolitan Sydney and the Central Coast and applies to all zones except RU1, RU2 and RU3 in the short term.

The aim of Chapter 4 - Koala Habitat Protection 2021 is to “*encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline*”.

Chapter 4 - Koala Habitat Protection 2021 applies to all zones in the following nine (9) LGAs - Metropolitan Sydney LGAs (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, Wollondilly) and the Central Coast LGA. In all other identified LGAs, the provisions of Chapter 4 - Koala Habitat Protection 2021 do not apply to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry.

### 6.5.2 Applicability to the Subject Site

Under the Byron LEP 2014, the western portion of the subject site is zoned C2 - Environmental Conservation. This SEPP therefore applies to C2 areas of the subject site.

In accordance with the requirements of Part 4.2, Clause 4.9 of Chapter 4 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP, as the site is more than 1 ha in size (including adjoining land in the same ownership) and does not have an approved koala plan of management applying to the land, before a Council may grant consent to a development application, it must assess whether the development is likely to have any impact on koalas or koala habitat.

Part 4.1, Clause 4.2 of Chapter 4 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP defines koala habitat and core koala habitat as:

*“Koala habitat means koala habitat however described in a plan of management under this Policy or a former Koala SEPP and includes core koala habitat.”*

*“Core koala habitat means -*

- a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*
- b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.”*

It is noted that the term highly suitable habitat is not defined within the Biodiversity and Conservation SEPP. However, a factsheet issued by the NSW Government provides the following definition:

*“Highly suitable habitat is where 15% or greater of the total number of trees within any Plant Community Type (PCT) are the regionally relevant species of those listed in Schedule 2 of the SEPP.”*

Koala habitat, highly suitable or otherwise, does not occur on the subject site. No evidence of koala habitat use was recorded during field assessments and there are no historical records from within the subject site (Atlas of Living Australia accessed 22<sup>nd</sup> October 2022). The land is therefore not considered to be core koala habitat for the purposes of the Chapter 4 - Koala Habitat Protection 2021 of the Biodiversity and Conservation SEPP.

## 6.6 Byron DCP (2014) Chapter B1 - Biodiversity

### 6.6.1 Background

The *Byron Shire Development Control Plan 2014* (Byron DCP) supplements the statutory provisions of Byron LEP 2014 by providing more details, guidelines and controls applying to the various forms of development permitted under the provisions of the LEP. For the purposes of this EA, Chapter B1 - Biodiversity of the Byron DCP is relevant.

The aim of Chapter B1 is to ensure that, subject to any relevant overarching state or commonwealth legislation, the planning and design of new development maintains or improves ecological values within Byron Shire thereby increasing the resilience of natural areas and supporting both biodiversity and climate adaptation. The objectives of the Chapter B1 are:

- 1) Identify, retain and restore native vegetation and habitats for native species in patches of a size and configuration that will enable existing plant and animal communities to survive in the long term and support climate adaptation.
- 2) Identify and retain high carbon storage ecosystems (e.g. blue carbon systems such as salt marsh, mangroves and sea grasses), wildlife corridors and refugia.
- 3) Provide development controls that prevent the degradation or loss of ecological values and or biodiversity.
- 4) Provide guidance on the information required to enable informed decision- making.
- 5) Ensure that construction and operational impacts of development are avoided and or mitigated using current best practice standards.
- 6) Provide guidance on acceptable measures to avoid or minimise the impact of proposed development on biodiversity including proposals affected by Part 7 of the BC Act and the Koala Habitat Protection SEPP.
- 7) Compensate for unavoidable habitat losses in accordance with applicable legislation, or in the absence of such legislation, contemporary best practice.

This section provides an assessment of compliance with the relevant sections of the Byron Shire Council DCP - Chapter B1 (Biodiversity).

#### *6.6.2 Applicability to the Subject Site*

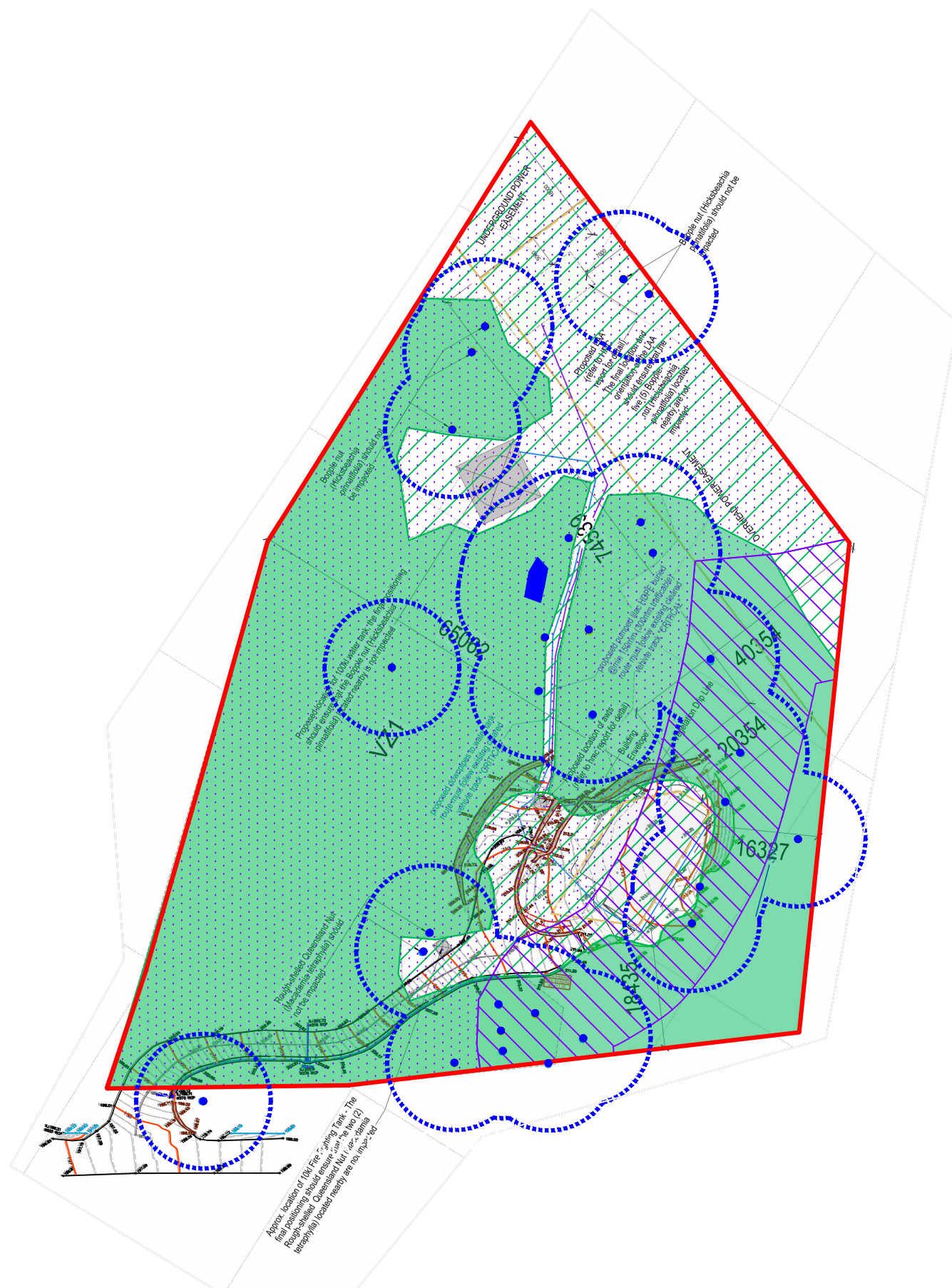
TABLE 9 below identifies the red flagged values and applicable ecological setbacks defined within Chapter B1 that occur on or adjoining the subject site. In accordance with Chapter B1, the following red flagged values and applicable ecological setbacks occur on the subject site and are shown in FIGURE 12:

- Threatened Ecological Communities - 30 m setback;
- Areas with a species polygon for threatened fauna or other significant fauna that are known or predicted to occur at the site - 20 m setback;
- Areas with a species polygon for threatened flora or other significant flora that are known or predicted to occur at the site - 10 m setback;
- Stags and hollow-bearing trees - 10 m setback.

With consideration of the above red flagged values, it is noted that the Clause 6 of Part B1.2.1 - Development Envelope Controls states:

*6. Minor variations to the red flagged areas identified in Table 3 may be considered to achieve practical outcomes. Some examples include:*

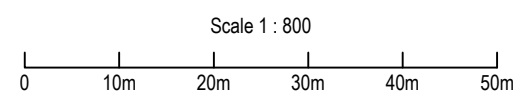
*a. minor incursions into the ecological setbacks;*



### LEGEND

- Subject Site
- Cadastre
- Byron DCP B1
- Threatened flora records
- 10m setback to threatened flora records
- Threatened Ecological Communities (TECs) including threatened fauna species polygon and bushland on slopes >18 degrees
- 30m setback to Threatened Ecological Communities (TECs) including threatened fauna species polygon and bushland on slopes >18 degrees
- Wildlife corridor
- 20m setback to wildlife corridor
- Proposed Development Layout
- Proposed dwelling
- Building envelope
- Vegetation drip line
- Proposed water tank or AWTS
- Proposed LAA
- Proposed downpipe to water tank
- Proposed pumped lilac HDPE

Note:  
Site boundary taken from proposed development layout/survey plan.  
The positional accuracy of any boundaries or critical features shown  
on this plan requires confirmation prior to its use in design or construction.



SOURCE: JWA Site Investigations;  
Eco Essence Homes - Location Plan Rev I  
(132 Mafeking Road Goonengary (I) WD's (2).pdf)

SCALE: 1 : 800 @ A3

JWA PTY LTD  
Ecological Consultants

CLIENT  
Mr T. E. Nabung and Ms T. M. Fumagall  
PROJECT  
Ecological Assessment  
Lot 11 on DP1202684  
132 Mafeking Road, Goonengerry NSW  
Byron Shire Council LGA

FIGURE 12

PREPARED: BW  
DATE: 9 February 2024  
FILE: N23030\_EA\_20240216.dwg

TITLE

BYRON DCP  
B1



- b. ecological setbacks that necessarily overlap with access roads or other linear infrastructure (e.g. a narrow access road that does not require clearing with native vegetation on each side);*
- c. isolated patches of native vegetation with an area of less than 1000m<sup>2</sup>;*
- d. ecological setbacks arising from adjoining land not in the same ownership;*
- e. threatened or other significant fauna that are considered vagrant, highly nomadic, or are not closely associated with the habitat on site;*
- f. areas subject to a controlled activity approval under the Water Management Act 2000.*
- g. threatened or other significant flora that occur as seedlings or saplings outside of their natural habitat.*

TABLE 9 below quantifies impacts on the red flagged values and applicable ecological setbacks defined within Chapter B1 that occur on or adjoining the subject site, and details proposed variations in accordance with Clause 6.

The proposed development generally complies with the requirements of Chapter B1; however, does require some variations. These are illustrated in FIGURE 12 and outlined in TABLE 9 along with justification for any proposed variations as part of the proposed development.

TABLE 9  
RED FLAGGED VALUES ON OR ADJOING THE SUBJECT SITE

Red Flags	Applicable to Subject Site?	Details	Required Ecological Setback	Predicted Impacts	Proposed variation	Justification and/or Compensation
HEV Vegetation						
Threatened Ecological Communities (includes Critically Endangered, Endangered or Vulnerable listed under State or Commonwealth legislation)	✓	<p>One (1) listed ecological community has been recorded from the subject site:</p> <ul style="list-style-type: none"> <li>VZ1 and VZ2 contain the relevant characteristic species, alliances, or sub alliances to be classified as the TEC - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions.</li> </ul>	30 m	<p>Lowland rainforest in the NSW North Coast and Sydney Bioregions</p> <ul style="list-style-type: none"> <li>No direct impacts on EEC vegetation will occur</li> <li>Encroachment on ecological setback buffer</li> </ul>	Encroachment on ecological setback buffer	<p>EEC setback area overlaps with the proposed development; however, these areas are predominately cleared and degraded.</p> <p>With the implementation of recommendations in SECTION 5.3, there will be no direct impacts to the Lowland Rainforest of Subtropical Australia TEC on the subject site as result of the proposed development. Potential indirect impacts are not considered to represent a significant impact with consideration of the above criteria.</p>
Over-cleared vegetation types (A vegetation type of which more than 70% has been cleared in the Catchment Management Area).	☒	The subject site does not contain a vegetation type of which more than 70% has been cleared in the Catchment Management Area.	20 m	n/a	n/a	n/a
Over-cleared landscapes (A Mitchell landscape in which more than 70% native vegetation cover has been cleared. NSW is divided into 580 relatively homogeneous landscape units in terms of geomorphology, soils and broad vegetation types mapped at a scale of 1: 250000 (Mitchell 2002, 2003), which are colloquially termed "Mitchell Landscapes" after their author)	☒	The subject site occurs with the Lamington Volcanic Slopes Landscape region which is not considered an over-cleared landscape	20 m	n/a	n/a	n/a
Old growth (old-growth forests are ecologically mature forests, often diverse in structure and species with relatively large old trees, some of which may contain tree hollows).	☒	The site is not considered to contain old growth.	30 m	n/a	n/a	n/a
Important wetlands (Wetlands protected under NSW State or Commonwealth legislation or policy. Includes wetlands mapped under the NSW State Environmental Planning Policy (SEPP) Coastal Management 2018, previously SEPP 14 Wetlands).	☒	The site does not contain important wetlands	5 0m	n/a	n/a	n/a
Other wetlands (Any other wetland other than an Important wetland. Wetland has the	☒	The site does not contain any other wetlands.	20 m	n/a	n/a	n/a

Red Flags	Applicable to Subject Site?	Details	Required Ecological Setback	Predicted Impacts	Proposed variation	Justification and/or Compensation
<p>same meaning as defined within NSW Wetland Policy:</p> <ul style="list-style-type: none"> <li>Wetlands are areas of land that are wet by surface water or groundwater, or both, for long enough periods that the plants and animals in them are adapted to, and depend upon moist conditions for at least part of their lifecycle. They include areas that are inundated cyclically, intermittently or permanently with fresh, brackish, or saline water, which is generally still or slow moving except in distributary channels such as tidal creeks which may have higher peak flows.</li> <li>Examples of wetlands include; mangroves, backwaters, sedgeland, wet heathlands, lakes, lagoons, estuaries, rivers, floodplains, swamps, bogs, billabongs, marshes, coral reefs and seagrass beds).</li> </ul>						
Other bushland on a slope >18 degrees	✓	The site contains slopes greater than 18 degrees.	20 m	n/a	n/a	n/a
<p>Pre-existing protected habitat (Areas of existing habitat (or other land) provided with formal long-term protection designed to limit further development.</p> <p>Protected habitat can be established by various mechanisms including but not limited to; restrictive covenants, rezoning, voluntary planning agreements, formal conservation agreements, biodiversity stewardship agreements, or in some cases dedication to Council or other public authority. The mechanism(s) to establish protected habitat must be conditioned or otherwise approved by Council).</p>	☒	No pre-existing protected habitat occurs onsite.	20 m or as above, whichever is larger	n/a	n/a	n/a
<b>Wildlife Corridors</b>						
<p>Land within a defined wildlife corridor</p> <p>(Refers to linear areas that link wildlife habitat and provide a crucial role in maintaining connectivity between plant and animal populations that would otherwise be at greater</p>	☒	The subject site is mapped as containing wildlife corridor and associated ecological buffer.	20 m			

Red Flags	Applicable to Subject Site?	Details	Required Ecological Setback	Predicted Impacts	Proposed variation	Justification and/or Compensation
risk of extinction. Such corridors are critical for the maintenance of ecological processes, enabling migration, colonisation and interbreeding of plants and animals).						
<b>Threatened and Significant Species</b>						
Areas with a species polygon for threatened fauna or other significant fauna that are known or predicted to occur at the site. (Threatened fauna or flora is any species listed as critically endangered, endangered or vulnerable under NSW State or Commonwealth legislation).	✓	<p>Potentially suitable habitat (i.e. species polygon) is available for the following threatened species:</p> <ul style="list-style-type: none"> <li>• Albert's Lyrebird;</li> <li>• Barred Cuckoo-shrike;</li> <li>• Black-breasted Button-quail;</li> <li>• Common Planigale;</li> <li>• Eastern False Pipistrelle;</li> <li>• Eastern Long-eared Bat;</li> <li>• Grey-headed Flying-fox;</li> <li>• Greater Broad-nosed Bat;</li> <li>• Large Bent-winged Bat;</li> <li>• Little Bent-winged Bat</li> <li>• Marbled Frogmouth;</li> <li>• Olive Whistler;</li> <li>• Pink Underwing Moth;</li> <li>• Red-legged Pademelon;</li> <li>• Rose-crowned fruit-dove;</li> <li>• Shorter Rainforest Ground-beetle;</li> <li>• Sooty Owl;</li> <li>• Spotted-tailed Quoll;</li> <li>• Stephens' Banded Snake;</li> <li>• Superb Fruit-Dove;</li> <li>• White-eared Monarch;</li> <li>• White-throated Needletail; and</li> <li>• Wompoo Fruit-Dove.</li> </ul>	20 m	The proposed development will generally be located within cleared areas of the subject site and although there is overlap with threatened fauna polygons, no direct impacts are expected.	Encroachment in polygon and on ecological setback buffer.	With the implementation of recommendations in SECTION 5.3, the impact of the proposed development on threatened fauna species and/or their habitat is considered to be insignificant when considering the availability of suitable and better-quality habitat in other parts of the subject site and across the locality.
Areas with a species polygon for threatened flora or other significant flora that are known or predicted to occur at the site. (A species polygon is an area of land enclosing the known or predicted habitat of targeted flora or fauna. In most cases known records will be used for flora and predicted habitat will be used for fauna).	✓	<p>The following threatened flora species have been recorded from the subject site:</p> <ul style="list-style-type: none"> <li>• Arrowhead vine;</li> <li>• Bopple nut; and</li> <li>• Rough-shelled Queensland Nut.</li> </ul>	10 m	<p>The proposed development will generally be located within cleared areas of the subject site. However, there are potential impacts on threatened flora species associated with:</p> <ul style="list-style-type: none"> <li>• The positioning of the proposed 10kl firefighting tank;</li> <li>• The positioning of the proposed 100kl rainwater tank;</li> <li>• The location of the land application area;</li> </ul>	Encroachment in polygon and on ecological setback buffer.	<p>To ensure the proposed development will not result in any direct impacts to Threatened flora species on the subject site, the following recommendations are provided:</p> <ul style="list-style-type: none"> <li>• The final positioning of the proposed 10kl firefighting tank should ensure that the two (2) Rough-shelled Queensland Nut (<i>Macadamia tetraphylla</i>) located nearby are not impacted;</li> <li>• The final positioning of the proposed 100kl rainwater tank should ensure that the three (3) Bopple nut (<i>Hicksbeachia pinnatifolia</i>) located nearby are not impacted;</li> </ul>

Red Flags	Applicable to Subject Site?	Details	Required Ecological Setback	Predicted Impacts	Proposed variation	Justification and/or Compensation
				<ul style="list-style-type: none"><li>The locations of the proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area; and</li><li>Inadvertent damage to threatened plants during construction of the dwelling.</li></ul>		<ul style="list-style-type: none"><li>The final location and orientation of the LAA should ensure that the five (5) Bopple nut (<i>Hicksbeachia pinnatifolia</i>) located nearby are not impacted; and</li><li>The proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area should be installed within the existing cleared vehicle track.</li></ul> <p>A suitably qualified ecologist should clearly mark the above Threatened flora, and any other specimens in close proximity to proposed works and be onsite during the planning phase of the above works to ensure compliance.</p> <p>As a contingency, in the event that a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.</p>
Koala Habitat						
Koala habitat outside of areas defined within a Comprehensive Koala Plan of Management.	<input checked="" type="checkbox"/>	Koala habitat is not present on site. No koalas were recorded from site.	20 m	n/a	n/a	n/a
Isolated or scattered koala use trees with evidence of koala activity	<input checked="" type="checkbox"/>		20 m	n/a	n/a	n/a
Any other areas where koalas are present and/or koala habitat is planted with public monies.	<input checked="" type="checkbox"/>		20 m	n/a	n/a	n/a
Waterways and Riparian Areas (from the top of the bank)						
First order stream	<input checked="" type="checkbox"/>	No waterways are mapped on the subject site.	10 m	n/a	n/a	n/a
Second order stream	<input checked="" type="checkbox"/>		20 m			
Third order stream	<input checked="" type="checkbox"/>		30 m			
Fourth order stream	<input checked="" type="checkbox"/>		40 m			
Estuarine area (Any part of a river, lake, lagoon or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide).	<input checked="" type="checkbox"/>		50 m			
Flying Fox Camps						



Red Flags	Applicable to Subject Site?	Details	Required Ecological Setback	Predicted Impacts	Proposed variation	Justification and/or Compensation
Year round or intermittent	<input checked="" type="checkbox"/>	No known flying fox camps are located in the vicinity of the subject site.	100 m	n/a	n/a	n/a
Other Habitat Features						
Very large native trees (Local native trees that have a trunk diameter of greater than or equal to 0.8 metres at 1.4 metres above the natural ground level. Local native trees are trees that existed in the Byron Shire before European settlement).	<input checked="" type="checkbox"/>	No large native trees were recorded on site.	10 m	n/a	n/a	n/a
Stags and hollow-bearing trees	<input checked="" type="checkbox"/>	No stags or hollow-bearing trees were recorded on site.	10 m	n/a	n/a	Whilst a number of stags and hollow-bearing trees occur within the vegetated areas of the site, none will be impacted by the proposed development.
Raptor nests	<input checked="" type="checkbox"/>	No known raptor nests are located in the vicinity of the subject site.	50 m	n/a	n/a	n/a

## 6.7 Byron Coast Comprehensive Koala Plan of Management 2015 (BCKPoM)

### 6.7.1 Background

The BCKPoM applies to those lands within the identified koala planning area. The overall vision of the Plan is to enable a long-term, sustainable future for koala populations inhabiting the koala planning area. This vision is envisaged to be realised by way of the following aims:

- a) an increase in the total area of potential koala habitat in central parts of the koala planning area by a minimum of 20% to at least 1,800 ha, including consolidated linkages within and beyond the koala planning area;
- b) the presence of a self-sustaining, stable koala population of 250 - 300 individuals distributed equitably along the Byron Coast; and
- c) a community that is collectively informed and committed to a sustainable future for the Byron Coast koalas.

The Koala Management Framework is expressed in the BCKPoM through:

- the identification and classification of koala habitat;
- the identification of areas known to contain resident koala populations;
- the division of the koala planning area into Koala Management Areas (KMAs) and Koala Management Precincts (KMPs); and
- management principles for habitat buffer areas and koala corridors.

### 6.7.2 Applicability to the Subject Site

The subject site is not mapped as occurring within the Koala Planning Area as identified in the BCKPoM. The BCKPoM therefore does not apply.

## 7 SUMMARY AND RECOMMENDATIONS

JWA Pty Ltd (JWA) was engaged by Mr T. E. Nabung and Ms T. M. Fumagall to complete an Ecological Assessment (EA) for 132 Mafeking Road, Goonengerry; formally described as Lot 11 on DP1202684 (the subject site).

A development application (10.2023.123.1) was previously lodged with Byron Shire Council (BSC) for the construction of a residential dwelling at the subject site. BSC have subsequently requested further information in a letter dated 7th September 2023. This assessment has been prepared in response to the information request.

A total of one hundred and seventy-six (176) flora species were recorded at the subject site. Fifty-five (55) threatened plant specimens were recorded consisting of the following three (3) threatened species:

- Bopple nut (*Hicksbeachia pinnatifolia*) - Vulnerable under the EPBC Act and the BC Act - a total of thirty-nine (39) records;
- Rough-shelled Queensland Nut (*Macadamia tetraphylla*) - Vulnerable under the EPBC Act and the BC Act - a total of twelve (12) records; and
- Arrowhead vine (*Tinospora tinoporoides*) - Vulnerable under the BC Act - a total of four (4) records.

A total of four (4) vegetation zones (VZ) were identified across the subject site with VZs 1 and 2 considered to be representative of the TEC - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions as listed within schedules of the BC Act. VZs 1 and 2 are also considered to be representative of the TEC - Lowland Rainforest of Subtropical Australia as listed as Critically Endangered within schedules of the EPBC Act.

Site surveys recorded two (2) native reptile species, thirty-three (33) native bird species and one (1) native and one (1) exotic mammal species. One (1) threatened species, the Rose-crowned fruit-dove, was heard calling from adjoining land. Habitat suitability assessments identified twenty-two (22) additional threatened species that are considered possible occurrences on the subject site as they move through the locality. With the above species and habitat assessment considered, the highest quality habitat for threatened fauna species occurs in areas containing intact vegetation.

The proposed development will generally be located within cleared areas of the subject site. However, there are potential impacts on site vegetation and threatened flora specimens associated with (FIGURE 11):

- The positioning of the proposed 10kl firefighting tank;
- The positioning of the proposed 100kl rainwater tank; and
- The location of the land application area;
- The locations of the proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area; and
- Inadvertent damage to threatened plants during construction of the dwelling.

To minimise potential impacts on the ecological values of the site the following recommendations are made:

- The final positioning of the proposed 10kl firefighting tank should ensure that no trees require removal and that the two (2) Rough-shelled Queensland Nut (*Macadamia tetraphylla*) located nearby are not impacted. There may be some loss of shrubs and groundcovers however this is not considered likely to result in any significant ecological impacts.
- The final positioning of the proposed 100kl rainwater tank should ensure that no trees require removal or that tree clearing is kept to a minimum and that the three (3) Bopple nut (*Hicksbeachia pinnatifolia*) located nearby are not impacted. There may be some loss of shrubs and groundcovers however this is not considered likely to result in any significant ecological impacts.
- The final location and orientation of the LAA should ensure that the five (5) Bopple nut (*Hicksbeachia pinnatifolia*) located nearby are not impacted.
- The proposed downpipes to the rainwater tank and the buried lilac HDPE pipes to the land application area should be installed within the existing cleared vehicle track.

A suitably qualified ecologist should clearly mark the above Threatened flora, and any other specimens in close proximity to proposed works and be onsite during the planning phase of the above works to ensure compliance.

As a contingency, in the event that a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.

An assessment under the Commonwealth EPBC Act concluded that the proposed development will not have a significant impact on any Matters of National Environmental Significance. Commonwealth assessment of the proposal is not required.

The BOS Threshold test has determined that the proposed development will not trigger the relevant area clearing threshold or result in impacts on BV mapping. In accordance with the requirements of the BCR it is therefore not necessary to engage an accredited assessor to apply the BAM to assess the impacts of the proposal or prepare a BDAR to accompany the development application.

A Test of Significance was undertaken for the Lowland rainforest EEC, threatened flora present and threatened fauna species considered a possible occurrence at the subject site over time. The assessment determined that the impacts of the proposed development would be unlikely to result in any significant impacts on Threatened species or EECs.

An assessment of the relevant sections of the Byron Shire Council DCP (2014) - Chapter B1 Biodiversity has been completed. 'Biodiversity elements' and associated 'ecological setbacks' as defined within the DCP are considered to occur on the subject site. The proposed development will not strictly comply with some of the red flagged areas and

associated setbacks. However, the proposed development has been located to utilise cleared land and/or disturbed vegetation communities as far as practical. The proposed incursions into relevant setbacks are considered to be justifiable in accordance with Clause 6 of Part B1.2.1 - Development Envelope Control.



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## APPENDIX 1 - PLANT SPECIES LIST

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act#	Exotic
<i>Acacia melanoxylon</i>	Blackwood			
<i>Acmena hemilampra</i> subsp. <i>hemilampra</i>	Broad-leaved Lilly Pilly			
<i>Acmena ingens</i>	Red Apple			
<i>Actephila lindleyi</i>				
<i>Adiantum hispidulum</i>	Rough Maidenhair			
<i>Ageratina adenophora</i>	Crofton Weed			*
<i>Ageratina riparia</i>	Mistflower			*
<i>Ageratum houstonianum</i>	Blue Billygoat Weed			*
<i>Alchornea ilicifolia</i>	Native Holly			
<i>Alocasia brisbanensis</i>	Cunjevoi			
<i>Alphitonia excelsa</i>	Red Ash			
<i>Alpinia caerulea</i>	Native Ginger			
<i>Aphananthe philippinensis</i>	Rough-leaved Elm			
<i>Araucaria cunninghamii</i>	Hoop Pine			
<i>Archidendron muellerianum</i>	Veiny Lace Flower			
<i>Archirhodomyrtus beckleri</i>	Rose Myrtle			
<i>Archontophoenix cunninghamiana</i>	Bangalow Palm			
<i>Arthropteris tenella</i>	Climbing fern			
<i>Asclepias curassavica</i>	Redhead Cotton Bush			*
<i>Asplenium australasicum</i>	Bird's Nest Fern			
<i>Araucaria cunninghamii</i>	Hoop pine			
<i>Austrocallerya megasperma</i>	Native Wisteria			
<i>Austrosteenisia glabristyla</i>	Giant Blood Vine			
<i>Bidens pilosa</i>	Cobbler's Pegs			*
<i>Blechnum cartilagineum</i>	Gristle Fern			
<i>Brachychiton acerifolius</i>	Flame tree			
<i>Breynia oblongifolia</i>	Coffee Bush			
<i>Caesalpinia subtropica</i>	Corky prickly-vine			
<i>Calochlaena dubia</i>	Rainbow Fern			
<i>Canarium australasicum</i>	Mango Bark			
<i>Castanospermum australe</i>	Black bean			
<i>Cayratia clematidea</i>	Native Grape			
<i>Cayratia eury nema</i>	Soft Water Vine			
<i>Centella asiatica</i>	Indian Pennywort			
<i>Ceratopetalum apetalum</i>	Coachwood			
<i>Cinnamomum camphora</i>	Camphor Laurel			*
<i>Cinnamomum oliveri</i>	Oliver's Sassafras			
<i>Cirsium vulgare</i>	Spear Thistle			*
<i>Cissus antarctica</i>	Water Vine			

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act#	Exotic
<i>Cissus hypoglauca</i>	Giant Water Vine			
<i>Commelina cyanea</i>	Native Wandering Jew			
<i>Commersonia bartramia</i>	Brown Kurrajong			
<i>Conyza bonariensis</i>	Flaxleaf Fleabane			*
<i>Conyza sumatrensis</i>	Tall fleabane			*
<i>Cordyline petiolaris</i>	Broad-leaved Palm Lily			
<i>Cordyline rubra</i>	Red-fruited Palm Lily			
<i>Cordyline stricta</i>	Narrow-leaved Palm Lily			
<i>Carronia multiseptata</i>	Carronia Vine			
<i>Croton verreauxii</i>	Green Native Cascarilla			
<i>Cryptocarya glaucescens</i>	Jackwood			
<i>Cryptocarya microneura</i>	Murrogun			
<i>Cryptocarya rigida</i>	Forest Maple			
<i>Cryptocarya triplinervis</i>	Three-veined Laurel			
<i>Cryptocarya obovata</i>	Pepperberry			
<i>Cupaniopsis newmanii</i>	Long-leaved Tuckerroo			
<i>Cuphea carthagenensis</i>				*
<i>Cyathea australis</i>	Rough Treefern			
<i>Cynodon dactylon</i>	Common Couch			
<i>Cyperus brevifolius</i>				*
<i>Daphnandra tenuipes</i>	Red-flowered Socketwood			
<i>Davallia solida</i> var. <i>pyxidata</i>	Hare's Foot Fern			
<i>Decaspermum humile</i>	Silky Myrtle			
<i>Denhamia celastroides</i>	Denhamia			
<i>Desmodium uncinatum</i>	Silver-leaved Desmodium			*
<i>Dianella caerulea</i>	Blue Flax-lily			
<i>Dichondra repens</i>	Kidney Weed			
<i>Dioscorea transversa</i>	Native Yam			
<i>Diospyros pentamera</i>	Myrtle Ebony			
<i>Diploglottis australis</i>	Native Tamarind			
<i>Doodia aspera</i>	Prickly Rasp Fern			
<i>Dysoxylum mollissimum</i> subsp. <i>molle</i>	Red Bean			
<i>Elaeocarpus grandis</i>	Blue Quandong			
<i>Elaeocarpus kirktonii</i>	White Quandong			
<i>Elattostachys nervosa</i>	Beetroot Tree			
<i>Embelia australiana</i>	Embelia Vine			
<i>Endiandra pubens</i>	Hairy Walnut			
<i>Eucalyptus grandis</i>	Flooded gum			
<i>Eupomatia laurina</i>	Bolwarra			

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act#	Exotic
<i>Euroschinus falcatus</i> var. <i>falcatus</i>	Ribbonwood			
<i>Ficus coronata</i>	Creek Sandpaper Fig			
<i>Ficus macrophylla</i>	Moreton Bay Fig			
<i>Ficus watkinsiana</i>	Strangling Fig			
<i>Flagellaria indica</i>	Whip Vine			
<i>Flindersia schottiana</i>	Cudgerie			
<i>Flindersia xanthoxyla</i>	Long Jack			
<i>Geitonoplesium cymosum</i>	Scrambling Lily			
<i>Glochidion ferdinandi</i>	Cheese Tree			
<i>Glochidion sumatranum</i>	Umbrella Cheese Tree			
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush			*
<i>Grevillea robusta</i>	Silky Oak			
<i>Guioa semiglauca</i>	Guioa			
<i>Harpullia pendula</i>	Tulipwood			
<i>Hibbertia scandens</i>	Climbing Guinea Flower			
<i>Hibiscus heterophyllus</i>	Native Rosella			
<i>Hicksbeachia pinnatifolia</i>	Red Bopple Nut	V	V	
<i>Hoya australis</i> subsp. <i>australis</i>	Native Hoya			
<i>Hypochoeris radicata</i>	Flatweed			*
<i>Hypolepis muelleri</i>	Harsh Ground Fern			
<i>Imperata cylindrica</i>	Blady Grass			
<i>Jagera pseudorhus</i> var. <i>pseudorhus</i>	Foambark Tree			
<i>Lantana camara</i>	Lantana			*
<i>Lastreopsis acuminata</i>	Shiny Shield Fern			
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
<i>Lophostemon confertus</i>	Brush Box			
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	
<i>Macaranga tanarius</i>	Blush Macaranga			
<i>Maclura cochinchinensis</i>	Cockspur Thorn			
<i>Mallotus philippensis</i>	Red Kamala			
<i>Marsdenia rostrata</i>	Milk Vine			
<i>Melia azedarach</i>	White cedar			
<i>Melicope elleryana</i>	Pink-flowered Doughwood			
<i>Melicope micrococca</i>	White Euodia			
<i>Mischocarpus australis</i>	Red Pear-fruit			
<i>Neoachmandra cunninghamii</i>	Slender Cucumber			
<i>Neolitsea dealbata</i>	Hairy-leaved Bolly Gum			
<i>Notelaea longifolia</i>	Large Mock-olive			
<i>Ochna serrulata</i>	Mickey Mouse Plant			*
<i>Olea paniculata</i>	Native Olive			



Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act#	Exotic
<i>Omalanthus populifolius</i>	Bleeding heart			
<i>Oplismenus aemulus</i>				
<i>Ottochloa gracillima</i>				
<i>Oxalis</i> spp.				
<i>Paspalum dilatatum</i>	Paspalum			*
<i>Paspalum urvillei</i>	Vasey Grass			*
<i>Passiflora edulis</i>	Common Passionfruit			*
<i>Passiflora suberosa</i>	Corky Passionflower			*
<i>Passiflora subpeltata</i>	White Passionflower			*
<i>Pellaea falcata</i>	Sickle fern			
<i>Pennisetum clandestinum</i>	Kikuyu			*
<i>Phytolacca octandra</i>	Inkweed			*
<i>Ptilidostigma glabrum</i>	Plum myrtle			
<i>Pimelea latifolia</i>	Rice flower			
<i>Pittosporum multiflorum</i>	Orange Thorn			
<i>Pittosporum undulatum</i>	Sweet Pittosporum			
<i>Platynerium bifurcatum</i>	Elkhorn fern			
<i>Platynerium superbum</i>	Staghorn fern			
<i>Polyscias elegans</i>	Celery Wood			
<i>Pothos longipes</i>				
<i>Psilotum nudum</i>	Skeleton Fork-Fern			
<i>Pteridium esculentum</i>	Bracken			
<i>Pyrrosia confluens</i>	Horseshoe Felt Fern			
<i>Pyrrosia rupestris</i>	Rock Felt Fern			
<i>Quassia</i> sp. Mt Nardi				
<i>Ripogonum discolor</i>	Prickly Supplejack			
<i>Rumex crispus</i>	Curled Dock			*
<i>Sarcopetalum harveyanum</i>	Pearl vine			
<i>Sarcopteryx stipata</i>	Steelwood			
<i>Schefflera actinophylla</i>	Umbrella Tree			*
<i>Schizomeria ovata</i>	Crabapple			
<i>Senecio madagascariensis</i>	Fireweed			*
<i>Senna pendula</i> var. <i>glabrata</i>				*
<i>Setaria sphacelata</i>	South African Pigeon Grass			*
<i>Sida rhombifolia</i>	Paddy's Lucerne			*
<i>Sloanea australis</i>	Maiden's Blush			
<i>Sloanea woollsii</i>	Yellow Carabeen			
<i>Smilax australis</i>	Barber Wire Vine			
<i>Solanum mauritianum</i>	Wild Tobacco Bush			*
<i>Stenocarpus sinuatus</i>	Firewheel Tree			

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act#	Exotic
<i>Stephania japonica</i> var. <i>discolor</i>	Snake Vine			
<i>Streblus brunonianus</i>	Whalebone Tree			
<i>Synoum glandulosum</i>	Scentless Rosewood			
<i>Syzygium luehmannii</i>	Small-leaved Lilly Pilly			
<i>Syzygium oleosum</i>	Blue Lilly Pilly			
<i>Tabernaemontana pandacaqui</i>	Banana Bush			
<i>Tetrastigma nitens</i>	Three-leaf Water Vine			
<i>Tinospora tinosporoides</i>	Arrowhead Vine	V		
<i>Toeckia dasyrrhache</i>	Blunt-leaved Steelwood			
<i>Trema tomentosa</i> var. <i>aspera</i>	Native Peach			
<i>Trifolium repens</i>	White clover			*
<i>Tristaniopsis laurina</i>	Kanooka			
<i>Trophis scandens</i>	Burny Vine			
<i>Verbena bonariensis</i>	Purpletop			*
<i>Wilkiea huegeliana</i>	Veiny Wilkiea			
<i>Wilkiea macrophylla</i>	Large-leaved Wilkiea			
<i>Zieria smithii</i>	Sandfly Zieria			

## APPENDIX 2 - HABITAT SUITABILITY ASSESSMENTS

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act <sup>#</sup>	Habitat
<b>Birds</b>				
<i>Amaurornis moluccana</i>	Pale-vented Bush-hen	V	-	The pale-vented bush-hen inhabits tall dense margins of freshwater streams and natural rainforest, rainforest remnants or forests.
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	The Regent honeyeater is found from Dalby the ranges and the western slopes. Its distribution is known breeding sites. The estimated total Potential habitat for this species includes coastal areas with mature eucalypts. It favours ironbark (E. sideroxylon), white box (E. albens), and yellow mahogany (E. robusta), spotted gum (Corymba cunninghamiana) with associated needle-leaved species. It prefers wetter, more fertile sites that are such as creek flats, river valleys and lower slopes.
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	The Fork-tailed Swift is almost exclusively found on ground and probably much higher. In Australia they are found above foothills or in coastal areas. They often roost sometimes well out to sea. They also occur in cities. They mostly occur over dry or open areas, swamps, low scrub, heathland or saltmarsh. They are found in areas covered with spinifex, open farmland and in rainforests, wet sclerophyll forest or open forest.
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	Primarily inhabit dry, open eucalypt forest or open or sparse understorey of eucalypt saplings, grasses or sedges and fallen woody debris. They are very occasionally in moist forest or rainforest or forest or woodland.
<i>Atrichornis rufescens</i>	Rufous Scrub-bird	V	E	Rufous scrub-birds are now confined to high altitude temperate and cool temperate rainforests,
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	The Australasian bittern is widespread but generally preferring freshwater habitats with reeds and rushes.

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
					the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	
<i>Calyptrorhynchus lathamii lathamii</i>	South-eastern Glossy Black-Cockatoo	V	V	This species is associated with woodland or open sclerophyll forests with populations of Allocasuarina, which comprise its exclusive diet. They require large old trees with hollows for nesting.	There are 9 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Carterornis leucotis</i>	White-eared Monarch	V	-	In NSW, White-eared monarchs occur in rainforest, especially drier types, such as littoral rainforest, as well as wet and dry sclerophyll forests, swamp forest and regrowth forest.	There are 31 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Circus assimilis</i>	Spotted Harrier	V	-	The Spotted Harrier occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	V	V	Found in eucalypt woodlands and dry open forest of the inland slopes and plains inland of the Great Dividing Range. This species mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. It is also found in mallee and River Red Gum ( <i>Eucalyptus camaldulensis</i> ) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Fallen timber is an important habitat component for foraging. The Brown treecreeper has been recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Hollows in standing dead or live trees and tree stumps are essential for nesting.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	-	Found in rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. They are active birds, frequently moving from tree to tree.	There are 7 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	-	M	This species is found in monsoon forests, the edges of rainforests, treed paddocks, mangroves, roadsides, and river flats (Pizzey and Knight 1999).	The subject site contains suitable habitat for this species however there are no records of this species from	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
					within 10 km of the subject site in the NSW BioNet database.	
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-Parrot	CE	CE	Usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. Also found in the wetter lowland rainforests that are now largely cleared in New South Wales.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Varied sittellas are found in eucalypt woodlands and forests throughout their range. They prefer rough-barked trees like stringybarks and ironbarks or mature trees with hollows or dead branches.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern New South Wales the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	Floodplain wetlands (swamps, billabongs, watercourses, and dams) of the major coastal rivers are the key habitat in NSW for the black-necked stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Erythroriorchis radiatus</i>	Red Goshawk	CE	E	This species occupies open forests and woodlands along rivers and wetlands and rainforest fringes. In NSW favoured habitat includes Melaleuca forest along coastal rivers (Debus 1991, 1993).	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Falco hypoleucos</i>	Grey Falcon	V	V	This species is associated with arid or semi-arid environments, where it can be found in shrublands, grasslands, watercourses, and wetlands.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely



Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	This species has a large distribution range, and is found in association with coasts, large rivers and estuaries and prefers to nest in large trees adjacent watercourses.	There are 3 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. Occupies open eucalypt forest, open woodland, She oak or Acacia woodlands, and riparian woodlands of interior NSW.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V, M	This species is recorded in all coastal regions of QLD and NSW and almost always forages aerially. Most often, the species is recorded above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.	There are 4 records of this species from within 10 km of the subject site in the NSW BioNet database.  This aerial species may occasionally inhabit the airspace over the subject site and surrounds.	Possible
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest, and mangroves.	There are 4 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Lathamus discolor</i>	Swift Parrot	E	CE	The swift parrot migrates from its Tasmanian breeding grounds to overwinter in the box-ironbark forests and woodlands of Victoria, NSW, and southern QLD.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Menura alberti</i>	Albert's Lyrebird	V	-	The Albert's Lyrebird mainly occurs in the wettest rainforests or wet sclerophyll forests with a wet understorey, often of rainforest plants. Higher densities of Albert's Lyrebirds occur in association with a canopy of eucalypts compared with rainforest lacking eucalypts (for equivalent climate), and in wet sclerophyll forest with greater weights of litter and logs and slower rates of litter decomposition. In optimum habitat, they forage up to major ridges whereas in mid-quality habitat tend to forage only on lower slopes and in gullies, and do not forage in dry sclerophyll forest. The Albert's Lyrebird feeds on the ground, usually where there is a deep, moist layer of leaf-litter, and fallen logs. In NSW, usually forage in rather open areas without a dense layer but with a well-developed taller strata.	There are 49 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M	This species 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. During winter or migration, this species also occurs in marginal habitats such as 20-30 years old regrowth rainforest, nearby open eucalypt forest (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as dry sclerophyll forests and woodlands, often with a patchy understorey.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Motacilla flava</i>	Yellow Wagtail	-	M	Inhabits open country near water, such as wet meadows. It nests in tussocks.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M	This species occurs in heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occurs in coastal forests, woodlands, mangroves and drier woodland and open forests.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Pachycephala olivacea</i>	Olive Whistler	V	-	The Olive Whistler mostly inhabits wet forests above about 500m. During the winter months they may move to lower altitudes.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Pandion haliaetus</i>	Osprey	-	M	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia (Johnstone & Storr 1998; Marchant & Higgins 1993; Olsen 1995). They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes (Czechura 1985; Domm 1977; Fleming 1987; Gosper 1983; Gosper & Holmes 2002; Johnstone & Storr 1998; Olsen 1995; Roberts & Ingram 1976). They exhibit a preference for coastal cliffs and elevated islands in some parts of their range (Boekel 1976; Domm 1977), but may also occur on low sandy, muddy or rocky shores and over coral cays (Marchant & Higgins 1993). They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging sites (Czechura 1985; Hembrow 1988; Pruett-Jones & O'Donnell 2004; Roberts & Ingram 1976).	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Petroica boodang</i>	Scarlet Robin	V	-	Found in open forests and woodlands. During winter, it will visit more open habitats such as grasslands, farmland and urban parks.	There are 3 records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
					Suitable habitat is not considered to occur on the subject site.	
<i>Podargus ocellatus</i>	Marbled Frogmouth	V	-	<p>The Marbled Frogmouth prefers subtropical rainforest, particularly in deep, wet, sheltered gullies along creek lines and often containing stands of Bangalow Palms or ferns. In NSW, it is most often found in moist, lowland, mesophyll vine forest.</p> <p>Less often, they are found in the ecotone between rainforest and wet Eucalyptus forests, or occasionally in cool rainforest and higher elevation temperate rainforests. Rarely in wet eucalypt forest.</p>	<p>There are 27 records of this species from within 10 km of the subject site in the NSW BioNet database.</p> <p>The subject site contains suitable habitat for this species.</p>	Possible
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V	-	Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit. Thought to be an effective medium to long-distance vector for seed dispersal.	<p>There are 41 records of this species from within 10 km of the subject site in the NSW BioNet database.</p> <p>The subject site contains suitable habitat for this species.</p>	Possible
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V	-	Rose-crowned fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	<p>There are 72 records of this species from within 10 km of the subject site in the NSW BioNet database.</p> <p>This species was heard calling from within vegetation adjacent to the site.</p>	RECORDED
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V	-	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	<p>There are 10 records of this species from within 10 km of the subject site in the NSW BioNet database.</p> <p>The subject site contains suitable habitat for this species.</p>	Possible
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	In east and south-east Australia, the Rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallowwood ( <i>Eucalyptus microcorys</i> ), Mountain grey gum ( <i>E. cypellocarpa</i> ), Narrow-leaved peppermint ( <i>E. radiata</i> ), Mountain ash ( <i>E. regnans</i> ), Alpine ash ( <i>E. delegatensis</i> ), Blackbutt ( <i>E. pilularis</i> ) or Red mahogany ( <i>E. resinifera</i> ); 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 ( <i>Acmena smythii</i> ) rainforest, with Grey myrtle ( <i>Backhousia myrtifolia</i> ), Sassafras ( <i>Doryphora sassafras</i> ) and Sweet pittosporum ( <i>Pittosporum undulatum</i> ) 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 ( <i>Eucalyptus maculata</i> ), Yellow box ( <i>E. melliodora</i> ), ironbarks or Stringybarks, often with a shrubby or heath understorey. In north and north-east Australia, they often occur in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of <i>Melaleuca</i> spp.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	This species inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps, and clay pans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). Breeding habitat requirements appear to be specific and includes shallow wetlands with areas of bare wet mud, with both upper and canopy cover nearby. Nest records are predominately from or near small islands in freshwater wetlands, provided that these islands are a combination of very shallow water, exposed mud, dense low cover and sometimes some tall dense cover.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Stagonopleura guttata</i>	Diamond Firetail	V	V	The Diamond firetail is typically found in grassy eucalypt woodlands (including Box-Gum woodlands and Snow Gum Eucalyptus pauciflora woodlands), and is often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. It also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities. Nests are built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Symposiachrus trivirgatus</i>	Spectacled Monarch	-	M	The Spectacled monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Turnix melanogaster</i>	Black-breasted Button-quail	CE	V	This species is restricted to areas mostly 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. This species may also be found in low, dense acacia thickets and in littoral areas, in vegetation behind sand dunes. An extensive dense leaf-litter layer is required for foraging and possibly also roosting. Fallen logs and a dense, heterogeneously distributed shrub layers are also considered to be important habitat characteristics for shelter and breeding.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	There are 4 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Tyto tenebricosa</i>	Sooty Owl	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	There are 24 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
Frogs						
<i>Assa darlingtoni</i>	Pouched Frog	V	V	Pouched frogs live in cool, moist rainforest, including Antarctic Beech, or moist eucalypt forest in mountainous areas, mostly above 800 m but have been found as low as 300 m.	There are 24 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Litoria olongburensis</i>	Wallum Sedge Frog	V	V	The Wallum Sedge Frog is found in ephemeral, seasonal and permanent wetlands with emergent reeds, ferns and/or sedges, in undisturbed coastal wallum swamps.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Mixophyes balbus</i>	Stuttering Frog, Southern Barred Frog (in Victoria)	E	V	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Mixophyes fleayi</i>	Fleay's Frog	E	E	Fleay's frog is associated with montane rainforest (Corben & Ingram 1987) and open forest communities adjoining rainforest (Hines 2001, pers. comm.). The species occurs along stream habitats from first to third order streams (i.e. small streams close to their origin through to permanent streams with grades of 1 in 50) and is not found in ponds or ephemeral pools. Adults may be found in leaf litter and along watercourses in rainforest and adjoining wet sclerophyll forests (Hines & SEQTFRT 2002).	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Mixophyes iteratus</i>	Giant Barred Frog, Southern Barred Frog	E	V	Giant barred frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation.  Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, giant barred frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Philoria loveridgei</i>	Loveridge's Frog	E	-	This frog is dependent on high moisture levels, occurring in the headwaters of small streams and about soaks where ground-water is continually present and close to the surface. It favours subtropical and warm temperate rainforest and wet eucalypt forest, but also occurs in moist eucalypt forest where rocky outcropping creates surface water.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely



Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<b>Insects/Invertebrates/Gastropods</b>						
<i>Argynnis hyperbius inconstans</i>	Australian Fritillary	-	CE	Restricted to open, swampy, coastal areas where the larval food plant, <i>Viola betonicifolia</i> , grows as a small, ground herb in association with <i>Lomandra longifolia</i> (long leaved matrush) and grasses, especially the grass <i>Imperata cylindrica</i> (blady grass).	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle	V	-	This species occurs in subtropical and warm temperate rainforest. It lives in small burrows of up to about 50cm, that it excavates with its powerful mandibles. Burrows are characteristically beneath roots, rocks or logs.	There are 8 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Phyllodes imperialis smithersi</i>	Pink Underwing Moth	E	E	The southern pink underwing moth is found in subtropical rainforest below about 600 m elevation.	There are 5 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Thersites mitchelliae</i>	Mitchell's Rainforest Snail	E	CE	The Mitchell's Rainforest Snail is found in remnant areas of lowland subtropical rainforest and swamp forest on alluvial soils. Slightly higher ground around the edges of wetlands with palms and fig trees are particularly favoured habitat. Typically found amongst leaf litter on the forest floor, and occasionally under bark in trees.	There are 3 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<b>Mammals</b>						
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V	-	Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	V	V	This species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors that are used for foraging. Almost all records have been found within several kilometres of cliff lines or rocky terrain. Roosting has also been observed in disused mine shafts, caves, overhangs, and disused fairy martin ( <i>Hirundo ariel</i> ) nests. The structure of primary nursery roosts appears to be very specific, i.e. arch caves with dome roofs (that need to be deep enough to allow juvenile bats to learn to fly safely inside) and with indentations in the roof (presumably to allow the	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
				capture of heat). These physical characteristics are very uncommon in the landscape and therefore a limiting factor to the species distribution.		
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	-	This species is recorded from a wide range of habitats, including montane rainforests, sclerophyll forests (e.g. open, closed, wet), coastal heathlands, sub-alpine woodlands, and riparian forests. It prefers mature wet forests that have not been logged and require large areas of relatively intact forest for foraging. Preferred den sites include hollow logs, caves, or rocky outcrops for daytime shelter.	There are 9 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests, and banksia scrub. Generally found in well-timbered areas.	There are 13 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable forage habitat for this species.	Possible
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the treetops.	There are 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable forage habitat for this species.	Possible
<i>Myotis macropus</i>	Southern Myotis	V	-	The Southern myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Foraging occurs over streams and pools catching insects and small fish by raking their feet across the water surface.	There are 4 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<i>Notamacropus parma</i>	Parma Wallaby	V	V	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. During the day they shelter in dense cover.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	V	-	Favour streamside habitats within coastal subtropical rainforest and moist eucalypt forests with a well-developed rainforest understorey.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	-	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in tree hollows, the hanging foliage of palms, in dense clumps of foliage of rainforest trees, under bark and in shallow depressions on trunks and branches, among epiphytes, in the roots of strangler figs, among dead fronds of tree ferns and less often in buildings.	There are 7 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	E	This species is found in eucalypt forests and woodlands. It prefers forests with a good diversity of eucalypt species to provide consistent forage opportunities year-round, and is found in the greatest abundance in tall, montane, moist old growth forests.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	-	V	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	There are 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-	Inhabits mature or old growth Box, Box-ironbark woodlands and River red gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	There are 3 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north.	There are no records of this species from within 10 km of	Unlikely

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
					the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	
<i>Phascolarctos cinereus</i>	Koala	E	-	This species inhabits a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities where suitable food trees are present. The koala is a leaf-eating specialist that feeds primarily during dawn, dusk, or night. Its diet is restricted mainly to foliage of a small selection of preferred Eucalyptus spp; however, it may also consume foliage of related genera, including Corymbia spp., Angophora spp., Melaleuca spp., and Lophostemon spp.	There are 1,108 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Planigale maculata</i>	Common Planigale	V	-	Common planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland, and rocky areas where there is surface cover, and usually close to water. They are active at night and during the day shelter in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (northern)	-	V	This species inhabits coastal heath and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an important habitat feature, and may consist of grasstrees, sedges, ferns, or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	There are 5 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes.	There are 0 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, and swamps as well as urban gardens and cultivated fruit crops. This species feeds on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The grey-headed flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are generally located within 20 km of a regular food source and are typically located near water, such as lakes, rivers, or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas. The species can maintain fidelity to roost sites for extended periods, although new sites have been colonized.	There are 16 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable forage habitat for this species.	Possible

Scientific Name	Common Name	BC Act^	EPBC Act#	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-	The Yellow-bellied sheathtail-bat roost singly or in groups of up to six, in tree hollows and buildings. Forages for insects over the forest canopy, but lower in more open country. Forages in most habitats across its wide range, with and without trees.	There is 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	There are 1 record of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Thylogale stigmatica</i>	Red-legged Pademelon	V	-	Inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators.	There are 6 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible
<i>Xeromys myoides</i>	Water Mouse	-	V	The water mouse required habitat that includes mangroves and the associated saltmarsh, sedgeland, clay pans, heathlands, and freshwater wetlands. These habitat types are similar across the three regions the species occurs: The Northern Territory, central south QLD and south-east QLD. The main habitat difference between these locations is the littoral, supralittoral and terrestrial vegetation which differs in structure and composition.  In south-east QLD, the upper tidal areas on the shoreward side of the mangrove zone often support sedgeland or salt meadows. The adjacent terrestrial communities are typically freshwater wetland, coastal woodland or wet heathland dominated variously by species such as <i>Melaleuca quinquenervia</i> , <i>Corymbia intermedia</i> , <i>Casuarina glauca</i> , <i>Eucalyptus robusta</i> , <i>Leptospermum liversidgei</i> , <i>Gahnia sieberiana</i> and <i>Caustis blakei</i> . A supralittoral bank may also be present and be utilised by the Water Mouse for nesting.	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<b>Reptiles</b>						
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	V	This species inhabits rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. This species feeds on earthworms and beetle grubs and is found in leaf litter, often immediately adjacent to fallen tree trunks.	The subject site contains suitable habitat for this species however there are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely
<i>Delma torquata</i>	Adorned Delma, Collared Delma	-	V	Due to specific habitat requirements, this species distribution is highly fragmented and restricted to only a few locations. The collared delma is known from the western suburbs of Brisbane, Queensland and the following sites: Bunya Mountains, Blackdown Tableland National Park (NP), Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran and the Toowoomba Range. This species inhabits	There are no records of this species from within 10 km of the subject site in the NSW BioNet database.	Unlikely

Scientific Name	Common Name	BC Act <sup>^</sup>	EPBC Act <sup>#</sup>	Habitat Assessment <sup>1</sup>	Local Records and Suitable Habitat Onsite	Likelihood of Occurrence
				eucalypt dominated woodland and open forest where it is associated with suitable micro-habitats (exposed rocky outcrops). The ground cover is predominantly native grasses, such as kangaroo grass ( <i>Themeda triandra</i> ), barbed-wire grass ( <i>Cymbopogon refractus</i> ), wiregrass ( <i>Aristida</i> sp.) and Lomandra ( <i>Lomandra</i> sp.). The presence of rocks, logs, bark and other coarse woody debris, and leaf litter (typically 30-100 mm thick) appears to be an essential characteristic of the collared delma microhabitat, and these features are always present where the species occurs.	Suitable habitat is not considered to occur on the subject site.	
<i>Harrisoniascincus zia</i>	Rainforest Cool-skink	-	V	The rainforest cool-skink occurs in cool, high elevation rainforest including (but not restricted to) areas with <i>Nothofagus moorei</i> (Antarctic beech) (Ingram & Ehmann 1981, Wilson & Swan 2021). These ecosystems are relicts within the broader landscape due to moist and cool conditions and lack of significant fire activity (Schuster 1981). The rainforest cool-skink occurs in both undisturbed closed canopy areas and in small clearings within rainforests. It is a secretive species that inhabits moist areas of deep leaf-litter where it shelters under flat rocks and logs. It basks among leaf-litter and at the edges of cleared tracks (Ingram & Ehmann 1981; Environment Australia 1999; Wilson & Swan 2021).	There are 0 records of this species from within 10 km of the subject site in the NSW BioNet database.  Suitable habitat is not considered to occur on the subject site.	Unlikely
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	-	The Stephens' Banded Snake is found in rainforest and eucalypt forests and rocky areas up to 950 m in altitude. Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day.	There are 2 records of this species from within 10 km of the subject site in the NSW BioNet database.  The subject site contains suitable habitat for this species.	Possible

<sup>^</sup> NSW *Biodiversity Conservation Act 2016* (BC Act)

<sup>#</sup> Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

CE - Critically Endangered, E - Endangered, V - Vulnerable and M - Migratory

<sup>1</sup> Sources (including specific literature references) from:

- DAWE (2022) *Species Profile and Threats Database*. Department of Agriculture, Water and the Environment (DAWE). Australian Government. Available at <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- DES (2022) *Species Profile Search*. Department of Environment and Science (DES), Queensland Government.
- DoPIE (2022) *Threatened biodiversity profile search*. Office of Environment and Heritage, Department of Planning, Industry and Environment (DoPIE), New South Wales Government.



## APPENDIX 3 – TESTS OF SIGNIFICANCE

*(a) In the case of a threatened species, whether the action is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

### Albert's lyrebird (*Menura alberti*)

#### *Extent of the local population*

The NSW BioNet database contained 49 records of this species within 10 km of the subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

#### *Stages of the life-cycle affected by the proposed development*

The Albert's Lyrebird mainly occurs in the wettest rainforests or wet sclerophyll forests with a wet understorey, often of rainforest plants. Higher densities of Albert's Lyrebirds occur in association with a canopy of eucalypts compared with rainforest lacking eucalypts (for equivalent climate), and in wet sclerophyll forest with greater weights of litter and logs and slower rates of litter decomposition. In optimum habitat, they forage up to major ridges whereas in mid-quality habitat tend to forage only on lower slopes and in gullies, and do not forage in dry sclerophyll forest.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing of rainforest and wet eucalypt forest habitat, and subsequent, fragmentation and isolation of remnant patches, for forestry and agriculture is thought to be the main reason for the decline of the species and continued clearing through forestry activities or for agricultural and residential development remains a threat to the species.
- Intensive management of forests, especially loss of optimal wet sclerophyll forest habitat to plantations of eucalypts or Hoop Pines (*Araucaria cunninghamii*), but also including damage to the canopy, understorey and ground layers of rainforest and wet sclerophyll forest habitats through forestry activity. Plantations contain much lower densities (and sometimes zero) of Albert's Lyrebirds than in habitat recovering from selective logging, or optimal habitat.
- Invasion of logged or otherwise damaged habitat by weeds, especially Lantana (*Lantana camara*), which reduces suitability of the habitat.
- Damage to habitat by grazing stock.

- Encroachment of urban or rural development close to habitat of Albert's Lyrebirds, as densities of Lyrebirds are lower close to such developments than would be expected.
- The isolated population in the Blackwall Range is under threat because it is so small, with possibly as few as 10 or fewer birds, and isolated from other populations.
- Fire may be a threat in exceptionally dry years, particularly isolated outlying populations.
- Predation by Red Foxes (*Vulpes vulpes*), and feral or, close to settlements, domestic Dogs and Cats may pose some threat, though this is thought to be of minor significance.
- Anthropogenic climate change, and potential changes to habitat and further restrictions of range linked to such change.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Arrowhead vine (*Tinospora tinoporoides*)

##### *Extent of the local population*

The NSW BioNet database contained 82 records of this species within 10 km of the subject site. Four (4) plant specimens were recorded on the subject site during recent field assessments.

The local population of this species comprises those individuals known to occur on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

This species is typically recorded in wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing and fragmentation of habitat for development, agriculture, and roading.
- Risk of local extinction because populations are small at some locations.
- Grazing and trampling by domestic stock.

- Fire.
- Invasion of habitat by introduced weeds.
- Accidental damage to plants when cutting introduced vines during bush regeneration.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, the proposed development can avoid plant specimens on the subject site. Conversely, as a contingency, in the event that a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Barred Cuckoo-shrike (*Coracina lineata*)

##### *Extent of the local population*

The NSW BioNet database contained seven (7) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

Coastal eastern Australia from Cape York to the Manning River in NSW. Barred Cuckoo-shrikes are generally uncommon in their range, and are rare in NSW.

Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. They are active birds, frequently moving from tree to tree.

The OEH Threatened Species Unit discusses the following threats for this species:

- Reduction of habitat, particularly rainforest, due to clearing for agriculture, development and timber harvesting.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continues presence of this species.

### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

### Black-breasted button-quail (*Turnix melanogaster*)

#### *Extent of the local population*

The NSW BioNet database contained two (2) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

#### *Stages of the life-cycle affected by the proposed development*

This species is restricted to areas mostly 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. This species may also be found in low, dense acacia thickets and in littoral areas, in vegetation behind sand dunes. An extensive dense leaf-litter layer is required for foraging and possibly also roosting. Fallen logs and a dense, heterogeneously distributed shrub layers are also considered to be important habitat characteristics for shelter and breeding.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing of subtropical and dry rainforests for agriculture leading to loss and fragmentation of habitat and loss of habitat connectivity. It is estimated over 90% of the habitat of the species has been cleared.
- Clearing of habitat for urban development.
- Logging activities modifying the habitat of the Black-breasted Button-quail, removing habitat (particularly in Hoop Pine plantations), and facilitating predator access.
- Inappropriate fire regimes in Black-breasted Button-quail habitat can reduce the density of shrubs, ground layer species and deep litter-layer, all of which the species depends on for shelter and food.
- Loss and degradation of habitat and habitat connectivity through grazing by livestock.
- Predation by Foxes.
- Predation by feral cats.
- Invasion and degradation of remnant rainforest habitat by weeds.

- Predation by feral dogs.
- Predation and degradation of habitat by feral pigs.
- The small population size of the Black-breasted Button-quail makes it vulnerable to threatening processes.
- Lack of information on the species in NSW to inform a conservation management strategy.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Bopple nut (*Hicksbeachia pinnatifolia*)

##### *Extent of the local population*

The NSW BioNet database contained 351 records of this species within 10 km of the subject site. Thirty-nine (39) plant specimens were recorded on the subject site during recent field assessments.

Given the extent of local records, the local population of this species comprises those individuals known to occur on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

This species is typically recorded in subtropical rainforest, moist eucalypt forest and Brush Box forest in coastal areas of north-east NSW from the Nambucca Valley north to SEQ

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing of rainforest habitat for development or agriculture.
- Habitat invasion and competition by multiple weeds reduces habitat suitability and suppresses recruitment and growth of the plant.
- Fire.
- Removal of existing plants or removal of seeds by horticulturalists
- Disturbance by domestic stock.
- Removal of trees and damage to habitat by roadworks.
- Lack of knowledge on seed predation by rats (*Rattus rattus*; *R. norvegicus*) potentially impacting species recruitment.

- Inappropriate fire regimes including risk from uncontrolled fires due to lightning strikes and arson, particularly on the edges of drier vegetation.
- Lack of knowledge of seed dispersal mechanisms and population recruitment dynamics. These processes are likely to constrain recruitment and reduce movement of plants between habitat patches and influence its ability to regenerate and increase in number after fire.
- Alteration of habitat structure, composition, resource availability, reduction in soil moisture, and alteration of microclimate for plants from climate induced drought, extreme weather events and increased fire intensity and frequency.
- Lack of long-term protection for the species on private and forestry tenures and potential for change of land use causing further negative impacts (e.g. fragmentation, residential and agricultural development). Population is particularly susceptible to localised extinction because of small number of extant populations and low species abundance.
- Lack of knowledge of species abundance or distribution

With the implementation of recommendations outlined in SECTION 5.3 of this EA, the proposed development can avoid plant specimens on the subject site. Conversely, as a contingency, if a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Common planigale (*Planigale maculata*)

##### *Extent of the local population*

This species has not been recorded on the subject site during previous or recent targeted surveys. There are five (5) records of the Common planigale within 10 km of the subject site from the NSW BioNet online database.

The local population of this species comprises those individuals that potentially occur on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise).

##### *Stages of the life-cycle affected by the proposed development*

Common planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland, and rocky areas where there is surface cover, and usually close to water. They are active at night and during the day shelter in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks.

The OEH Threatened Species Profile for the Common planigale identifies the following threats:



- Predation by foxes.
- Predation by cats
- Predation and poisoning by cane toads
- Loss of habitat from a variety of land uses resulting in species fragmentation and habitat degradation. Includes changes to riparian areas and hydrology from residential and associated infrastructure development, and loss of ground cover vegetation and woody debris from too frequent fire and clearing.
- Frequent burning that reduces ground cover such as hollow logs and bark.
- Over grazing that reduces ground cover
- Disturbance of vegetation surrounding water bodies.
- Predation by domestic cats
- The species is often misidentified and requires further survey work to identify distribution and abundance.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Eastern false pipistrelle (*Falsistrellus tasmaniensis*)

##### *Extent of the local population*

The NSW BioNet database contained one (1) record of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

This species hibernates in winter and prefers moist habitat containing trees taller than 20 m. Roosting generally occurs in eucalypt hollows, but they have also been found under loose bark on trees or in buildings.

The OEH Threatened Species Unit discusses the following threats for this species:

- Disturbance to winter roosting and breeding sites.

- Loss of roosting habitat, primarily hollow-bearing eucalypts.
- Loss and fragmentation of foraging habitat, particularly extensive areas of continuous forest and areas of high productivity.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Eastern Long-eared Bat (*Nyctophilus bifax*)

##### *Extent of the local population*

The OEH database contained seven (7) records of this species within 10 kilometres of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life cycle affected by the proposed development*

Found from Cape York through eastern QLD to the far north-east corner of NSW. In NSW, they appear to be confined to the coastal plain and nearby coastal ranges, extending south to the Clarence River area, with a few records further south around Coffs Harbour. The species can be locally common within its restricted range.

Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in tree hollows, the hanging foliage of palms, in dense clumps of foliage of rainforest trees, under bark and in shallow depressions on trunks and branches, among epiphytes, in the roots of strangler figs, among dead fronds of tree ferns and less often in buildings.

The OEH Threatened Species Unit discusses the following threats for this species:

- Development pressures in or near swamp, wet sclerophyll and rainforests resulting in habitat degradation, alterations to moisture regimes, and edge effects, and loss of connectivity
- Loss of hollow-bearing trees and stands of palms and rainforest trees used for roosting and maternity sites.

- Invasion of habitat by weeds, particularly by Bitou Bush on the coast.
- High frequency fire.
- Climate change resulting in degradation of habitat from forest drying and increasing likelihood of fire.
- Limited known sites for the species reducing NSW population viability.
- Predation from cats.
- Vehicle strike.
- Light pollution in and near habitat areas impacting species behaviour.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Greater Broad-nosed Bat (*Scoteanax rueppellii*)

##### *Extent of the local population*

The OEH database contained one (1) record of this species within 10 kilometres of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life cycle affected by the proposed development*

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however, does not occur at altitudes above 500 m.

This species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.

Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.

Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

The OEH Threatened Species Unit discusses the following threats for this species:

- Disturbance to roosting and summer breeding sites.
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees.
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores.
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Grey-headed flying fox (*Pteropus poliocephalus*)

##### *Extent of the local population*

The NSW BioNet database contained 16 records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

As part of the RFA process, Environment Australia (1999) conducted an analysis of the responses of forest fauna to various forms of land cover disturbance in the North-east region. The analysis identified breeding and sheltering sites for the Grey-headed flying fox as consisting of mainly rainforest and moist riparian forest with a complex mosaic of rainforest, swamp, and sclerophyll forest resources less than 40-50 km from roost. There is high site fidelity with roosts often in riverine rainforest. The Grey-headed flying fox forages in subtropical rainforest with a mosaic of resources - rainforest fruit, nectar, and

pollen. The Grey-headed flying fox is less restricted to rainforest remnants than the Black flying fox.

The RFA analysis (Environment Australia 1999) ranked the significance of various forms of disturbance for the Grey-headed flying fox, with the following results:

1 <sup>st</sup> order disturbances	Clearing - habitat loss
2 <sup>nd</sup> order disturbances	Direct disturbance to camps Drainage of swamps
3 <sup>rd</sup> order disturbances	Powerlines Logging of Sclerophyll Management burns Shooting
4 <sup>th</sup> order disturbances	Clearing resulting in fragmentation Wildfire
5 <sup>th</sup> order disturbances	Disease - lyssavirus Apiary Barbed wire fences Weed invasion
6 <sup>th</sup> order disturbances	Climate change

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Little Bent-wing Bat (*Miniopterus australis*)

##### *Extent of the local population*

The OEH database contained 13 records of this species within 10 kilometres of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence based on habitat suitability.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life cycle affected by the proposed development*

The Little bent-wing bat is found on the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.

Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.

The OEH Threatened Species Unit discusses the following threats for this species:

- Disturbance of colonies, especially in nursery or hibernating caves, may be catastrophic.
- Extractive mining activity that destroys or disturbs caves and resident bats. Includes maternity, staging and over-wintering roosting caves.
- Illegal extraction of guano causing disturbance to resident bats
- Changes to habitat, especially surrounding maternity/nursery caves and winter roosts.
- Pesticides on insects and in water consumed by bats bio accumulates, resulting in poisoning of individuals.
- Predation from foxes, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges.
- Predation from feral cats, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges
- Woody weeds such as Lantana or blackberry that can overgrow cave entrances and block access or provide an entanglement risk
- Introduction of exotic pathogens such as the White-nosed fungus.
- Hazard reduction and wildfire fires during the breeding season.
- Large scale wildfire or hazard reduction can impact on foraging resources.
- Poor knowledge of reproductive success and population dynamics.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Large Bent-winged Bat (*Miniopterus orianae oceanensis*)

*Extent of the local population*

The OEH database contained one (1) record of this species within 10 kilometres of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence based on habitat suitability.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life cycle affected by the proposed development*

Caves are the primary roosting habitat for this species, but they will also use derelict mines, storm-water tunnels, buildings and other man-made structures. They 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 and can support colonies from 100 to 150,000 individuals.

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.

This species hunts in forested areas, catching moths and other flying insects above the tree tops.

The OEH Threatened Species Unit discusses the following threats for this species:

- Disturbance by recreational cavers and general public accessing caves and adjacent areas particularly during winter or breeding.
- Loss of high productivity foraging habitat.
- Introduction of exotic pathogens, particularly white-nose fungus.
- Cave entrances being blocked for human health and safety reasons, or vegetation (particularly blackberries) encroaching on and blocking cave entrances.
- Hazard reduction and wildfire fires during the breeding season.
- Predation by feral cats.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.



Marbled frogmouth (*Podargus ocellatus*)

*Extent of the local population*

The NSW BioNet database contained 27 records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

The Marbled frogmouth prefers subtropical rainforest, particularly in deep, wet, sheltered gullies along creek lines and often containing stands of Bangalow Palms or ferns. In NSW, it is most often found in moist, lowland, mesophyll vine forest. Less often, they are found in the ecotone between rainforest and wet Eucalyptus forests, or occasionally in cool rainforest and higher elevation temperate rainforests. Rarely in wet eucalypt forest.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing, fragmentation and isolation of rainforest and associated wet eucalypt forests for agriculture and forestry has been the main cause of past declines and continue to operate as a threat for the species.
- Opening of the canopy and promotion of dense understorey growth caused by timber harvesting.
- Invasion of habitat by weeds following disturbance.
- Isolation of patches of habitat owing to frequent burning of connecting forest.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Olive whistler (*Pachycephala olivacea*)

*Extent of the local population*

The NSW BioNet database contained one (1) record of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

The Olive whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range.

This species mostly inhabits wet forests above 500 m; however, during winter it may move to lower altitudes. Nests are made of twigs and grass in the low forks of shrubs.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing and fragmentation of habitat.
- Fire that is too intense, widespread or frequent resulting in changed vegetation structure and composition.
- Predation by foxes and cats.
- Loss of understorey and midstorey habitat via grazing or other disturbances.
- Infestation and competition from invasive weeds.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Climate change impacts including reduction in resources due to drought.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Pink Underwing Moth (*Phyllodes imperialis smithersi*)

*Extent of the local population*

The NSW BioNet database contained five (5) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or

otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

#### *Stages of the life-cycle affected by the proposed development*

The Southern Pink Underwing Moth is distributed from Nambour in south-eastern Queensland to Bellingen in northern NSW. In NSW it is known to occur in a small number of localities from the QLD border to Wardell, and there is a disjunct population in the Bellingen area.

The Southern Pink Underwing Moth is found in subtropical rainforest below about 600 m elevation. Potential breeding habitat is restricted to areas where the caterpillar's food plant, a native rainforest vine, *Carronia multisepalea*, occurs in subtropical rainforest. Adult Southern Pink Underwing Moths require the low light conditions of the rainforest in order to breed.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing or disturbance of remnant patches of rainforest habitat for development and agriculture.
- Risk of local extinction due to restricted distribution and low numbers.
- Weed invasion of rainforest remnants particularly by exotic vine species.
- Use of rainforest remnants by domestic stock for shelter and grazing.
- Insufficient understanding of taxonomy.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Red-legged pademelon (*Thylogale stigmatica*)

##### *Extent of the local population*

The NSW BioNet database contained six (6) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence in the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

### *Stages of the life-cycle affected by the proposed development*

This species inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators. This species is rarely found outside of forested areas.

The OEH Threatened Species Unit discusses the following threats for this species:

- Loss or fragmentation of habitat due to land clearing and under scrubbing.
- Predation by domestic and wild dogs/dingos.
- Predation by foxes.
- Inappropriate fire regime reducing or degrading habitat, especially as a result of overly frequent or intense fires and regular burning of forest margins.
- Habitat degradation and grazing competition by feral horses, cattle, pigs, and rabbits.
- Predation by feral cats.
- Habitat degradation and grazing competition by domestic stock.
- Climate change altering habitat and increasing risks associated with fire.
- Intensive forestry practices resulting in, or exacerbating, habitat loss and fragmentation.
- Broad scale lantana removal resulting in habitat loss.
- Lack of information about disease prevalence and susceptibility.
- Lack of knowledge around threatening processes and their interactions.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

### Rose-crowned fruit-dove (*Ptilinopus regina*)

#### *Extent of the local population*

The NSW BioNet database contained 72 records of this species within 10 km of the Subject site. This species was heard calling from within vegetation adjacent to the subject site.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.

The OEH Threatened Species Unit discusses the following threats for the Rose-crowned fruit-dove:

- Clearing and fragmentation of low to mid-elevation rainforest.
- Logging and roading in moist eucalypt forest with well-developed rainforest understorey.
- Burning of remnant rainforest habitat.
- Invasion of habitat by introduced weed species
- Removal of Camphor laurel food source without appropriate mitigation measures.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Rough-shelled Queensland nut (*Macadamia tetraphylla*)

*Extent of the local population*

The NSW BioNet database contained 108 records of this species within 10 km of the subject site. Twelve (12) plant specimens were recorded on the subject site during recent field assessments.

Given the extent of local records, the local population of this species comprises those individuals known to occur on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas well outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

Confined chiefly to the north of the Richmond River in north-east NSW, extending just across the border into QLD. Many records, particularly those further south, are thought to be propagated. This species is typically recorded near the coast in subtropical rainforest.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing and fragmentation of habitat for coastal development, agriculture and roadworks.
- Risk of local extinction due to low numbers.
- Grazing and trampling by domestic stock..
- Fire.
- Invasion of habitat by weeds.
- Loss of local genetic strains through hybridisation with commercial varieties.
- Reduction of genetic diversity as a result of fragmentation

With the implementation of recommendations outlined in SECTION 5.3 of this EA, the proposed development can avoid plant specimens on the subject site. Conversely, as a contingency, if a Threatened plant is inadvertently impacted/damaged during site works, each plant impacted should be replaced at a ratio of 10:1 on the subject site.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Shorter rainforest ground-beetle (*Nurus brevis*)

##### *Extent of the local population*

The NSW BioNet database contained eight (8) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence in the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

Currently the only known populations occur in Lismore and the Richmond Range near Mallanganee, west of Casino.

This species occurs in subtropical and warm temperate rainforest. It lives in small burrows of up to about 50cm, that it excavates with its powerful mandibles. Burrows are characteristically beneath roots, rocks or logs.

The OEH Threatened Species Unit discusses the following threats for this species:

- Risk of extinction due to small isolated populations.

- Drying of rainforest remnants reducing prey availability (leaf litter invertebrates).
- Removal of leaf litter prey items by over-abundant Brush-turkeys.
- Weed invasion impacting the rainforest ground layer habitat.
- Predation by Cane Toads during warm wet nights when males emerge from burrows to mate.
- Hydrological changes causing flooding, erosion or loss of leaf litter.
- Burning of rainforest understorey in small remnants causing loss of prey (leaf litter invertebrates).
- Small-scale clearing causing habitat loss and desiccation of rainforest ground layer.
- Beetle collecting activities.
- Insufficient understanding of species distribution.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Sooty owl (*Tyto tenebricosa*)

##### *Extent of the local population*

The NSW BioNet database contained 24 records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

The Sooty owl occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Individuals roost by day in the very large hollows of a tall forest tree or in heavy vegetation. At night the Sooty owl hunts for small ground mammals or tree-dwelling mammals.

The OEH Threatened Species Unit discusses the following threats for this species:

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.



- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### Spotted-tailed quoll (*Dasyurus maculatus*)

##### *Extent of the local population*

The NSW BioNet database contained nine (9) records of this species within 10 km of the subject site.

The local population of this species comprises those individuals that potentially occur on the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species has large home ranges, so the local population of this species is therefore likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

This species is recorded from a wide range of habitats, including montane rainforests, sclerophyll forests (e.g. open, closed, wet), coastal heathlands, sub-alpine woodlands, and riparian forests. It prefers mature wet forests that have not been logged and require large areas of relatively intact forest for foraging. Preferred den sites include hollow logs, caves, or rocky outcrops for daytime shelter.

The NSW Threatened Species Profile discusses the following threats for the Spotted-tailed quoll:

- Loss, fragmentation and degradation of habitat.
- Competition with introduced predators such as cats and foxes.
- Deliberate poisoning, shooting and trapping, primarily in response to chicken predation.
- Roadkill
- Poisoning from eating cane toads in the wild.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Stephens' banded snake (*Hoplocephalus stephensi*)

*Extent of the local population*

The NSW BioNet database contained two (2) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence in the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site as well as any individuals occurring in adjoining areas (contiguous or otherwise). The local population of this species is therefore likely to extend to areas outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

The Stephens' Banded Snake is found in rainforest and eucalypt forests and rocky areas up to 950 m in altitude. Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing and fragmentation of habitat.
- Forestry practices which result in loss of old or dead trees.
- Too frequent burning for fuel reduction or grazing management which destroys old and dead trees and removes understorey vegetation.
- Illegal collection of snakes from the wild.
- Poor knowledge of the species' habitat preferences.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

Superb fruit-dove (*Ptilinopus superb*)

*Extent of the local population*

The NSW BioNet database contained 10 records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life-cycle affected by the proposed development*

The Superb Fruit-dove occurs principally from north-eastern in QLD to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania.

Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.

Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn.

Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species.

The OEH Threatened Species Unit discusses the following threats for this species:

- Clearing and fragmentation of low-elevation rainforest resulting in irregular food availability throughout the year.
- Changes to rainforest habitat with climate change including drying and increased fire frequency.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

White-eared monarch (*Carterornis leucotis*)

*Extent of the local population*

The OEH database contained 31 records of this species within 10 kilometres of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

*Stages of the life cycle affected by the proposed development*

The White-eared Monarch is endemic to the coastal lowlands and eastern slopes of the Great Divide of eastern Australia, extending from Cape York Peninsula south to north-eastern NSW. In NSW, White-eared Monarchs are generally found from the Queensland border south to Iluka at the mouth of the Clarence River, and inland as far as the Richmond Range. There are occasional records south of the Clarence River, near Woolgoolga and around Port Macquarie.

White-eared Monarchs occur in rainforest, especially drier types, such as littoral rainforest, as well as wet and dry sclerophyll forests, swamp forest and regrowth forest. They appear to prefer the ecotone between rainforest and other open vegetation types or the edges of rainforest, such as along roads. They are highly active when foraging, characteristically sallying, hovering and fluttering around the outer foliage of rainforest trees. They are usually observed high in the canopy or subcanopy. They eat insects, but their diet is not well studied. They breed from about September to March, usually nesting high in the canopy, and often at the edge of patches of rainforest.

The OEH Threatened Species Unit discusses the following threats for the White-eared monarch:

- Clearing and increasing fragmentation and isolation of habitat, especially low-elevation subtropical rainforest, littoral rainforest and wet sclerophyll forest, through agricultural, tourist and residential development or forestry activities;
- Forest management that results in conversion of multi-aged forests to young, even-aged stands;
- Invasion of forests by weeds;
- Inappropriate fire regimes that degrade habitat or allow invasion by weeds;
- Degradation or loss of habitat through grazing of stock;
- Changes to rainforest habitat with climate change including drying and increased fire frequency;
- Lack of information on the species habitat requirements in NSW, particularly breeding habitat; and

- Easily disturbed by the presence of people.

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

#### *Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

#### White-throated needletail (*Hirundapus caudacutus*)

##### *Extent of the local population*

The NSW BioNet database contained four (4) records of this species within 10 km of the Subject site. This species was not recorded on the subject site but is considered a possible occurrence as it moves through the locality.

The local population of this species comprises those individuals known or likely to occur in the subject site, as well as any individuals occurring in adjoining areas (contiguous or otherwise). This species is highly mobile and therefore the local population of this species is likely to extend to areas well outside of the subject site.

##### *Stages of the life-cycle affected by the proposed development*

Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Peninsula and northern Japan June-August. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (e.g. termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed. More common in coastal areas, less so inland.

This species is recorded in all coastal regions of QLD and NSW and almost always forages aerially. Most often, the species is recorded above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.

The OEH Threatened Species Unit discusses the following threats for this species:

- Vegetation clearing
- Rotor strike from windfarms

With the implementation of recommendations outlined in SECTION 5.3 of this EA, it can be confidently concluded that the proposed development would have no direct impacts on the habitat value of the subject site or the continued presence of this species.

*Likelihood of local extinction*

With consideration of the above the development is considered highly unlikely to result in the local extinction of this species.

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*(b) In the case of an endangered ecological community or critically endangered ecological community whether the action proposed:*

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction;*
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion

With the implementation of recommendations in SECTION 5.3, there will be no direct impacts to the Lowland Rainforest TEC as result of the proposed development and potential indirect impacts are not considered to represent a significant impact.

As a result, it is considered highly unlikely that the proposed development will place the local occurrence of this EEC at risk of extinction, or adversely modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction.

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*(c) In relation to the habitat of a threatened species or ecological community:*

- the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*

The impact of the proposed development on fauna species habitat is considered to be insignificant when considering the availability of suitable and better-quality habitat in other parts of the subject site and across the locality.

- whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*

The proposed development will have no direct impact on the connection of the subject site's habitat with surrounding habitat.

- *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

The assessment of the importance of the habitat to be removed has taken into consideration the stages of relevant life cycles (including mobility for threatened fauna) and how reproductive success may be affected. It is considered that the impact of the proposed development on habitat is considered to be insignificant and will not significantly affect the life cycle or reproductive success of native flora and fauna species or ecological communities in the locality.

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*(d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).*

There will be no adverse effects on any of the critical habitats listed under the BC Act from the action proposed.

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*(e) Whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

A “threatening process” means a process that threatens, or may have the capability to threaten, the survival or evolutionary development of a species, population or ecological community. Key Threatening Processes (KTP) have been listed in Schedule 4 of the BC Act.

Key Threatening Processes (Schedule 4):

- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners (*Manorina melanocephala*)
- Alteration of habitat following subsidence due to longwall mining
- Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands
- Anthropogenic Climate Change
- Bushrock Removal
- Clearing of native vegetation
- Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- Competition and habitat degradation by feral goats (*Capra hircus*)
- Competition from feral honeybees (*Apis mellifera*)
- Death or injury to marine species following capture in shark control programs on ocean beaches



- Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments
- Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners
- Habitat degradation and loss by feral horses
- Herbivory and environmental degradation caused by feral deer
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
- Importation of Red Imported Fire Ants (*Solenopsis invicta*)
- Infection by Psittacine Circoviral (beak & feather) Disease affecting endangered psittacine species and populations
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- Infection of native plants by *Phytophthora cinnamomi*
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Introduction of the Large Earth Bumblebee (*Bombus terrestris*)
- Invasion and establishment of exotic vines and scramblers
- Invasion and establishment of Scotch Broom (*Cytisus scoparius*)
- Invasion and establishment of the Cane Toad (*Bufo marinus*)
- Invasion, establishment and spread of (Lantana camara)
- Invasion of native plant communities by African Olive (*Olea europaea* subsp. *cuspidata*)
- Invasion of native plant communities by *Chrysanthemoides monilifera*
- Invasion of native plant communities by exotic perennial grasses
- Invasion of the yellow crazy ant (*Anoplolepis gracilipes*)
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Loss of hollow-bearing trees
- Loss and degradation (or both) of sites used for hill-topping by butterflies
- Predation and hybridisation by Feral Dogs (*Canis lupus familiaris*)
- Predation by *Gambusia holbrooki* (Plague Minnow or Mosquito Fish)
- Predation by the European Red Fox (*Vulpes vulpes*)
- Predation by the Feral Cat (*Felis catus*)
- Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island
- Predation, habitat degradation, competition and disease transmission by Feral Pigs (*Sus scrofa*)

- Removal of dead wood and dead trees.

It is not considered that the proposed development will contribute significantly to any of the above listed KTPs.

The proposed development has the potential to result in an increase in the 'Invasion and establishment of exotic vines and scramblers', 'Invasion of native plant communities by exotic perennial grasses', 'Invasion, establishment and spread of *Lantana camara*' and 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants'. Exotic vines, scramblers and aquatic plants may be introduced to native vegetation communities and animal habitat via garden escapees or the illegal dumping of garden waste. Illegal dumping is an offence under the Protection of the *Environment Operations Act 1997*. The invasion by exotic perennial grasses and lantana may occur if native vegetation communities are disturbed (e.g. by unlawful clearing, trampling, creation of tracks etc.). The level of risk associated with these KTPs is considered to be very low given the nature of the proposed development and the mitigation measures that will be implemented to prevent impacts (directly or indirectly) to retained EECs / habitat.

Cane toads are already established within the subject site. The proposed development is unlikely to result in increased numbers of cane toads.

The assessment of KTPs indicates that with the adoption of the recommended mitigation measures, the proposed development is unlikely to exacerbate these KTPs on top of what is already present.

With the above considered, the proposed development is likely to have an insignificant impact to EECs or threatened fauna both locally and across the broader landscape. It is therefore concluded that a Species Impact Statement (SIS) is not required for impacts of the proposed development areas of EEC and threatened fauna.