



FLORA AND FAUNA ASSESSMENT REPORT

PROPOSED REZONING AND SUBDIVISION

**COLLINGWOOD DRIVE
AND MATCHAM ROAD**

MATCHAM

**NOVEMBER 2018
REF: 8068/FV2**

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NOVEMBER 2018

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PREFACE

This Flora and Fauna Assessment Report has been prepared by *Conacher Consulting* to identify the flora and fauna characteristics of the subject land at Collingwood Road, Matcham.

This report provides an assessment of existing habitats and the potential for the proposed activity to significantly impact on threatened species according to the provisions of Section 5(A) of *the Environmental Planning and Assessment Act 1979* and the *Threatened Species Conservation Act 1995* (pursuant to the provisions of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*).

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SECTION 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Conacher Consulting has been engaged to prepare a Flora and Fauna Assessment Report for a proposed subdivision.

This Report has been prepared to identify the flora and fauna characteristics of the subject site and to determine whether or not a Species Impact Statement should be prepared for development according to the provisions of Section 5(A) of the *Environmental Planning & Assessment Act 1979* (EP&A Act) and the *Threatened Species Conservation Act 1995* (TSC Act) (pursuant to the provisions of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*).

This report also provides an assessment of whether a referral is required pursuant to *Environment Protection & Biodiversity Conservation Act 1999* (EP&BC Act) for impacts to nationally listed threatened and migratory biodiversity.

1.2 SITE CHARACTERISTICS

The planning and cadastral details of the subject site are provided in Table 1.1.

TABLE 1.1 SITE DETAILS	
Location	Lots 11, 12 & 13 DP 576336 & Lot 2 DP 561283, Collingwood Drive and Matcham Road, Matcham
Area	8.1 hectares
Local Government Area	Central Coast Council
Existing Land Use	Rural residential

1.3 PROPOSED DEVELOPMENT

The development assessed in this Report is a future rural-residential subdivision. Assessments within this report have taken into account the potential future construction of to create an additional four lots, new dwellings and associated infrastructure such as driveway access, landscaping, asset protection zones and the provision of services. Future dwellings are proposed to be located in existing cleared locations within future lots.

Detailed plans of the proposed development have been provided as separate documentation to this report.

1.4 RECOMMENDED IMPACT MITIGATION & AVOIDANCE MEASURES

The following measures are recommended to avoid and/or minimise impacts to biodiversity:

- Retention of all hollow bearing trees identified within the site;
- Retention of endemic trees within the outer edges of the assessed Building Curtilage Areas
- Implementation and maintenance of suitable erosion and sediment controls during site clearing and construction until exposed soils are revegetated or stabilised;
- Restriction of future on-site waste water disposal treatment to existing cleared areas
- Retention of all trees within future bushfire asset protection zones; and
- Preparation and implementation of allotment specific vegetation management plans following site subdivision.

SECTION 2

FLORA CHARACTERISTICS

2.1 THREATENED FLORA SPECIES

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2018a) was undertaken to identify records of threatened flora species located within 10 km of the site. This allowed for a specific search for threatened flora to be undertaken to determine if any threatened flora species are present within the subject site. Details on threatened flora species as listed in Schedule 1 of the BC Act (2016) with a known or possible occurrence within the local area are provided in Table 2.1.

TABLE 2.1 THREATENED FLORA SPECIES OF THE AREA				
Name	BC Act	EP&BC Act	Habitat Requirements	Comments
<i>Acacia pubescens</i>	V	V	Spreading shrub 1-4 m high growing in open sclerophyll forest and woodlands on clay soils (NSW NPWS 2003).	No suitable habitat present.
<i>Chamaesyce psammogeton</i>	E	-	Prostrate herb. Grows on coastal dunes.	No suitable habitat present.
<i>Darwinia glaucophylla</i>	V	-	Spreading prostrate shrub. Occurs in heath and woodlands associated with sandstone rock platforms.	No suitable habitat present.
<i>Dendrobium melaleucaphilum</i>	E	-	Epiphytic orchid growing frequently on <i>Melaleuca stypheloides</i> , less commonly on rainforest trees or on rocks in coastal districts. Flowers July-Oct.	No suitable habitat present.
<i>Diuris praecox</i>	V	V	Terrestrial orchid. Grows in sclerophyll forest near the coast, most often found on clay graminoid heath on coastal headlands (Bishop 2000).	No suitable habitat present.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	-	Occurs in Sydney Sandstone Gully Forest and scrub with periodically poorly drained clay soil on sandstone or shale (NSW NPWS 2002).	No suitable habitat present.
<i>Eucalyptus camfieldii</i>	V	V	Stringybark to 10 m high. Grows in coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone (Harden 1994).	No suitable habitat present.
<i>Eucalyptus glaucina</i>	V	V	Tree to 30m. Grows in several habitats including shallow soils or stony hillsides (not on poor sandstone), grassy woodland on deep, moderately fertile slopes with moist soils and on gentle slopes near drainage lines in alluvial and clayey soils.	No suitable habitat present.

TABLE 2.1 THREATENED FLORA SPECIES OF THE AREA				
Name	BC Act	EP&BC Act	Habitat Requirements	Comments
<i>Hibbertia procumbens</i>	E	-	Prostrate shrub with linear leaves which occurs in heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits.	No suitable habitat present.
<i>Lindsaea fraseri</i>	E	-	A small rhizome creeping fern. Grows in swamp forest or open forest. Known primarily from the Far North Coast of NSW.	No suitable habitat present.
<i>Melaleuca biconvexa</i>	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation (NSW Scientific Committee 1998).	Suitable habitat present. Not observed during surveys.
<i>Persoonia hirsuta</i>	E	E	Spreading to decumbent shrub. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone (NSW OEH 2018b).	No suitable habitat present.
<i>Prostanthera askania</i>	E	E	Erect shrub. Grows in moist sclerophyll forest and warm temperate rainforest communities, as well as the ecotone between them. Habitats are characterised by undulating to moderately steep slopes of the Watagan and Erina soil landscapes and intersecting areas on alluvial soils of the Yarramalong soil landscape (NSW DECC 2006).	Suitable habitat present. Not observed during surveys.
<i>Pultenaea maritima</i>	V	-	Prostrate mat forming shrub with hairy stems. Occurs in grasslands, shrublands and heath on exposed coastal headlands. Distribution Newcastle to Bryon Bay less than 1km from coast.	No suitable habitat present.
<i>Senecio spathulatus</i>	E	-	Small spreading shrub growing on coastal dunes.	No suitable habitat present.
<i>Senna acclinis</i>	E	-	Shrub to 3m tall. Grows in or adjacent to subtropical and dry rainforest.	No suitable habitat present.
<i>Syzygium paniculatum</i>	E	V	Small tree. Subtropical and littoral rainforest on sandy soil (Fairley and Moore 1995).	Suitable habitat present. Not observed during surveys.

TABLE 2.1 THREATENED FLORA SPECIES OF THE AREA				
Name	BC Act	EP&BC Act	Habitat Requirements	Comments
<i>Tetratheca glandulosa</i>	V	-	Spreading shrub to 0.2 m high. Strongly associated with areas of shale-sandstone transition habitat (NSW OEH 2018b).	No suitable habitat present.
<i>Tetratheca juncea</i>	V	V	Prostrate shrub to 1 m high. Typically grows in nutrient poor sandy soils in Smooth-barked Apple, Scribbly Gum, and Spotted Gum dry sclerophyll communities with grassy or heathy understorey. Less commonly recorded from moist forest communities (Ecological Survey and Management 2000).	No suitable habitat present.
<i>Wilsonia backhousei</i>	V	-	A perennial subshrub with procumbent branches to 15cm high. Grows in saltmarshes and on sea cliffs.	No suitable habitat present.
Ext = Extinct P. Ext = Presumed Extinct CE = Critically Endangered E = Endangered V = Vulnerable Species				

No threatened flora species were observed within the subject site during surveys.

The threatened flora species listed under the *BC Act* (2016) and *EPBC Act* (1999), considered to have suitable habitat present within the subject, have been assessed in Section 4 and Appendix 1 of this report.

2.2 ENDANGERED FLORA POPULATIONS & ECOLOGICAL COMMUNITIES

2.2.1 Endangered Flora Populations

There are no endangered flora populations listed under the *BC Act* (1995) occurring within the locality.

2.2.2 Endangered Ecological Communities

Details regarding the habitat attributes and indicative species for the endangered ecological communities known to be present in the local government area are provided in Table 2.2.

TABLE 2.2 ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA				
Name	BC Act	EPBC Act	Habitat Requirements	Comments
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC	VEC	Geology / Soils: Estuarine mud flats. Topography: Intertidal zone on the shores of estuaries and lagoons. Characteristic Species: <i>Sarcocornia quinqueflora</i> , <i>Sporobolus virginicus</i> , <i>Juncus kraussii</i> and <i>Baumea juncea</i> .	No suitable habitat present.

**TABLE 2.2
ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA**

Name	BC Act	EPBC Act	Habitat Requirements	Comments
Coastal Upland Swamp in the Sydney Basin Bioregion	EEC	EEC	<p>Geology / Soils: Periodically waterlogged acidic soils on Hawkesbury Sandstone.</p> <p>Topography: Impermeable sandstone plateaus in the headwater valleys of streams and on sandstone benches with abundant moisture seepage.</p> <p>Characteristic Species: Highly diverse and variable, includes scrubs, heaths, sedgelands and fernlands.</p>	No suitable habitat present.
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC	-	<p>Geology / Soils: Silts, muds or humic loams.</p> <p>Topography: Depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains.</p> <p>Characteristic Species: Composition is variable and dependent on water regime. May include amphibious grasses and sedges, emergent floating herbs and emergent tall sedges and floating and submerged aquatic herbs.</p>	No suitable habitat present.
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	CEEC	-	<p>Geology / Soils: Terrigal Formation of the Narrabeen Group. Soils are characterised by Yellow Podzolic Soils and Yellow Earths of the Erina Soil Landscape.</p> <p>Topography: Foothslopes, gently inclined crests and ridges.</p> <p>Characteristic Species: <i>Eucalyptus racemosa</i>, <i>Angophora costata</i>, <i>Corymbia gummifera</i>, <i>Syncarpia glomulifera</i>, <i>Eucalyptus piperita</i> and <i>Allocasuarina littoralis</i>.</p>	No suitable habitat present.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	CE	<p>Geology / Soils: Sand dunes and on soils derived from underlying rocks</p> <p>Topography: Located near the seaoin coastal dunes, headland or riparian habitats.</p> <p>Characteristic Species: Comprises the <i>Cupaniopsis anacardioides</i> - <i>Acmena</i> spp. alliance of Floyd (1990).</p>	No suitable habitat present.

**TABLE 2.2
ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA**

Name	BC Act	EPBC Act	Habitat Requirements	Comments
Low woodland with heathland on indurated sand at Norah Head	EEC	-	Geology / Soils: Indurated (hard setting) sands with a range of local variation in drainage conditions. Topography: low rolling sandy hills – east of Wilfred Barrett Drive near Norah Head. Characteristic Species: <i>Eucalyptus camfieldii</i> , <i>Corymbia gummifera</i> , <i>Melaleuca</i> spp. <i>Lambertia formosa</i> , <i>Acacia longifolia</i> , <i>Banksia oblongifolia</i> and <i>Allocasuarina distyla</i> .	No suitable habitat present.
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	CE	Geology / Soils: High nutrient geological substrates, notably basalts and fine-grained sedimentary rocks. Topography: Coastal plains and plateaux, footslopes and foothills up to 600m ASL and within the Sydney basin below 350m ALS Characteristic Species: Principally encompasses the following groupings of Floyd (1990): <i>Argyrodendron trifoliatum</i> alliance (suballiances 1, 5 & 6); <i>Dendrocnide excelsa</i> - <i>Ficus</i> spp. alliance (suballiances 14 & 15); and <i>Drypetes australasica</i> – <i>Araucaria cunninghamii</i> alliance (suballiances 21 & 22).	No suitable habitat present.
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	E	-	Geology / Soils: Shale-derived soils from Narrabeen series geology Topography: Undulating to rolling hills. Characteristic Species: <i>Corymbia maculata</i> and <i>Eucalyptus paniculata</i> .	No suitable habitat present.
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Geology / Soils: Silts, clay-loams and sandy loams. Topography: Periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Characteristic Species: Eucalypt canopy with species belonging to the genus <i>Angophora</i> or the sections <i>Exsertaria</i> or <i>Transversaria</i> of the genus <i>Eucalyptus</i> . Has low abundance of <i>E. robusta</i> , <i>Casuarina</i> and <i>Melaleuca</i> species and a groundcover of soft-leaved forbs and grasses.	No suitable habitat present.

**TABLE 2.2
ENDANGERED ECOLOGICAL COMMUNITIES OF THE AREA**

Name	BC Act	EPBC Act	Habitat Requirements	Comments
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Geology / Soils: Waterlogged or periodically inundated grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline. Topography: Flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Characteristic Species: <i>Casuarina glauca</i> .	No suitable habitat present.
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Geology / Soils: Waterlogged or periodically inundated humic clay loams and sandy loams. Topography: Alluvial flats and drainage lines associated with coastal floodplains. Characteristic Species: <i>Eucalyptus robusta</i> , <i>E. longifolia</i> , <i>E. botryoides</i> , <i>Melaleuca quinquenervia</i> and <i>M. ericifolia</i> .	No suitable habitat present.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E	-	Geology / Soils: Generally on the Warriewood and Tuggerah Soil Landscapes. Topography: Freshwater swamps in swales and depressions on sand dunes and low nutrient sand plain sites in coastal areas. Characteristic Species: <i>Eleocharis sphacelata</i> , <i>Baumea juncea</i> , <i>B. rubiginosa</i> , <i>B. articulata</i> , <i>Gahnia sieberiana</i> , <i>Ludwigia peploides</i> and <i>Persicaria</i> sp.	No suitable habitat present.
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E	-	Geology / Soils: Found on a range of substrates including old sand dunes above cliffs and on basalt headlands, and less frequently on sandstone. Topography: Sea cliffs and coastal headlands. Characteristic Species: <i>Themeda australis</i> .	No suitable habitat present.
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	E	-	Geology / Soils: Holocene sediments of coastal sand. Iron podzols on the Woy Woy Soil Landscape. Topography: Sand plains on the Woy Woy Peninsula at Umina and Pearl Beach. Characteristic Species: <i>Eucalyptus botryoides</i> and <i>Angophora floribunda</i> with a diverse understorey of sclerophyllous shrubs.	No suitable habitat present.
Key to BC Act and EP&BC Act Status				
CEEC = Critically Endangered Ecological Community EEC = Endangered Ecological Community VEC = Vulnerable Ecological Community E = Endangered				

No endangered ecological communities were observed within the subject site during surveys.

2.3 VEGETATION SURVEY METHODOLOGY

To determine the likely and actual occurrence of flora species and plant communities on the subject site field survey work was undertaken to supplement literature reviews and previous flora surveys of the area. The methods utilised for the flora survey are outlined below.

Literature Review

- A review of available literature for the area was undertaken to obtain reference material and background information for this study. These documents are listed in the References section of this Report.
- A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2018a) was undertaken to identify records of threatened flora species located within 10 km of the site. This enabled the preparation of a predictive list of threatened flora species that could possibly occur within the habitats found on the site.

Aerial Photograph Interpretation

- Aerial photographs were utilised to identify the extent of vegetation with respect to the site and surrounding areas.

Field Survey

- Flora surveys were undertaken on 23 October 2018, generally in accordance with the requirements and methodologies of Murray *et al.*, (2002) for altered and disturbed habitats.
- Traverses were undertaken across the study area over a period of five hours to document the occurrence of flora species and plant community types present. A targeted search was completed for threatened flora species.
- The site does not provide suitable habitat for seasonal threatened flora species and additional seasonal searches are considered not necessary.
- Exotic species were included in the flora species list where known, however the surveys concentrated on the areas of native vegetation present.
- Native species of plants not readily identified in the field were collected for identification.
- Specimens of plants tentatively identified as threatened species are sent to the Sydney Royal Botanic Gardens for confirmation of the identification.
- All vascular plants were identified using keys, nomenclature and information in The Royal Botanic Gardens and Domain Trust (2017), Harden *et al.*, (2014) and Richardson *et al.*, (2016). Wherever they were known, changes to nomenclature and classification have been incorporated into the results.

Vegetation Community Nomenclature

- Native vegetation communities were classified and described according to condition and the dominant floristics and the structural formation of the dominant vegetative growth.
- Corresponding units of available vegetation mapping have been identified where available.
- Corresponding Endangered Ecological Communities listed on both the *BC Act* (2016) and *EP&BC Act* (1999) are also provided if relevant.

Searches for Cryptic Flora Species

As many threatened flora species are best observed during their flowering period, this survey was unable to detect species which flower at various other times of the year. The flowering times of cryptic threatened flora and the dates of seasonally targeted searches undertaken are provided in Table 2.3.

TABLE 2.3 CRYPTIC FLORA FLOWERING TIMES		
Species	Flowering Period	Date Surveyed
<i>Diuris praecox</i>	July - September	No suitable habitat present
<i>Tetratheca juncea</i>	August - January (Peaks September – October)	No suitable habitat present
<i>Tetratheca glandulosa</i>	July - November	No suitable habitat present

Note: Flowering periods may differ (earlier or later) due to annual differences in seasonal intensity

No suitable habitat is present for threatened seasonally detectable threatened flora species, therefore further seasonal searches are not necessary.

2.4 FLORA SPECIES AND VEGETATION COMMUNITIES DESCRIPTIONS

The following vegetation communities were observed within the subject site during surveys:

- Disturbed Coastal Narrabeen Moist Forest (Managed Understorey); and
- Cleared Land / Exotic Vegetation.

Vegetation community descriptions are provided below and a detailed species list is provided in Table 2.4. The locations of vegetation communities are shown in Figure 2.1.

No threatened flora species were observed within the subject site during surveys.

DISTURBED COASTAL NARRABEEN MOIST FOREST (MANAGED UNDERSTOREY)



Photo 1. Disturbed Coastal Narrabeen Moist Forest (Managed Understorey).

Structure:

Upper Stratum: To 35 metres high, with 5-50% Projected Foliage Cover (PFC).

Mid Stratum (upper layer): To 6 metres high, with <5% PFC.

Mid Stratum (Lower layer): To 1.5 metres high, with <5% PFC.

Lower Stratum: To 0.5-0.1 metres high, with 70-90% PFC.

Floristics:**(Characteristic Species)**

Upper Stratum: *Eucalyptus pilularis*, *Eucalyptus saligna*, *Syncarpia glomulifera*.

Mid Stratum (upper layer): *Allocasuarina torulosa*, *Acacia maidenii* and *Cinnamomum camphora*.

Mid Stratum (lower layer): *Pittosporum undulatum*, *Pittosporum revolutum*, *Ligustrum sinense*, *Nandina domestica*, *Denhamia silvestris*, *Ochna serrulata**, and *Notelaea longifolia*.

Lower Stratum: *Dichondra repens*, *Pratia purpurascens*, *Cynodon dactylon*, *Pennisetum clandestinum*, *Sida rhombifolia*, *Cerastium glomeratum*, *Hypochaeris radicata*, *Anagallis arvensis*, *Ehrharta erecta*, *Imperata cylindrica*, *Microlaena stipoides*, *Oplismenus aemulus*, *Poa annua*, *Stenotaphrum secundatum*, *Richardia brasiliensis*, *Asparagus aethiopicus* and *Lonicera japonica*.

Exotics: *Cinnamomum camphora*, *Ligustrum sinense*, *Nandina domestica*, *Ochna serrulata*, *Pennisetum clandestinum*, *Ligustrum*, *Sida rhombifolia*, *Cerastium glomeratum*, *Hypochaeris radicata*, *Anagallis arvensis*, *Ehrharta erecta sinense*, *Poa annua*, *Stenotaphrum secundatum*, *Richardia brasiliensis*, *Asparagus aethiopicus* and *Lonicera japonica*.

Variation:

Native shrub and ground cover plants are generally limited in occurrence to the edges of fence lines and around the larger remnant trees present. Other areas are heavily managed and grazed and contain mostly exotic grasses.

Disturbance:

This vegetation type has been disturbed by historical clearing and weed invasion associated with the long term use of the land for past agricultural purposes and current occupation.

Weed Invasion:

High levels of weed species are present particularly in the ground layer vegetation.

Location and Distribution:

This community occurs within the parts of the site which contain remnant and replanted endemic eucalypt tree species. This vegetation community occupies approximately 2.9 hectares.

Classification:

This vegetation community also corresponds to Map Unit E6ai Coastal Narrabeen Moist Forest as mapped and described by Bell (2009).

The vegetation present does not correspond to any threatened ecological communities listed under the *BC Act* (2016) or the *EPBC Act* (1999).

CLEARED LAND / EXOTIC VEGETATION



Photo 2. Cleared Land / Exotic Vegetation.

DESCRIPTION

Areas of Cleared Land / Exotic Vegetation occur throughout the site in locations where understorey vegetation is predominantly composed of managed areas of exotic grass species and planted exotic trees and non-endemic natives such as the Lemon-scented Gum. This vegetation type is too disturbed to warrant a detailed structure and composition description and does not correspond to any threatened ecological communities listed within the *BC Act* (2016) or the *EPBC Act* (1999). Approximately 5.2 hectares of Cleared Land / Exotic vegetation are present within the site.

TABLE 2.4 FLORA SPECIES OBSERVED ON THE SUBJECT SITE		
Family Name	Scientific Name	Common Name
Trees		
Araucariaceae	<i>Araucaria heterophylla</i> *	Norfolk Island Pine
Casuarinaceae	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> *	River Oak
Fagaceae	<i>Quercus robur</i> *	English Oak
Hamamelidaceae	<i>Liquidambar styraciflua</i> *	Sweetgum
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor Laurel
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
	<i>Corymbia citriodora</i> *	Lemon-scented Gum
	<i>Eucalyptus globulus</i> *	Tasmanian Blue Gum
	<i>Eucalyptus paniculata</i> subsp. <i>paniculata</i>	Grey Ironbark
	<i>Eucalyptus pilularis</i>	Blackbutt
	<i>Eucalyptus saligna</i>	Sydney Blue Gum
	<i>Lophostemon confertus</i> *	Brush Box

**TABLE 2.4
FLORA SPECIES OBSERVED ON THE SUBJECT SITE**

Family Name	Scientific Name	Common Name
	<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>	Turpentine
Salicaceae	<i>Salix</i> sp.*	Willow
Small Trees & Tall Shrubs		
Arecaceae	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak
Celastraceae	<i>Elaeodendron australe</i>	
Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
Fabaceae (Mimosoideae)	<i>Acacia falcata</i>	
	<i>Acacia schinoides</i>	Green Cedar Wattle
Lauraceae	<i>Cryptocarya microneura</i>	Murrogun
Meliaceae	<i>Melia azedarach</i>	White Cedar
Myrtaceae	<i>Acmena smithii</i>	Lilly Pilly
	<i>Callistemon salignus</i>	Willow Bottlebrush
Phyllanthaceae	<i>Glochidion ferdinandi</i>	
Pittosporaceae	<i>Hymenosporum flavum</i> *	Native Frangipani
Poaceae	<i>Bambusa</i> spp.*	Unidentified bamboo
Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung
Rhamnaceae	<i>Alphitonia excelsa</i>	Red Ash
Solanaceae	<i>Solanum mauritianum</i> *	Wild Tobacco Bush
Sterculiaceae	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree
Small Shrubs		
Arecaceae	<i>Livistona australis</i>	Cabbage Palm
Asteraceae	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> *	Bitou Bush
Celastraceae	<i>Denhamia silvestris</i>	Narrow-leaved Orangebark
Fabaceae (Caesalpinioideae)	<i>Senna pendula</i> var. <i>glabrata</i> *	
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle
	<i>Acacia maidenii</i>	Maiden's Wattle
Myrsinaceae	<i>Myrsine variabilis</i>	
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine
Nandinaceae	<i>Nandina domestica</i> *	Japanese Sacred Bamboo
Ochnaceae	<i>Ochna serrulata</i> *	Mickey Mouse Plant
Meliaceae	<i>Synoum glandulosum</i> subsp. <i>glandulosum</i>	Scentless Rosewood
Oleaceae	<i>Ligustrum sinense</i> *	Small-leaved Privet
	<i>Notelaea longifolia</i>	Large Mock-olive
Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush
Pittosporaceae	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Sapindaceae	<i>Guioa semiglauc</i>	Guioa

**TABLE 2.4
FLORA SPECIES OBSERVED ON THE SUBJECT SITE**

Family Name	Scientific Name	Common Name
Strelitziaceae	<i>Strelitzia reginae</i> *	Bird of Paradise
Verbenaceae	<i>Lantana camara</i> *	Lantana
Ground Covers		
Apiaceae	<i>Hydrocotyle sibthorpioides</i>	A Pennywort
Araceae	<i>Gymnostachys anceps</i>	Settler's Twine
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs
	<i>Cirsium vulgare</i> *	Spear Thistle
	<i>Hypochaeris radicata</i> *	Catsear
	<i>Senecio madagascariensis</i> *	Fireweed
	<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>	
	<i>Taraxacum officinale</i> *	Dandelion
Blechnaceae	<i>Blechnum neohollandicum</i>	
Caryophyllaceae	<i>Cerastium glomeratum</i> *	Mouse-ear Chickweed
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew
	<i>Tradescantia fluminensis</i> *	Trad
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Davalliaceae	<i>Nephrolepis cordifolia</i>	Fishbone Fern
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Fabaceae (Faboideae)	<i>Trifolium repens</i> *	White Clover
	<i>Vicia sativa</i> *	Common vetch
Geraniaceae	<i>Geranium solanderi</i>	Native Geranium
Lobeliaceae	<i>Pratia purpurascens</i>	whiteroot
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling Lily
Malvaceae	<i>Sida rhombifolia</i> *	
Myrsinaceae	<i>Anagallis arvensis</i> *	Scarlet Pimpernel
Orchidaceae	<i>Dipodium punctatum</i>	
Oxalidaceae	<i>Oxalis perennans</i>	Common Yellow Woodsorrel
Phormiaceae	<i>Dianella caerulea</i> var. <i>producta</i>	Blue Flax-lily
Plantaginaceae	<i>Plantago lanceolata</i> *	Lamb's Tongues
Poaceae	<i>Andropogon virginicus</i> *	Whisky Grass
	<i>Axonopus fissifolius</i> *	Narrow-leafed Carpet Grass
	<i>Briza maxima</i> *	Quaking Grass
	<i>Briza minor</i> *	Shivery Grass
	<i>Bromus catharticus</i> *	
	<i>Cynodon dactylon</i>	
	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
	<i>Ehrharta erecta</i> *	Panic Veldt-grass
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Lolium perenne</i> *	Perennial Ryegrass
	<i>Microlaena stipoides</i>	Weeping Grass

**TABLE 2.4
FLORA SPECIES OBSERVED ON THE SUBJECT SITE**

Family Name	Scientific Name	Common Name
	<i>Oplismenus aemulus</i>	
	<i>Pennisetum clandestinum</i> *	Kikuyu Grass
	<i>Poa annua</i> *	Winter Grass
	<i>Stenotaphrum secundatum</i> *	Buffalo Grass
Rubiaceae	<i>Richardia brasiliensis</i> *	Mexican Clover
Verbenaceae	<i>Verbena bonariensis</i> *	Purpletop
Violaceae	<i>Viola hederacea</i>	
Zingiberaceae	<i>Hedychium gardnerianum</i> *	Ginger Lily
Climbers		
Acanthaceae	<i>Thunbergia alata</i> *	Black-eyed Susan
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod
Araliaceae	<i>Hedera helix</i> *	English Ivy
Asparagaceae	<i>Asparagus aethiopicus</i> *	Asparagus Fern
	<i>Asparagus asparagoides</i> *	Bridal Creeper
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Wonga Vine
Caprifoliaceae	<i>Lonicera japonica</i> *	Japanese Honeysuckle
Dilleniaceae	<i>Hibbertia dentata</i>	Twining Guinea Flower
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil
	<i>Glycine microphylla</i>	Small-leaf Glycine
	<i>Kennedia rubicunda</i>	Dusky Coral Pea
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Menispermaceae	<i>Stephania japonica</i>	Snake vine
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry
Ranunculaceae	<i>Clematis aristata</i>	
Rosaceae	<i>Rubus anglocandicans</i> *	Blackberry
	<i>Rubus moluccanus</i>	Molucca Bramble
	<i>Rubus parvifolius</i>	Native Raspberry
Smilacaceae	<i>Smilax australis</i>	
Vitaceae	<i>Cayratia clematidea</i>	Slender Grape
	<i>Cissus antarctica</i>	
Epiphytes		
Orchidaceae	<i>Cymbidium suave</i>	Snake Orchid
Key Species name ^{TS} = Threatened Species * = Introduced Species		

2.5 LOCATION AND DISTRIBUTION OF ADJOINING AND CONTIGUOUS HABITATS

An inspection of the available aerial imagery for the local area, review of available vegetation mapping (Bell 2009) and field surveys were undertaken to determine the extent and condition of vegetation within the subject site and surrounding vicinity. The following assessment of connectivity is provided:

North

Disturbed vegetation and cleared / managed land with residential dwellings. Tenuous connectivity to larger areas of native vegetation exists beyond the Central Coast Highway to the south.

East

The site adjoins a small patch of disturbed vegetation to the east across Matcham Road. This vegetation adjoins cleared land and residential dwellings further to the east.

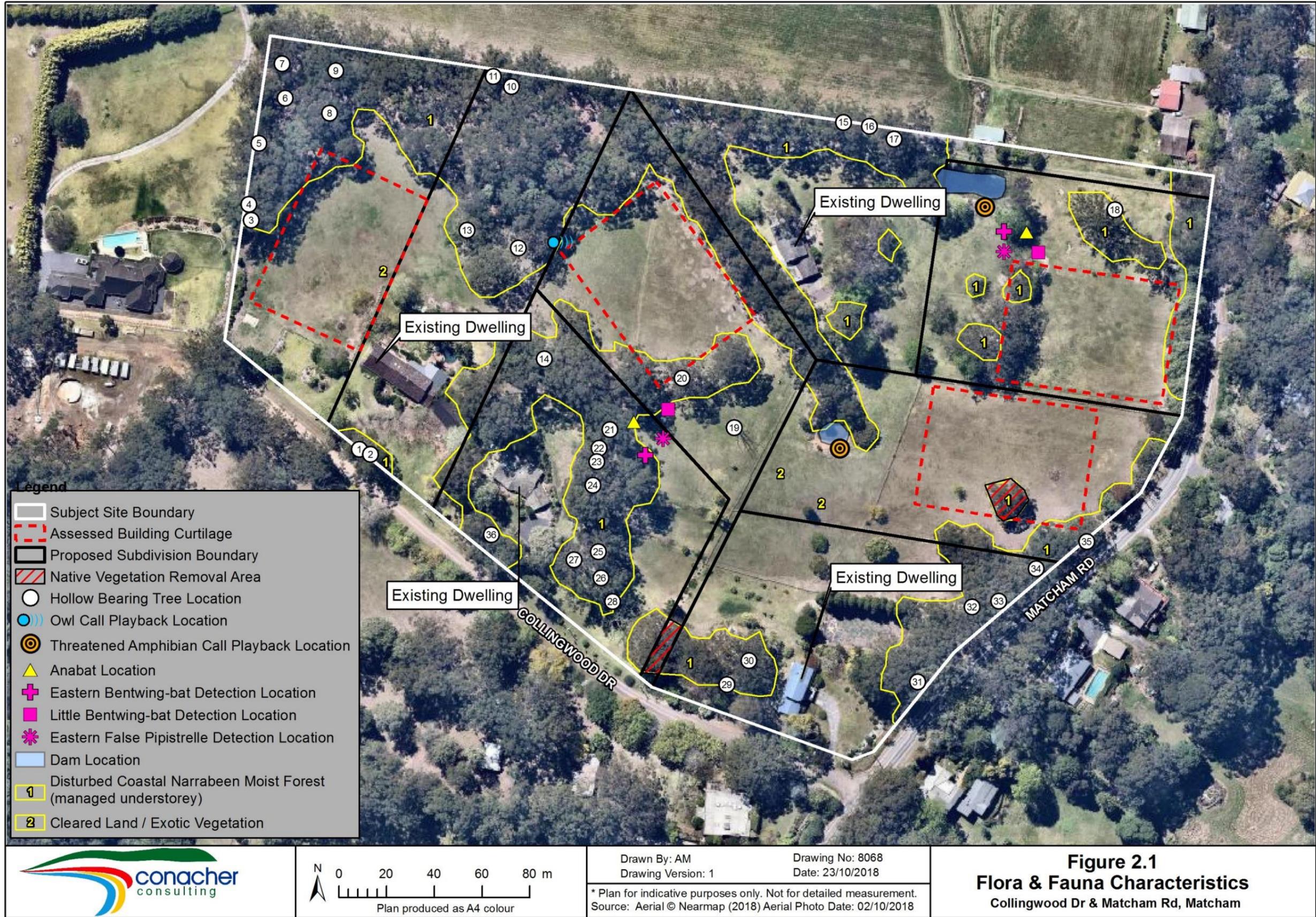
South

The southern section of the study area contains cleared land with forest patches under rural residential land management practices.

West

The site adjoins remnant vegetation and cleared land to the west.

Overall the site contains a small area of remnant native vegetation which is part of several remnant local patches set amongst areas of residential and rural residential development. The site does not form part of a strategic linkage between any large areas of bushland reserved for conservation purposes.



SECTION 3

FAUNA AND FAUNA HABITATS

3.1 THREATENED FAUNA SPECIES

A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2018a) was conducted for threatened fauna species recorded within 10km of the subject site. This revealed a number of threatened species that have been recorded in the area. Details on threatened fauna species as listed in Schedule 1 of the *BC Act* (2016) with a known or possible occurrence within the local area are provided in Table 3.1. Species which exclusively inhabit marine, estuarine and beach environments have been omitted due to a lack of suitable habitat within the study area.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V	V	Small, slow flowing water courses, soaks and swamps on sandstone plateaus and broad upland gullies (NSW NPWS 2001).	No suitable habitat present.
Green and Golden Bell Frog <i>Litoria aurea</i>	E	V	Breeding habitat consists of shallow (<1m) ponds or slowly moving waterways which undergo disturbance regimes such as fluctuating water flow or inflow of saline water with both areas of open water and dense low vegetation (NSW NPWS 1999).	Suitable habitat present.
Red-crowned Toadlet <i>Pseudophryne australis</i>	V	-	Grass, debris and rock outcrops near ephemeral watercourses on sandstone (NSW OEH 2018b).	No suitable habitat present.
Wallum Froglet <i>Crinia tinnula</i>	V	-	Acidic paperbark swamps and wallum habitats with dense groundcover. Breeds in temporary and permanent pools and ponds of high acidity (Cogger 2000).	No suitable habitat present.
Green-thighed Frog <i>Litoria brevipalmata</i>	V		Rainforests, open forests and disturbed areas with streams, swamps, lagoons, dams or ponds (NSW OEH 2018b).	No suitable habitat present.
Stuttering Frog <i>Mixophyes balbus</i>	E	V	Freshwater streams in undisturbed rainforest and wet sclerophyll forest (NSW OEH 2018b).	No suitable habitat present.
Giant Barred Frog <i>Mixophyes iteratus</i>	E	E	Deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest near permanent flowing water (Anstis 2002).	No suitable habitat present.
Rosenberg's Goanna <i>Varanus rosenbergi</i>	V	-	Woodlands, dry open forests and heathland habitats on Hawkesbury sandstone. Shelters in burrows, hollow logs, rock crevices and outcrops (Cogger 2000).	No suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Pale-headed Snake <i>Hoplocephalus bitorquatus</i>	V	-	Dry eucalypt forests and woodlands and occasionally in rainforest or moist eucalypt forest, particularly in riparian areas. Shelters under bark and in tree hollows (NSW OEH 2018b).	Suitable habitat present.
Stephens' Banded Snake <i>Hoplocephalus stephensii</i>	V	-	Open and closed forest communities, shelters under bark, in hollows and rock outcrops (Cogger 2000).	Suitable habitat present.
Wompoo Fruit-Dove <i>Ptilinopus magnificus</i>	V	-	Large undisturbed patches of rainforest, adjacent moist eucalypt forests and isolated remnant trees feeding on fruit (Higgins and Davies 1996).	Suitable habitat present.
Superb Fruit-Dove <i>Ptilinopus superbus</i>	V	-	Rainforests, adjacent mangroves, wet sclerophyll eucalypt forests, scrublands with native fruits (Higgins and Davies 1996).	Suitable habitat present.
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Open forests, savannah woodlands, dune scrub, savannah and mangrove fringes (Marchant and Higgins 1993).	No suitable habitat present.
Comb-crested Jacana <i>Irediparra gallinacea</i>	V	-	Deep and permanent vegetation-choked tropical and warm temperate wetlands (Marchant and Higgins 1993).	No suitable habitat present.
Eastern Osprey <i>Pandion cristatus</i>	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding.	No suitable habitat present.
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>	E		Shallow freshwater terrestrial wetlands, floodplains, watercourses, dams and paddocks. (Marchant and Higgins 1990).	No suitable habitat present.
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	Shallow freshwater or brackish wetlands with tall dense vegetation.	No suitable habitat present.
Black Bittern <i>Ixobrychus flavicollis</i>	V	-	Permanent freshwater wetlands with tall, dense vegetation (Lindsey 1992).	No suitable habitat present.
Black-breasted Buzzard <i>Hamirostra melanosternon</i>	V		Riverine and tropical eucalypt woodlands, shrub steppes, arid scrubs, grassy plains and sandy deserts.	No suitable habitat present.
Square-tailed Kite <i>Lophoictinia isura</i>	V		Coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and Mallee that are rich in passerine birds.	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Little Eagle <i>Hieraaetus morphnoides</i>	V		Various habitats including woodland, open forest, partially cleared areas, along watercourses and around wetlands (Marchant and Higgins 1993).	Suitable habitat present.
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	V	-	Coastal areas and inland rivers and wetlands. Nests in large emergent eucalypts (Marchant and Higgins 1993).	Suitable habitat present.
Sooty Owl <i>Tyto tenebricosa</i>	V	-	Tall, dense, wet forests containing trees with large hollows for roosting and breeding (Higgins 1999).	Suitable habitat present.
Powerful Owl <i>Ninox strenua</i>	V		Mature forests containing large hollows for breeding & densely vegetated gullies for roosting (Higgins 1999).	Suitable habitat present.
Masked Owl <i>Tyto novaehollandiae</i>	V		Open forest & woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting (Higgins 1999).	Suitable habitat present.
Barking Owl <i>Ninox connivens</i>	V		Woodlands, open forests and partially cleared land where prey is available. Nest in tree hollows (Higgins 1999).	Suitable habitat present.
Black Falcon <i>Falco subniger</i>	V	-	Inhabits the inland regions of NSW. Most reports of Black Falcons on the tablelands and coast of NSW are likely to be referable to the Brown Falcon (NSW Scientific Committee 2013)	No suitable habitat present.
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	V		Open forests with <i>Allocasuarina</i> species and hollows for nesting (Higgins 1999).	Suitable habitat present.
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V		Open forests, woodlands, and urban areas (Higgins 1999).	Suitable habitat present.
Swift Parrot <i>Lathamus discolor</i>	E	CE	NSW eucalypt forests and woodlands with winter flowering eucalypts between March and October (Saunders and Tzaros 2011).	Suitable habitat present.
Turquoise Parrot <i>Neophema pulchella</i>	V		Coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands (Higgins 1999).	No suitable habitat present.
Little Lorikeet <i>Glossopsitta pusilla</i>	V		Forests and woodlands feeding mostly on nectar and pollen particularly in profusely-flowering eucalypts (Courtney and Debus 2006).	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Estuarine and damp open grassland habitats on the coast and open grassy plains, salt lakes and saltpans near rivers and waterways in inland areas (Higgins et al., 2001).	No suitable habitat present.
Regent Honeyeater <i>Anthochaera phrygia</i>	CE	CE	Box-Ironbark dry open forest and woodland and riparian River Sheoak forests. Also Coastal Swamp Forest and Spotted Gum Forest during winter. May occasionally forage within planted or remnant eucalypts (Higgins et al., 2001).	Suitable habitat present.
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V		Found in dry open forests, woodland scrubland, and farmland with isolated trees. Occurs mostly west of the Great Divide except Hunter Valley (Higgins and Peter 2002).	No suitable habitat present.
Speckled Warbler <i>Chthonicola sagittata</i>	V		Temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts (Higgins and Peter 2002).	No suitable habitat present.
Varied Sittella <i>Daphoenositta chrysoptera</i>	V		Open eucalypt woodlands forests and scrubs. May also forage within planted rough-barked trees (Higgins and Peter 2002).	Suitable habitat present.
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Inhabits a variety of habitats including forest, woodland, shrubland, heath and disturbed environments. Widespread species which inhabits inland and coastal areas (NSW OEH 2018b).	Suitable habitat present.
Diamond Firetail <i>Stagonopleura guttata</i>	V	-	Eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands (Higgins et al., 2006).	No suitable habitat present.
Scarlet Robin <i>Petroica boodang</i>	V		Dry eucalypt forest and woodlands during breeding season, dispersing during autumn–winter into open habitats including urban areas (Higgins and Peter 2002).	Suitable habitat present.
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Shelters in hollow-bearing trees, fallen logs, small caves and rock crevices (NSW NPWS 1999).	No suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Eastern Quoll <i>Dasyurus viverrinus</i>	E	-	Dry and moist sclerophyll forests containing hollow logs, rock caves, abandoned burrows or trees with open grazing land interspersed. Likely to be extinct on the mainland.	No suitable habitat present.
Southern Brown Bandicoot (eastern) <i>Isoodon obesulus obesulus</i>	E	E	Open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland with thick ground cover for shelter south of the Hawkesbury River (NSW OEH 2018b).	No suitable habitat present.
Koala <i>Phascolarctos cinereus</i>	V	V	Wet & dry eucalypt forest on high nutrient soils containing preferred feed trees (Reed <i>at al.</i> , 1991).	No suitable habitat present.
Eastern Pygmy-possum <i>Cercartetus nanus</i>	V	-	Occurs in sandstone heath and adjoining rainforest habitats. (Turner and Ward 1995).	No suitable habitat present.
Greater Glider <i>Petauroides volans</i>	-	V	Inhabits eucalypt forests and shelters in large hollow sections of eucalypt trees.	Suitable habitat present.
Yellow-bellied Glider <i>Petaurus australis</i>	V		Tall productive mature eucalypt forests with high nectar producing species. Shelters in large hollow bearing trees (Goldingay and Kavanagh 1991).	Suitable habitat present.
Squirrel Glider <i>Petaurus norfolcensis</i>	V		Box-Ironbark and River Red Gum forest west of the Great Dividing Range and coastal forest with heath understorey. Shelters in tree hollows (Suckling 1995).	No suitable habitat present.
Long-nosed Potoroo <i>Potorous tridactylus</i>	V	V	Coastal heath and dry and wet sclerophyll forests with a dense understorey (Seebeck <i>et al.</i> , 1989).	No suitable habitat present.
Parma Wallaby <i>Macropus parma</i>	V	-	Rainforests and wet and dry sclerophyll forests with a dense understorey and associated grassy patches (Menkhorst 2001).	No suitable habitat present.
New Holland Mouse <i>Pseudomys novaehollandiae</i>	-	V	Within NSW occurs in a variety of structural vegetation types including heathland and woodland, dry sclerophyll forest with a dense shrub layer and on vegetated sand dunes (Wilson and Laidlaw 2003).	No suitable habitat present.
Eastern Chestnut Mouse <i>Pseudomys gracilicaudatus</i>	V	-	Recently burnt (1.5-4yrs) dense, wet heath and swamps (NSW OEH 2018b).	No suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V	Rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Roosts in trees in gullies, riparian habitats and urban areas (Tidemann 1995).	Suitable foraging habitat present. Observed during surveys.
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>	V	-	Wet and dry sclerophyll forest, open woodland, shrubland, mallee, grassland and desert. Roosts in tree hollows (Churchill 2008).	Suitable habitat present.
Eastern Freetail-bat <i>Mormopterus norfolkensis</i>	V		Eucalypt forest and woodland on the coastal side of the Great Dividing Range. Roosts in tree hollows, under bark and in various man-made structures (Churchill 2008).	Suitable habitat present.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies (Churchill 2008).	Suitable habitat present.
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V		Wet sclerophyll forest, open forest, rainforest and coastal mallee. Roosts in hollow trunks of eucalypts, caves and man-made structures (Churchill 2008).	Suitable habitat present. Detected during surveys.
Golden-tipped Bat <i>Kerivoula papuensis</i>	V	-	Rainforest and adjoining moist open forest habitats. Roosts in tree hollows, dense vegetation and Scrub Wren and Gerygone nests (Churchill 2008).	Suitable habitat present.
Little Bentwing-bat <i>Miniopterus australis</i>	V		Coastal forests, vine thickets and adjoining cleared areas. Roosts in caves, tree hollows and man-made structures (Churchill 2008).	Suitable habitat present. Detected during surveys.
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V		Coastal forests, vine thickets and adjoining cleared areas. Roosts in caves and man-made structures (Churchill 2008).	Suitable habitat present. Detected during surveys.
Southern Myotis <i>Myotis macropus</i>	V		Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water (Churchill 2008).	Suitable habitat present.

TABLE 3.1 THREATENED FAUNA SPECIES OF THE AREA				
Common Name Scientific Name	BC Act	EP&BC Act	Preferred Habitat	Comments
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	V		Moist gullies in mature coastal forest, rainforest, open woodland, sclerophyll forest and cleared areas with remnant trees. Roosts in tree hollows, under bark and in man-made structures (Churchill 2008).	Suitable habitat present.
CE = Critically Endangered Species Ext. = Presumed Extinct Species V = Vulnerable Species E = Endangered Species				

Threatened fauna species observed during surveys are detailed in Section 3.5.

Threatened fauna species observation locations are shown in Figure 2.1. The threatened fauna species which are considered to have suitable habitat within the subject have been assessed under the 7 part test of significance as detailed in Section 4 and Appendix 1 of this report.

3.2 ENDANGERED FAUNA POPULATIONS

No endangered fauna populations listed within the *BC Act* (2016) were observed during surveys.

3.3 FAUNA HABITATS

The fauna habitats present consist of Disturbed Coastal Narrabeen Moist Forest and Cleared Land with Remnant Trees. An unnamed highly disturbed watercourse intersects the site.

Hollow bearing trees (35) were observed within the subject site. Details of these trees are provided in Figure 2.1 and Appendix 3.

Amphibians

Amphibian breeding habitat is present within the two farm dams present on the site. Amphibians are also likely to utilise areas of cleared grassland and forest vegetation directly adjoining these dams. Suitable breeding habitats for amphibians are not present within the proposed home-site areas.

Reptiles

Suitable foraging habitat is present for locally common reptile species. No areas of substantial rock outcropping were observed.

Birds

The flower, nectar, fruit and seed producing tree and shrub species provide a seasonal foraging resource for bird species. The site provides good habitat for edge-specialist type bird species due to the disturbed conditions and narrow width of the naturally vegetated areas present. No tree hollows suitable for large forest owl breeding or roost sites were observed within the subject site.

Mammals

The flower, nectar, fruit and seed producing tree and shrub species provide a seasonal foraging resource for arboreal mammals and bat species. Understorey habitats for mammals consist of cleared land as well as native and exotic vegetation within the forested southern section of the site. Hollow bearing trees were observed within the subject site as identified in Figure 2.1 and Appendix 3.

3.4 FAUNA SURVEY METHODOLOGY

In order to detect the possible occurrence of threatened fauna species specific methods targeting these species were employed.

Literature Review

- Review of local resource documents;
- A search of the Bionet Atlas of NSW Wildlife (NSW OEH 2018a) was undertaken to identify records of threatened fauna species located within 10 km of the site. This enabled the preparation of a predictive list of threatened fauna species that could possibly occur within the habitats found on the site.

Fauna Surveys

A detailed fauna survey of the subject site was undertaken generally incorporating the methodologies outlined in Murray *et al.*, (2012). The methods that were utilised consisted of:

- Targeted nocturnal and diurnal reptile and amphibian searches;
- Diurnal and nocturnal bird surveys;
- Diurnal and nocturnal mammal surveys;
- Recorded call playback for threatened nocturnal amphibian, bird and mammal species;
- Spotlighting;
- Microchiropteran bat echolocation call detection;
- Koala habitat assessment;
- Habitat searches and opportunistic observations during the completion of method specific fauna surveys; and
- Hollow bearing tree survey.

Fauna trapping surveys were not undertaken as the proposed development areas are predominantly cleared and the areas of Disturbed Coastal Moist Forest habitats are proposed for retention.

Fauna survey details are shown in Table 3.2 and fauna survey locations are shown in Figure 2.1.

TABLE 3.2 FAUNA SURVEY DETAILS				
Survey Type	Date	Weather Conditions	Survey Method	Survey Effort/Time
Diurnal Surveys	3 October 2018 16 October 2018 22 October 2018 23 October 2018	Generally fine days – occasional overnight rainfall	Amphibian habitat search Reptile habitat search Mammal census Bird census Hollow bearing tree survey Koala Habitat Assessment Opportunistic observation	3 hours (1 hr per survey) (0900-1400)
	23 October 2018	0/8 cloud, calm conditions, 25°C	Reptile habitat search Mammal census Bird census Hollow bearing tree survey	5.25 hrs (0900-1415)
Nocturnal Surveys	22 October 2018	0/8 cloud, calm conditions, 16°C	Spotlight search and quiet listening for nocturnal bird, mammal and amphibian calls	1 hr x 2 persons (1900-2030)
			Threatened nocturnal fauna playback survey / nocturnal bird census	0.5hrs (2000 - 2030)
	23 October 2018	0/8 cloud, light breeze, 15°C	Spotlight search and quiet listening for nocturnal bird, mammal and amphibian calls	1 hr 20min x 1 person (1930-2050)

TABLE 3.2 FAUNA SURVEY DETAILS				
Survey Type	Date	Weather Conditions	Survey Method	Survey Effort/Time
			Threatened nocturnal fauna playback survey / nocturnal bird census	1 hr (1900-2000)
Remote Surveys	16 -22 October 2018	Variable weather conditions	Microchiropteran bat ultrasonic call recording	2 units x 6 nights

3.5 FAUNA OBSERVED

The fauna species observed within the subject site are listed in Table 3.3. The following threatened fauna species were observed during surveys:

- Grey-headed Flying-fox
- Eastern False Pipistrelle
- Little Bentwing-bat
- Eastern Bentwing-bat

A Grey-headed Flying-fox was observed flying over the site on 4 May 2017 during nocturnal surveys.

The Eastern Bentwing-bat, Little Bentwing-bat and Eastern False Pipistrelle were detected during Anabat surveys between 16 October 2018 and 22 October 2018.

Threatened species observation locations are shown in Figure 2.1. All other fauna species observed are considered relatively common within the local area.

TABLE 3.3 FAUNA OBSERVED AND RECORDED WITHIN THE SUBJECT SITE		
Common Name	Scientific Name	Observation Type
AMPHIBIANS		
Broad-palmed Frog	<i>Litoria latopalmata</i>	OW
Peron's Tree Frog	<i>Litoria peronii</i>	OW
Tyler's Tree Frog	<i>Litoria tyleri</i>	OW
Smooth Toadlet	<i>Uperoleia laevigata</i>	W
Tusked Frog	<i>Adelotus brevis</i>	W
Bleating Tree Frog	<i>Litoria dentata</i>	OW
Eastern Dwarf Tree Frog	<i>Litoria fallax</i>	OW
REPTILES		
Eastern Water Dragon	<i>Physignathus lesueurii</i>	O
Dark-flecked Garden Sunskink	<i>Lampropholis delicata</i>	O
BIRDS		
Australian Owllet-nightjar	<i>Aegotheles cristatus</i>	W
Australian Wood Duck	<i>Chenonetta jubata</i>	O
Cattle Egret	<i>Ardea ibis</i>	O
Australian Magpie	<i>Cracticus tibicen</i>	OW
Grey Butcherbird	<i>Cracticus torquatus</i>	OW
Pied Currawong	<i>Strepera graculina</i>	OW
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	OW
Little Corella	<i>Cacatua sanguinea</i>	OW
Galah	<i>Eolophus roseicapillus</i>	OW

**TABLE 3.3
FAUNA OBSERVED AND RECORDED WITHIN THE SUBJECT SITE**

Common Name	Scientific Name	Observation Type
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	OW
Cicadabird	<i>Coracina tenuirostris</i>	W
Masked Lapwing	<i>Vanellus miles</i>	OW
Brown Cuckoo-Dove	<i>Macropygia amboinensis</i>	W
Crested Pigeon	<i>Ocyphaps lophotes</i>	OW
Dollarbird	<i>Eurystomus orientalis</i>	OW
Australian Raven	<i>Corvus coronoides</i>	OW
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	W
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	OW
Red-browed Finch	<i>Neochmia temporalis</i>	OW
Eastern Whipbird	<i>Psophodes olivaceus</i>	W
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	OW
Sacred Kingfisher	<i>Todiramphus sanctus</i>	OW
Welcome Swallow	<i>Hirundo neoxena</i>	O
Superb Fairy-wren	<i>Malurus cyaneus</i>	OW
Variiegated Fairy-wren	<i>Malurus lamberti</i>	OW
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	OW
Red Wattlebird	<i>Anthochaera carunculata</i>	OW
Little Wattlebird	<i>Anthochaera chrysoptera</i>	OW
Noisy Miner	<i>Manorina melanocephala</i>	OW
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	OW
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	W
Noisy Friarbird	<i>Philemon corniculatus</i>	OW
Magpie-lark	<i>Grallina cyanoleuca</i>	OW
Olive-backed Oriole	<i>Oriolus sagittatus</i>	W
Spotted Pardalote	<i>Pardalotus punctatus</i>	W
Australian King-Parrot	<i>Alisterus scapularis</i>	OW
Musk Lorikeet	<i>Glossopsitta concinna</i>	OW
Eastern Rosella	<i>Platycercus eximius</i>	OW
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	OW
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	OW
Eurasian Coot	<i>Fulica atra</i>	O
Willie Wagtail	<i>Rhipidura leucophrys</i>	OW
Southern Boobook	<i>Ninox novaeseelandiae</i>	W
Common Myna*	<i>Sturnus tristis</i>	OW
Silvereye	<i>Zosterops lateralis</i>	OW
MAMMALS		
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	O
Dog *	<i>Canis lupus familiaris</i>	OW
Horse *	<i>Equus caballus</i>	O
Grey-headed Flying-fox ^{TS}	<i>Pteropus poliocephalus</i>	O
White-striped Freetail-bat	<i>Tadarida australis</i>	U
Eastern Horseshoe-bat	<i>Rhinolophus megaphyllus</i>	U

TABLE 3.3 FAUNA OBSERVED AND RECORDED WITHIN THE SUBJECT SITE		
Common Name	Scientific Name	Observation Type
Gould's Wattleed Bat	<i>Chalinolobus gouldii</i>	U
Eastern False Pipistrelle ^{TS}	<i>Falsistrellus tasmaniensis</i>	U
Little Bentwing-bat ^{TS}	<i>Miniopterus australis</i>	U
Eastern Bentwing-bat ^{TS}	<i>Miniopterus schreibersii oceanensis</i>	U
Eastern Forest Bat	<i>Vespadelus pumilus</i>	U
Key to Observation Type		
E - Nest / Roost		O - Observed
F - Tracks / Scratchings / Chew Marks		OW - Observed and Heard Call
FB - Burrow		P - Scat
G - Crushed Cones		Q - Camera
H - Hair / Feathers / Skin		T - Trapped
K - Dead		U - Ultrasonic Recording
M - Miscellaneous Record		W - Heard
Note: * indicates introduced species. ^{TS} indicates threatened species <i>BC Act</i> (2016).		

SECTION 4

ASSESSMENTS AND CONCLUSIONS

4.1 ENVIRONMENTAL PROTECTION & BIODIVERSITY CONSERVATION ACT (1999) ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act*, (1999) requires that Commonwealth approval be obtained for certain actions. The Act provides an assessment and approvals systems for actions that have a significant impact on matters of National Environmental Significance (NES). These may include:-

- Wetlands protected by international treaty (the Ramsar Convention);
- Nationally listed threatened species and ecological communities;
- Nationally listed migratory species.

Actions are projects, developments, undertakings, activities, series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on a NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, the matter needs to be referred to the Australian Government Department of the Environment & Energy (AGDEE).

The following assessment in accordance with the EP&BC Act Policy Statement 1.1 *Significant Impact Guidelines* (AGDE 2013) is provided:

i. Are there any Matters of National Environmental Significance located in the area of the proposed action?

A search of the Protected Matters Search Tool (AGDEE 2018) was conducted for EPBC Listed threatened and migratory species recorded within 5 km of the subject site.

Suitable habitat is present for the following nationally listed threatened or migratory species recorded from the Protected Matters Search (AGDEE 2018) which occur or which may occur within 5 km of the subject site:

Threatened Flora Species

- *Melaleuca biconvexa*

Threatened Fauna Species

- Regent Honeyeater (*Anthochaera phrygia*)
- Swift Parrot (*Heleioporus australiacus*)
- Greater Glider (*Petauroides volans*)
- Long-nosed Potoroo (*Potorous tridactylus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)

The nationally listed threatened species, Grey-headed Flying-fox was observed during surveys.

Migratory Species

- Oriental Cuckoo (*Cuculus optatus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Spectacled Monarch (*Monarcha trivirgatus*)
- Satin Flycatcher (*Myiagra cyanoleuca*)

- Rufous Fantail (*Rhipidura rufifrons*)

No nationally listed migratory species were observed within the subject site during surveys.

Threatened Ecological Communities

No nationally listed threatened ecological communities have suitable habitat present within the subject site.

ii. Considering the proposed action at its broadest scope, is there potential for impacts on Matters of National Environmental Significance?

The proposal will require the removal or modification of approximately 0.04 hectares of disturbed habitats for the proposed development.

These areas provide suitable foraging habitat for nationally listed locally occurring threatened and migratory species.

iii. Are there any proposed measures to avoid or reduce impacts on Matters of National Environmental Significance?

The proposed development has have been situated to minimise impacts including removal of vegetation and habitats for nationally listed threatened and migratory biodiversity. Additional impact mitigation and avoidance measures are identified in Section 1.4. of this Report.

iv. Are any impacts of the proposed action on Matters of National Environmental Significance likely to be significant impacts?

No, the proposal is not likely to have a significant impact on a matter of National Environmental Significance.

A detailed assessment in accordance with AGDE (2013) Significant Impact Guidelines has been provided for the Grey-headed Flying-fox, in Appendix 2 of this report.

The assessment completed has determined that the proposal is not likely to have a significant impact on the Grey-headed Flying-fox.

The following additional assessments are provided as follows for nationally listed threatened species and ecological communities and nationally listed migratory species which were not observed during surveys with suitable habitat present within the subject site.

Nationally Listed Threatened Species

With regard to nationally listed threatened species it is considered that the proposal is not likely to:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat;
- introduce disease that may cause a species to decline; or
- interfere with the recovery of the species.

The following reasons are provided:

- These species were not observed within the subject site during surveys;
- There are larger areas of higher quality habitat for locally occurring nationally listed threatened and migratory species present within the locality, including lands reserved for conservation such as Kincumba Mountain Reserve and Wambina Nature Reserve; and

- The area of proposed habitat loss is relatively small in area, and the majority of the intact habitats present will be retained.

Nationally Listed Migratory Species

With regard to nationally listed migratory species it is considered that the proposal is not likely to:

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

The following reasons are provided:

- The subject site does not contain important habitat for a nationally listed migratory species;
- The area of proposed habitat loss is relatively small in area; and
- No nationally listed migratory species have been recorded within the subject site during surveys.

Nationally Listed Threatened Ecological Communities

It is considered that the proposal is not likely to have a significant impact on nationally listed endangered or critically ecological communities as the proposal is not likely to:

- 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.

The following reasons are provided:

- The vegetation within the subject site does not correspond to a nationally listed endangered or critically endangered ecological community.

CONCLUSION

It is considered that the proposed action is not likely to have a significant impact on nationally listed threatened or migratory species or nationally listed threatened ecological communities.

4.2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)

Pursuant to the provisions of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*, Section 5(A) of the *EP&A Act 1979* provides seven factors (referred to as the assessment of significance or 7 part test) which must be taken into account by a consent authority in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats, listed within the *BC Act (2016)*.

The fauna threatened species, Grey-headed Flying-fox, Eastern False Pipistrelle, Little Bentwing-bat and Eastern Bentwing-bat, as listed within the *BC Act (2016)*, were observed within the subject site during surveys.

No endangered populations or endangered ecological communities listed within the *BC Act* (2016), were observed during surveys.

An Assessment of Significance prepared in accordance with Section 5A of the EP&A Act (1979) has been undertaken for threatened species, populations and ecological communities listed within the *BC Act* (2016), observed or with suitable habitat contained within the subject site. The assessment is provided as Appendix 1 to this report and has determined that the proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats.

4.3 STATE ENVIRONMENTAL PLANNING POLICIES

SEPP Coastal Management (2018)

The subject site is not located within a Coastal Wetland Area, Littoral Rainforest Area or associated Proximity Area. The entire subject site is located within a Coastal Environment Area mapped under this SEPP.

SEPP 44 - Koala Habitat Assessment

The subject site was assessed for activity by Koalas using the following methods:

- i. A search of the BioNet Atlas of NSW Wildlife (NSW OEH 2018a) was undertaken to identify records of Koalas in the area;
- ii. The site was surveyed on foot with any species of Koala food trees being inspected for signs of Koala usage. Trees were inspected and identified for presence of Koalas, scratch and claw marks on the trunk and scats around the base of each tree. The proportion of any trees showing signs of Koala use was calculated for the whole of the site. Additionally the location and density of droppings if found were documented;
- iii. Koalas were also targeted during spotlight surveys;
- iv. Identification and assessment of the density of tree species listed as Koala food trees in State Environmental Planning Policy No. 44 - Koala Habitat Protection was undertaken across the site.

TABLE 4.1			
SEPP-44 KOALA FEED TREE SPECIES			
(From SEPP-44 Schedule 2)			
Scientific Name	Common Name	Observed On Site	Percentage within survey plots
<i>Eucalyptus tereticornis</i>	Forest Red Gum	No	0%
<i>Eucalyptus microcorys</i>	Tallowwood	No	0%
<i>Eucalyptus punctata</i>	Grey Gum	No	0%
<i>Eucalyptus viminalis</i>	Ribbon or Manna Gum	No	0%
<i>Eucalyptus camaldulensis</i>	River Red Gum	No	0%
<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum	No	0%
<i>Eucalyptus signata</i>	Scribbly Gum	No	0%
<i>Eucalyptus albens</i>	White Box	No	0%
<i>Eucalyptus populnea</i>	Bimble Box or Poplar Box	No	0%
<i>Eucalyptus robusta</i>	Swamp Mahogany	No	0%

No Koala food tree species as listed on Schedule 2 of State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) were observed within the subject site. The site does not contain vegetation where the listed trees constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. Therefore the site does not contain potential koala habitat as defined by SEPP 44.

No Koalas were observed during the fauna survey and no evidence of Koala habitation, such as scats, claw and scratch marks, were located on the site. Therefore the subject site is considered to not form core koala habitat as defined by SEPP 44.

4.4 CONCLUSIONS

Based on the detailed field surveys and information provided in this report it is concluded that:

- i. No threatened flora species listed within the *BC Act* or the *EPBC Act* were observed within the subject site.
- ii. The threatened fauna species, Grey-headed Flying-fox, Eastern False Pipistrelle, Little Bentwing-bat and Eastern Bentwing-bat, as listed within the *BC Act* (2016) and *BC Act* (2016), were observed within the subject site during surveys.
- iii. No threatened populations listed within the *BC Act* (2016) or the *EP&BC Act* (1999) were observed within the subject site.
- iv. No threatened ecological communities listed within the *BC Act* (2016) or the *EPBC Act* (1999) were observed within the subject site during surveys.
- v. No migratory species listed within the *EPBC Act* (1999), were observed within the subject site.
- vi. A referral to the Australian Government Department of the Environment and Energy is considered unnecessary.
- vii. The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats.
- viii. A Species Impact Statement is not required for the proposed development.

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APPENDIX 1

**ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)
SECTION 5(A) ASSESSMENT**

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT (1979)
SECTION 5(A) ASSESSMENT

As identified in Section 5(A) of the *EP&A Act* 1979 the following matters need to be addressed to determine whether or not a significant effect on threatened species, populations or ecological communities or their habitats is likely to result from the proposed development.

A1.1 ASSESSMENT OF SIGNIFICANCE / 7 – PART TEST

This assessment of significance has been completed following detailed site surveys, local area threatened species database searches and habitat assessments, as identified in the previous sections of this report. The contents of the previous sections of this Report should be utilised in conjunction with any review of the following assessment of significance.

For the purposes of the following assessments the definitions of specific terminology and interpretations of the key terms used are as per the DECC (2007) Threatened species assessment guidelines. These definitions include details of what constitutes the local population for the threatened species observed during surveys and due to the lack of details on the specific numbers of threatened fauna species in the local area the assessment of local populations is based on suitable habitat within the local area, not an actual number of individual of any particular threatened species which may comprise the local population.

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

Threatened Flora Species

Melaleuca biconvexa

This species is a paperbark shrub or small tree which prefers poorly drained habitats near swamps and along drainage lines. This species occurs in disjunct populations from near Jervis Bay to Port Macquarie with the main concentration of records on the Central Coast in the Gosford and Wyong local government areas (NSW Scientific Committee 1998).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Prostanthera askania

This species grows in moist sclerophyll forest and warm temperate rainforest communities, as well as the ecotone between them. Habitats are characterised by undulating to moderately steep slopes of the Watagan and Erina soil landscapes and intersecting areas on alluvial soils of the Yarramalong soil landscape (DEC 2006).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Syzygium paniculatum

This species is usually found growing in or near subtropical and littoral rainforests on sandy soils, stabilised dunes near the sea or sheltered gullies, especially near watercourses (Fairly and Moore 1995).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Threatened Fauna Species

Green and Golden Bell Frog (*Litoria aurea*)

The Green and Golden Bell Frog is largely aquatic and is found among vegetation within or at the edges of permanent water. The males call mainly after rain from spring to autumn while afloat among vegetation, usually in larger permanent dams, swamps and lagoons. Breeding often peaks after heavy rains in January to February (NSW NPWS 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Pale-headed Snake (*Hoplocephalus bitorquatus*)

The Pale-headed Snake is found in a wide variety of habitats, from rainforest or moist hardwood forest to the drier eucalypt forests and open woodland in New South Wales and inland Queensland. The species is usually found beneath loose bark, or in hollow trunks and limbs of dead timber, especially along watercourses (Wilson & Knowles, 1988).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Stephen's Banded Snake (*Hoplocephalus stephensii*)

Stephen's Banded Snake frequents coastal rainforests and wet sclerophyll forests. This species shelters beneath loose bark, among epiphytes, in hollow trunks, limbs and rock crevices. This species is nocturnal and partly arboreal (Cogger 2000).

There is one record for this species in the local area on the Bionet Atlas of NSW Wildlife (OEH 2018a). The record was from a poor quality photograph taken by a plumber of a juvenile snake captured in a residential backyard. The record was never confirmed by proper identification.

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Wompoo Fruit-dove (*Ptilinopus magnificus*)

The Wompoo Fruit-dove mainly inhabits large undisturbed patches of tall tropical or subtropical evergreen rainforest. It is an obligate frugivore, taking fruits of many species of rainforest trees, palms, vines and epiphytes, feeding mostly in the canopy (Higgins & Davies 1996).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Superb Fruit-dove (*Ptilinopus superbus*)

This species inhabits mostly closed forests, occasionally near streams or lakes within rainforest. Breeding most commonly occurs within dense forests. They are a regular autumn and winter migrant to the Hunter, Sydney, Illawarra and South Coast regions. This species is frugivorous, taking fruits of many species of rainforest trees, vines and palms (Higgins & Davies 1996).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Square-tailed Kite (*Lophoictinia isura*)

The Square-tailed Kite inhabits the coastal forested and wooded lands of tropical and temperate Australia. The Square-tailed Kite is a specialist hunter of passerines, especially honeyeaters, and insects in the tree canopy, picking most prey items from the outer foliage (Marchant & Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Eagle (*Hieraetus morphnoides*)

This species forages in a variety of habitats including woodland open forest, partially cleared areas, along watercourses and around wetlands, avoiding large areas of dense forest. This species nests in mature living trees in open forest, woodland and remnant areas including farmland and areas close to urban development (Marchant and Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

White-bellied Sea-Eagle (*Haliaeetus leucogaster*)

This species occupies home ranges of up to 100km² and is widespread along most of the coastline areas of Australia and occasionally inland in association with rivers and wetlands. Nests are typically constructed in large emergent eucalypts (Marchant and Higgins 1993).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

The Glossy Black-Cockatoo inhabits woodlands and open sclerophyll forests dominated by or with a middle stratum of *Allocasuarina*. They choose trees with larger cone crops, concentrating foraging in trees with a high ratio of total seed weight to cone weight. They breed in hollow trees or stumps usually in Eucalypts (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Gang-gang Cockatoo (*Callocephalon fimbriatum*)

The Gang-gang Cockatoo is associated with a variety of woodland and forest habitats, and occasionally more open areas in south-eastern New South Wales and Victoria. This species utilises eucalypt forests and exotic trees, and is known to feed on the seeds of native shrubs and trees, in addition to some exotic species such as the Hawthorn and *Cupressus* species (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Swift Parrot (*Lathamus discolor*)

This species feeds mainly on nectar and lerp from eucalypt flowers, particularly Blue Gum

(*Eucalyptus globulus*). On the mainland, the Swift Parrot congregates where winter flowering species such as Yellow Gum, Red Ironbark, Mugga Ironbark, Box Gums and Swamp Gum. This species also occurs within Blackbutt, Forest Red Gum, Swamp Mahogany and Spotted Gum dominated communities along the coast. The Swift Parrot is a migratory species that breeds in Tasmania and its offshore islands in summer. In late March almost the entire population migrates to mainland Australia spreading from Victoria through to central and coastal NSW and south east Queensland (Saunders and Tzaros 2011).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Lorikeet (*Glossopsitta pusilla*)

Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including, melaleucas and mistletoes (Courtney & Debus 2006).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Regent Honeyeater (*Xanthomyza phrygia*)

The Regent Honeyeater inhabits mostly dry eucalypt woodlands and forests dominated by box ironbark eucalypts; on inland slopes of Great Divide, especially associations in moister more fertile sites, along creeks, broad river valleys and on lower slopes of foothills. Nectar is the principle food but sugary exudates from insects are also used. The Regent Honeyeater is known to breed along the western Slopes of the Great Dividing Range in New South Wales (Higgins et al., 2001).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Barking Owl (*Ninox connivens*)

The Barking Owl utilises dry sclerophyll forests and woodlands of tropical, temperate and semi-arid zones, particularly those associated with watercourses, wetlands and forest edges. Nests in large hollows in live eucalypts, often near open country (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Powerful Owl (*Ninox strenua*)

The Powerful Owl breeds in open or closed sclerophyll forests and woodlands, including wet sclerophyll forest and dry sclerophyll forest and woodlands. They nest in hollows in large old trees; usually living Eucalyptus, within or below canopy in stumps or broken-off trunks. Powerful Owls are sedentary within home ranges of about 1,000 hectares within open eucalypt, casuarina or Callitris pine forest and woodlands, though they often roost in denser vegetation, including rainforest or exotic pine plantations. Powerful Owls feed mainly on medium-sized arboreal marsupials (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however

this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Masked Owl (*Tyto novaehollandiae*)

The Masked Owl is widespread through forests and woodlands. The Masked Owl is known to utilise forest margins and isolated stands of trees within agricultural land. This species is often found in heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained. The Masked Owl is dependent upon hollow bearing trees all year round requiring old mature trees with large hollows for breeding and as diurnal roosting sites (Higgins 1999).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Sooty Owl (*Tyto tenebricosa*)

The Sooty Owl's habitat is often tall old-growth montane forests, including temperate and subtropical rainforest. This species occurs mostly in uplands in gullies and on slopes of valleys but rarely on ridges. Optimal habitat contains tall eucalypts with large hollows suitable for nesting and roosting, but also a range of hollows that provide shelter for prey. The same nest is used repeatedly, and the owls also roost and occasionally nest in caves. The Sooty Owl preys on arboreal and terrestrial mammals and occasionally birds (Higgins 1999).

The Sooty Owl is a highly mobile species and will defend a large home range of 400-3000 ha (NSW OEH 2018b). Within a home range this species is considered to be resident type species and therefore the local population is considered to comprise those individuals known or likely to occur in the study area as well as any individuals occurring in adjoining areas that are known or likely to utilise habitats in the study area (NSC, 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Varied Sittella (*Daphoenositta chrysoptera*)

This species inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (Higgins & Peter 2002).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)

This species inhabits a variety of habitats including forest, woodland, shrubland, heath and disturbed environments. Widespread species which inhabits inland and coastal areas (OEH 2018b).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Scarlet Robin (*Petroica boodang*)

This species inhabits mainly dry eucalypt forest and woodlands with open shrubby and grassy understorey on ridges and slopes during the spring-summer breeding season,

dispersing during autumn–winter into open habitats including urban areas (Higgins and Peter 2002).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Yellow-bellied Glider (*Petaurus australis*)

The Yellow-bellied Glider is an arboreal tree-dwelling mammal. The Yellow-bellied Glider is restricted to tall mature eucalypt forests found within high rainfall regions of temperate through to sub-tropical eastern Australia. The bulk of the diet of the Yellow-bellied Glider consists of plant and insect exudates including sap, nectar, honeydew and manna while arthropods and pollen are also eaten. Yellow-bellied Gliders occupy home ranges between 30 and 65 hectares in size (Goldingay & Kavanagh 1991).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

Grey-headed Flying-foxes roost in camps during the day, which may contain tens of thousands of individuals, and then disperse to surrounding areas to forage at night. This species inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and urbanised and agricultural areas. Camps are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy. Camps may also be formed in urban parkland areas (Tidemann 1995). A local camp site has been recorded at North Avoca, approximately 4km from the subject site.

Grey-headed Flying-foxes were observed flying over the subject site from south to north during spotlight surveys on 22 and 23 October 2018. The proposal will require the removal of approximately 0.04 ha of suitable foraging habitat for this species. No colony roost sites for this species have been observed within the subject site and it is considered that:

- The proposal is unlikely to result in direct harm to this species due to this species mobility;
- This species is likely to utilise the extensive areas of foraging habitats present within the local area and may from time to time forage within the subject site; and
- The overall areas of available habitat for the local population of this species are not likely to be significantly reduced by the proposal.

It is therefore considered that the proposed development is not 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.

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

The Yellow-bellied Sheathtail-bat inhabits a wide variety of habitats from wet and dry sclerophyll forest, to open woodland, shrubland, mallee, grassland and desert. They fly fast and straight usually over the canopy, and lower over open spaces and at forest edges. This species roosts in large tree hollows (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern Freetail Bat (*Mormopterus norfolkensis*)

The Eastern Freetail-bat utilises dry eucalypt forest and woodland on the coastal side of the Great Dividing Range. They show a preference for open spaces in woodland or forest, and are more active in the upper slopes of forest areas rather than in riparian zones. They also forage over large waterways. This species roosts in hollow trees (usually in hollow spouts), under exfoliating bark and in various man-made structures (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Large-eared Pied Bat (*Chalinolobus dwyeri*)

In the Sydney Basin this species is most commonly recorded in areas of high fertility soils in wet sclerophyll forest along the edges of sandstone escarpments. This species is also recorded in dry sclerophyll forest and woodlands, sub-alpine woodland, at the edges of rainforest, Callitris forest and within sandstone outcrop country. Large-eared Pied Bats roost in clusters in fairy martin nests and on the ceilings of caves, crevices in cliffs and mines in twilight areas (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

The Eastern False Pipistrelle inhabits wet sclerophyll forest, open forest, rainforest and coastal mallee. They generally prefer tall and wet forests where the trees are more than 20 metres high and the understorey is dense. This species predominantly roosts in hollow trunks of eucalypts, however have also been reported to roost in caves and old buildings (Churchill 2008).

This species was recorded within the subject site during Anabat surveys. The proposal will require the removal or modification of approximately 0.04 ha of suitable foraging habitat for this species. It is considered that:

- The proposal is unlikely to result in direct harm to this species due to this species mobility;
- This species is likely to utilise the extensive areas of foraging habitats present within the local area and may from time to time forage within the subject site;
- The overall areas of available habitat for the local population of this species are not likely to be significantly reduced by the proposal; and
- No hollow bearing trees or potential roost sites will be impacted by the proposal.

It is therefore considered that the proposed development is not 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.

Golden Tipped Bat (*Kerivoula papuensis*).

This species forages on small spiders within rainforests and moist gully habitats and adjacent upper slope eucalypt forests. They roost in tree hollows, beneath clumps of hanging moss, and in hanging abandoned dome-shaped nests of the Brown Gerygone and Yellow-throated Scrubwren in rainforests and gully lines (Law and Chidel 2004).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Little Bentwing-bat (*Miniopterus australis*)

The Little Bentwing-bat forages below the canopy within well-timbered areas including rainforest, vine thicket, wet and dry melaleuca swamps and coastal forests. This species is a cave dweller with individuals congregating during the summer months in maternity colonies and disperse during the winter. Other roost sites used by this species include abandoned mines, tunnels, stormwater drains and occasionally in buildings, banana trees and tree hollows (Churchill 2008).

This species was recorded within the subject site during Anabat surveys. This species was recorded within the subject site during Anabat surveys. The proposal will require the removal or modification of approximately 0.04 ha of suitable foraging habitat for this species. It is considered that:

- The proposal is unlikely to result in direct harm to this species due to this species mobility;
- This species is likely to utilise the extensive areas of foraging habitats present within the local area and may from time to time forage within the subject site;
- The overall areas of available habitat for the local population of this species are not likely to be significantly reduced by the proposal; and
- No hollow bearing trees or potential roost sites will be impacted by the proposal.

It is therefore considered that the proposed development is not 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.

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

Preferred habitats for this species include rainforest, wet and dry sclerophyll forest, open woodland, Melaleuca forests and open grassland. The Eastern Bentwing-bat forages high in forested areas from just above canopy height to many times canopy height. In more open areas such as grasslands, flight may be within a few metres of the ground. Eastern Bentwing-bats are cave dwellers, but will also roost in man-made structures such as road culverts and mines (Churchill 2008).

This species was recorded within the subject site during Anabat surveys. The proposal will require the removal of approximately 0.04 ha of suitable foraging habitat for this species. It is considered that:

- The proposal is unlikely to result in direct harm to this species due to this species mobility;
- This species is likely to utilise the extensive areas of foraging habitats present within the local area and may from time to time forage within the subject site;
- The overall areas of available habitat for the local population of this species are not likely to be significantly reduced by the proposal; and
- No hollow bearing trees or potential roost sites will be impacted by the proposal.

It is therefore considered that the proposed development is not 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.

Southern Myotis (*Myotis macropus*)

The Large-footed Myotis has a strong association with streams and permanent waterways, most commonly within vegetated areas at lower elevations and in flat undulating country. This species forages over water for small insects, fish and invertebrates and have a preference for large pools rather than flowing streams. Roost habitats for this species are near water and include caves, tree hollows, abandoned fairy martin nests, among vegetation, in clumps of Pandanus, and man-made structures including under bridges, in mines, tunnels, road culverts and stormwater drains (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

A wide variety of habitats are utilised by this species including moist gullies in mature coastal forest, rainforest, open woodland, Melaleuca swamp woodland, wet and dry sclerophyll forest, cleared areas with remnant trees and tree-lined creeks in open areas. The Greater Broad-nosed Bat forages about 5m from the edge of isolated trees, forest remnants or along forest crowns with a slow direct flight pattern. This species is known to roost in tree hollows, cracks and fissures in trunks and dead branches, under exfoliating bark, as well as in man-made structures including roofs of old buildings (Churchill 2008).

It is considered that suitable habitat for this species is present on the subject site, however this species was not observed within the subject site during surveys. It is considered that the action proposed is not 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.

- b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

No flora or fauna specimens belonging to any endangered population were observed within the subject site. Therefore the proposed action will not have an adverse effect on the life cycle of any species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

- c) *In the case of a critically endangered or endangered ecological community, whether the action proposed:***

- i. *Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

No critically endangered or endangered ecological communities were observed within the subject site during surveys. Therefore the proposed action is not likely to have an adverse effect on the extent of an 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 such that its local occurrence is likely to be placed at risk of extinction,***

No critically endangered or endangered ecological communities were observed within the subject site during surveys. Therefore the proposed action is not likely to substantially and adversely modify the composition of an ecological community such that its local occurrence is likely to be placed at risk of extinction.

d) In relation to the habitat of threatened species, populations or ecological community:

i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The subject site contains approximately 2.9 hectares of Disturbed Coastal Moist Forest and 5.2 hectares of Cleared Land / Exotic Vegetation. The proposed development will be mostly confined to areas of Cleared Land / Exotic Vegetation. Approximately 0.04 ha of Disturbed Moist Forest will be removed in the locations shown in Figure 2.1. No hollow bearing trees will be removed.

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The existing connectivity between the site and adjoining areas is described as follows:

North

Disturbed vegetation and cleared / managed land with residential dwellings. Tenuous connectivity to larger areas of native vegetation exists beyond the Central Coast Highway to the south.

East

The site adjoins a small patch of disturbed vegetation to the east across Matcham Road. This vegetation adjoins cleared land and residential dwellings further to the east.

South

The southern section of the study area contains cleared land with forest patches under rural residential land management practices.

West

The site adjoins remnant vegetation and cleared land to the west.

The area of proposed development will be located within the cleared sections of the site. The existing levels of fragmented connectivity are not likely to be reduced by the proposed development.

It is therefore considered that the proposal is not likely to result in an area of habitat becoming fragmented or isolated from other areas of habitat.

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

With regard to the habitats to be impacted, the following considerations are provided:

- The site is disturbed and does not provide known habitat for locally occurring threatened flora species;
- The site is disturbed and provides suitable habitats for nomadic locally occurring threatened fauna species capable of utilising disturbed and modified environments as part of a larger home range;
- The site does not provide suitable habitat for a threatened population or ecological community;
- Due to the position of the site in the context of the surrounding landscape it is considered that the habitats to be removed and modified do not provide an important linkage for threatened species, populations of ecological communities;
- The majority of the native vegetation present is proposed for retention.

It is therefore concluded that the habitats within the site are not likely to be of significant importance to the long-term survival of the threatened species, populations or ecological community within the locality.

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

The subject site has not been classed as critical habitat within the provisions of the *Threatened Species Conservation Act* (1995). Therefore it is considered that the proposed development will not have an adverse effect on critical habitat either directly or indirectly.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Recovery Plans

Recovery plans have been prepared for the following species within suitable habitat present within the subject site:

- *Prostanthera askania*;
- Barking Owl;
- Powerful Owl, Masked Owl and Sooty Owl (Large Forest Owls Recovery Plan);
- Grey-headed Flying-fox; and
- Large-eared Pied Bat.

Implementation of actions required to meet the objectives listed in the identified recovery plans are primarily the responsibility of public authorities such as the NSW OEH and Local Government. It is considered that the proposed development is not likely to obstruct the implementation of the identified recovery objectives. The proposal is therefore considered to be not inconsistent with the objectives or actions of the identified recovery plans.

Threat Abatement Plans

The following threat abatement plans have been prepared by the NSW OEH.

- Bitou Bush and Boneseed Threat Abatement Plan
- Predation by the Red Fox (*Vulpes vulpes*) Threat Abatement Plan
- Predation by *Gambusia holbrooki* (plague minnow) Threat Abatement Plan

The proposal is considered to be not inconsistent with the objectives or actions identified within these plans.

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

An assessment of the likely impact of the proposal on Key Threatening Processes is provided in Table A1.2.

TABLE A1.2 ASSESSMENT OF KEY THREATENING PROCESSES			
Key Threatening Processes Listed under the BC Act (2016) & FM Act (1994)	Likely to Occur as a Result of the Proposal	Impact or Occurrence Likely to be Mitigated or Reduced as a Result of the Proposal	Comments
Alteration of habitat following subsidence due to longwall mining	No	No	-
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	No	No	-
Anthropogenic climate change	No	No	-

TABLE A1.2 ASSESSMENT OF KEY THREATENING PROCESSES			
Key Threatening Processes Listed under the BC Act (2016) & FM Act (1994)	Likely to Occur as a Result of the Proposal	Impact or Occurrence Likely to be Mitigated or Reduced as a Result of the Proposal	Comments
Bushrock removal	No	No	-
Clearing of native vegetation	Yes	No	-
Competition and grazing by the feral European rabbit (<i>Oryctolagus cuniculus</i>)	No	No	-
Competition and habitat degradation by feral goats (<i>Capra hircus</i>)	No	No	-
Competition from feral honey bees (<i>Apis mellifera</i>)	No	No	-
Death or injury to marine species following capture in shark control programs on ocean beaches	No	No	-
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	No	No	-
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners	No	No	-
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	No	No	-
Herbivory and environmental degradation caused by feral deer	No	No	-
Importation of red imported fire ants (<i>Solenopsis invicta</i>)	No	No	-
Infection by psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations	No	No	-
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	No	No	-
Infection of native plants by <i>Phytophthora cinnamomi</i>	No	No	-
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	No	No	-
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)	No	No	-
Invasion and establishment of exotic vines and scramblers	No	No	-
Invasion and establishment of Scotch broom (<i>Cytisus scoparius</i>)	No	No	-
Invasion and establishment of the cane toad (<i>Bufo marinus</i>)	No	No	-
Invasion of native plant communities by African Olive <i>Olea europaea</i> L. subsp. <i>cuspidata</i>	No	No	-
Invasion, establishment and spread of <i>Lantana camara</i>	No	No	-

TABLE A1.2 ASSESSMENT OF KEY THREATENING PROCESSES			
Key Threatening Processes Listed under the BC Act (2016) & FM Act (1994)	Likely to Occur as a Result of the Proposal	Impact or Occurrence Likely to be Mitigated or Reduced as a Result of the Proposal	Comments
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i> (bitou bush and boneseed)	No	No	-
Invasion of native plant communities by exotic perennial grasses	No	No	-
Invasion of the yellow crazy ant (<i>Anoplolepis gracilipes</i> (Fr. Smith)) into NSW	No	No	-
Loss of hollow-bearing trees	Yes	No	
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	No	No	-
Loss or degradation (or both) of sites used for hill-topping by butterflies	No	No	-
Predation and hybridisation of feral dogs (<i>Canis lupus familiaris</i>)	No	No	-
Predation by the European red fox (<i>Vulpes vulpes</i>)	No	No	-
Predation by the feral cat (<i>Felis catus</i>)	No	No	-
Predation by <i>Gambusia holbrooki</i> (plague minnow or mosquito fish)	No	No	-
Predation by the ship rat (<i>Rattus rattus</i>) on Lord Howe Island	No	No	-
Predation, habitat degradation, competition and disease transmission by feral pigs (<i>Sus scrofa</i>)	No	No	-
Removal of dead wood and dead trees	No	No	-
Current shark meshing program in NSW Waters	No	No	-
Hook and line fishing in areas important for the survival of threatened fish species	No	No	-
Human-caused climate change	No	No	-
Instream structures and other mechanisms that alter natural flow	No	No	-
Introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW	No	No	-
The introduction of fish to fresh waters within a river catchment outside their natural range	No	No	-
The removal of large woody debris from NSW Rivers and streams	No	No	-
The degradation of native riparian vegetation along the New South Wales watercourses	No	No	-

The proposal is likely to increase the impact of the key threatening processes 'Clearing of native vegetation' and possibly "Loss of hollow-bearing trees". It is considered that the proposal is unlikely to

increase the operation of this key threatening process to the extent that a significant effect on threatened biodiversity will occur.

A1.2 ASSESSMENT OF SIGNIFICANCE (7-PART TEST) CONCLUSION

Based on the details provided in the accompanying report, ecological surveys completed and assessment undertaken above it is concluded that:

- i. The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats; and
- ii. A Species Impact Statement is not required for the proposed development.

APPENDIX 2

GREY-HEADED FLYING-FOX EPBC ACT SIGNIFICANT IMPACT ASSESSMENT

ENVIRONMENT PROTECTION & BIODIVERSITY CONSERVATION ACT (1999)
GREY-HEADED FLYING-FOX
SIGNIFICANT IMPACT ASSESSMENT

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats listed under the EP&BC Act (1999), the matter needs to be referred to the Australian Government, Department of the Environment and Energy (DOEE).

The nationally listed vulnerable threatened species Grey-headed Flying-fox was observed during surveys on 4 May 2017,

The following separate significant impact assessments in accordance with the EPBC Act Policy Statement 1.1 *Significant Impact Guidelines* (DOE 2013) have been prepared to determine whether or not the proposed action is likely to have a significant impact on these species.

A2.2 GREY-HEADED FLYING-FOX (*PTEROPUS POLIOCEPHALUS*) EPBC ACT SIGNIFICANT IMPACT ASSESSMENT

A single Grey-headed Flying-fox was observed flying over the site during nocturnal surveys on 4 May 2017.

Vulnerable Species Important Population Criteria (Determining an important population)

1. Whether the population has been identified within a recovery plan

The Grey-headed Flying-fox Draft National Recovery Plan (DECCW 2009) does not identify any important populations of this species.

2. Whether the population constitutes a key source population either for breeding or dispersal

The site contains suitable foraging habitat for this species, which may be utilised on occasion. No roost or camp sites for this species are present within the site. The site of the proposed action does not contain a key source population for breeding or dispersal.

3. Whether the population constitutes a population necessary for maintaining genetic diversity

The site contains suitable foraging habitat for this species, which may be utilised on occasion. No roost or camp sites for this species are present within the site. The study area and subject site do not contain a population that is necessary for maintaining genetic diversity.

4. Whether the population is near the limit of the species range

The Grey-headed Flying-fox is known to occupy the coastal lowlands and slopes of south-eastern Australia from Bundaberg to Geelong and are usually found at altitudes < 200 m. Areas of repeated occupation extend inland to the tablelands and western slopes in northern New South Wales and the tablelands in southern Queensland. Sightings in inland areas of southern New South Wales and Victoria are uncommon. There are rare records of individuals or small groups west to Adelaide, north to Gladstone and south to Flinders Island (DECCW 2009). The site of the proposed action is not near the limit of this species range.

Important Population Assessment Conclusion

From the above information and details it is considered that the specimens observed within the subject site are not:

- Identified in a recovery plan for this species;
- A key source population for breeding or dispersal;
- A population necessary for maintaining genetic diversity; or

- A population which is near this species range.

Therefore it is considered that the threatened species observed does not satisfy the criteria of an important population as identified by the DEWHA (2009).

Notwithstanding the above conclusions if the precautionary approach is adopted, further consideration as to whether the proposed action is likely to have a significant impact on this species needs to assess the significant impact criteria (DEWHA 2009) for a vulnerable species.

Vulnerable Species Significant Impact Criteria

Questions (in bold) to determine whether the proposal is likely to have a significant impact on an important population of a vulnerable species are as follows:

1. Lead to a long-term decrease in the size of an important population of a species.

This species is likely to continue to utilise the habitats present within the site and adjoining areas. The proposal is not likely to have a direct impact on the size of the population of this species.

2. Reduce the area of occupancy of an important population;

This species is likely to continue to utilise the habitats present within the site and adjoining areas. It is considered that the proposal is not likely to reduce the area of occupancy of an important population of this species.

3. Fragment an existing important population into two or more populations;

This species is likely to continue to utilise the habitats present within the site and adjoining areas. It is therefore considered that the proposal is not a type of development which is likely to fragment an existing important population of this species into two or more populations.

4. Adversely affect habitat critical to the survival of a species;

It is considered that the study area does not contain habitat critical to the survival of this species and the proposal is therefore not likely to adversely affect habitat critical to the survival of this species.

5. Disrupt the breeding cycle of an important population;

This species is likely to continue to utilise the habitats present within the site and adjoining areas. It is considered that the proposal is not likely to disrupt the breeding cycle of an important population of this species.

6. Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

This species is likely to continue to utilise the habitats present within the site and adjoining areas. It is considered that the proposal is not likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline.

7. Result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat;

It is considered that the proposal is not a type of development which is likely to result in invasive species that are harmful to this species becoming established in habitat for this species.

8. Introduce disease that may cause a species to decline; or

It is considered that the proposed action and the proposal is not a type of development likely to introduce disease that may cause this species to decline.

9. Interfere with the recovery of the species.

This species is likely to continue to utilise the habitats within the adjoining areas. It is considered that the proposed action and the proposal is not likely to interfere with the recovery of this species.

Conclusion

It is considered that the proposed action is not likely to have a significant impact on this species or its habitats and a referral to the DOEE is not necessary.

APPENDIX 3

HOLLOW BEARING TREE ASSESSMENT

HOLLOW BEARING TREE ASSESSMENT

A3.1 HOLLOW BEARING TREE ASSESSMENT METHODOLOGY

A hollow bearing tree survey of the proposed development area was undertaken during October 2018. Systematic searches were conducted throughout the subject site on foot to assess and detect the presence of hollow bearing trees. Inspection of trees was undertaken by encircling trees from ground level from vantage points which allowed inspection from each cardinal point.

A pair of binoculars was utilised to assist with the detection of tree hollows. Observation of fauna use was also recorded and included searches for scratches on the trunk of trees and evidence of nesting material, signs of chewing, rubbing, scratching or droppings on hollow entrances, presence of fauna inside hollows and fauna entering or exiting hollows. Each hollow bearing tree observed was numbered and tagged and its location was recorded either by GPS or on a map of the site.

The following Information was recorded for each hollow bearing observed:

- Tree tag number;
- Tree species name;
- Hollow aperture in increments;
- Quantity of separate hollows; and
- Species of any fauna observed utilising the hollows observed.

Visual inspection from ground level has inherent limitations and can result in observer bias where actual tree hollows are not visible to the observer or false hollows are recorded. Hollows can be obscured due to the location within the tree and the angle of observation by the surveyor and not all tree hollows present may have been identified. False hollows can also be recorded due to variables such as dark stains, wounds or marks on trees, poor visibility, solid branch ends or the presence of shallow cavities. In instances where the observer was uncertain as to the presence of a tree hollow the precautionary principle was applied and a hollow was assumed to be present.

A3.2 HOLLOW BEARING TREE ASSESSMENT RESULTS

Two hollow bearing trees were observed during surveys and are mapped in Figure 2.1. The details of these hollow bearing trees are provided in Table A1.1. The hollows observed provide potential den and nesting sites habitat for reptiles, micro-chiropteran bats, small arboreal mammals and small sized birds. No hollow bearing trees with characteristics suitable for large forest owl nest sites were observed.

**TABLE A3.1
HOLLOW BEARING TREE DETAILS**

Tag No.	Scientific Name	DBH	Height	Quantity and Size of Hollow Openings								Fauna Use Observed	Remove/Retain
				<10	10-<15	15-<20	20-<25	25-<30	30-<40	40-<50	50-60+		
1	<i>Eucalyptus saligna</i>	60	15				1						
2	<i>Eucalyptus pilularis</i>	80	20	1									
3	<i>Eucalyptus pilularis</i>	80	25	3	1							Native bee hive present	
4	<i>Eucalyptus pilularis</i>	120	25		1	1							
5	<i>Eucalyptus saligna</i>	45	20	1		1							
6	<i>Eucalyptus pilularis</i>	100	30		2	1							
7	<i>Eucalyptus saligna</i>	170	30		1							Rainbow Lorikeet Nesting / possum scratches on trunk	
8	<i>Eucalyptus pilularis</i>	150	30	1								Termite mound hollow only	
9	<i>Eucalyptus saligna</i>	40	25	1								possum scratches on trunk	
10	Dead Tree	50	6				1						
11	<i>Eucalyptus pilularis</i>	70	30			2							
12	<i>Eucalyptus saligna</i>	110	25		1								
13	<i>Eucalyptus saligna</i>	120	20	1									
14	<i>Eucalyptus saligna</i>	80	18				1						
15	<i>Eucalyptus saligna</i>	120	20					1					
16	Dead Tree	70	8			1							
17	<i>Eucalyptus saligna</i>	130	30	1									
18	<i>Eucalyptus saligna</i>	130	18	1								possum scratches on trunk	
19	Dead Tree	75	13	2									
20	<i>Eucalyptus saligna</i>	80	12					1				possum scratches on trunk	
21	<i>Eucalyptus saligna</i>	110	25	1									
22	<i>Eucalyptus saligna</i>	40	20			1						possum scratches on trunk	
23	<i>Eucalyptus saligna</i>	60	25			1							
24	<i>Eucalyptus saligna</i>	80	25						1			Little Corella Nesting / scratches on trunk	
25	<i>Eucalyptus pilularis</i>	100	26	1									
26	<i>Eucalyptus pilularis</i>	120	20			1							

**TABLE A3.1
HOLLOW BEARING TREE DETAILS**

Tag No.	Scientific Name	DBH	Height	Quantity and Size of Hollow Openings								Fauna Use Observed	Remove/Retain
				<10	10-<15	15-<20	20-<25	25-<30	30-<40	40-<50	50-60+		
27	<i>Eucalyptus saligna</i>	80	20	1									
28	Dead Tree	70	18	1									
29	<i>Eucalyptus saligna</i>	80	18	2								possum scratches on trunk	
30	<i>Eucalyptus saligna</i>	120	20		1							possum scratches on trunk	
31	<i>Eucalyptus saligna</i>	35	18	1									
32	<i>Eucalyptus saligna</i>	80	12	1									
33	<i>Eucalyptus pilularis</i>	110	30			1							
34	<i>Allocasuarina torulosa</i>	25	8	1									
35	<i>Eucalyptus saligna</i>	100	20	4									
36	<i>Eucalyptus pilularis</i>	110	25		1								

APPENDIX 4

EPBC ACT PROTECTED MATTERS SEARCH



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/10/18 12:14:41

[Summary](#)

[Details](#)

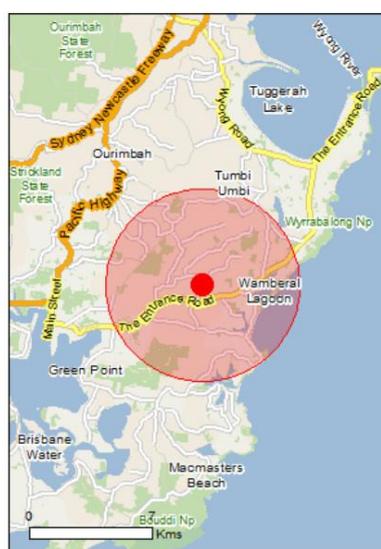
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Coordinates](#)

Buffer: 5.5Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	79
Listed Migratory Species:	56

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	75
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	4
Regional Forest Agreements:	1
Invasive Species:	49
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or

Name	Status	Type of Presence
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	related behaviour likely to occur within area Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Status	Type of Presence to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat may occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Diuris praecox Newcastle Doubletail [55086]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Prostanthera askania Tranquillity Mintbush, Tranquillity Mintbush [64958]	Endangered	Species or species habitat likely to occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Tetradlea juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleishy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence
Pandion haliaetus Osprey [952]		within area Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Telstra Corporation Limited
Defence - ERINA GRES DEPOT

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		habitat known to occur within area Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may

Name	Status	Type of Presence
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		occur within area Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]	
Name	State	
Gosford Coastal Open Space System	NSW	
Wamberal Lagoon	NSW	
Wambina	NSW	
Wyrabalong	NSW	
Regional Forest Agreements	[Resource Information]	
Note that all areas with completed RFAs have been included.		
Name	State	
North East NSW RFA	New South Wales	
Invasive Species	[Resource Information]	
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.		
Name	Status	Type of Presence
Birds		

Name	Status	Type of Presence
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur

Name	Status	Type of Presence
Mus musculus House Mouse [120]		within area Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengli's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name		State
Avoca Lagoon		NSW
Terrigal Lagoon		NSW
Wamberal Lagoon		NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.41928 151.4186

Acknowledgements

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- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

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Please feel free to provide feedback via the [Contact Us](#) page.

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