Flora and Fauna Assessment of Lot 6 DP 229296 Garfield Road East, Rouse Hill NSW

(Reference Number: 20212305)

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Revision	Details	Date	Amended By
A	Draft Flora & Fauna Assessment	23/05/2021	John Whyte
B	Final	02/08/2021	John Whyte
C	Final Amended	03/08/2021	John Whyte

Author: .....John Whyte

Signed: 

Date: .....3rd of August 2021

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1. Introduction

Enviro Ecology has been engaged by Landen Property Group Pty Ltd to carry out a Flora and Fauna Assessment for part of Lot 6 DP 229296 Garfield Road East, Riverstone NSW within Blacktown City LGA, hereafter referred to as the study area (Figure 1-1).

The proposed development is to subdivide the subject property into thirty-two (32) residential allotments (Figure 1-2). This flora and fauna assessment has been prepared over a portion of the subject property which has not been bio-certified.

This report examines the terrestrial flora assemblages and faunal species and their habitats within the location of proposed development (Figure 1-2). The report then determines the impacts of development and associated infrastructure upon local biodiversity. It summarises proposed mitigation measures as well as the assessment under the *Environmental Planning and Assessment Act 1979* and under the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*.

1.1 Terminology

This report uses the following terminology:

- BC Act abbreviates the *Biodiversity Conservation Act 2016;;*
- EPBC Act abbreviates the *Environment Protection and Biodiversity Conservation Act 1999;*
- EP&A Act abbreviates the *Environmental Planning and Assessment Act 1979*;
- DPIE abbreviates Department of Planning, Industry and Environment formerly the Office of Environment & Heritage (OEH) (NSW);
- LGA abbreviates Local Government Area;
- Threatened species refers to those flora and fauna species listed as vulnerable, endangered or critically endangered under the BC Act or EPBC Act
- EEC abbreviates Endangered Ecological Community; and
- WSUD abbreviates Water Sensitive Urban Design.

1.2 Legislative context

All proposals assessed under the *Environmental Planning and Assessment Act 1979* must include an examination of the threatened biodiversity, or their habitats, that are likely to occur within the development area or that may be indirectly affected by the construction and operation of a proposal. In the event that threatened biodiversity is within the vicinity of a proposal, the application must also include an assessment of the potential impact.

Other Commonwealth and State legislation relevant to the protection of flora, fauna and biodiversity within the study area include:

- *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
- *Biodiversity Conservation Act 2016*
- State Environmental Planning Policy—Koala Habitat Protection 2021

1.3 Site Description

The planning and cadastral details of the study area are provided in (Table 1-1). The study area is bordered by Garfield Road to the north, east by Clarke Street and to the east and south by bio certified lands (Figure 1-1).

Table 1-1 Site details

Location	Lot 6 DP 229296 Garfield Road East, Rouse Hill
LGA	Blacktown City
Aspect	North-south
Vegetation	Cleared land with exotic pasture & remnant PCT 835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

1.4 Study objectives

The objectives of this report are to:

- Conduct a fauna survey and habitat assessments to determine the likelihood of occurrence of threatened or Migratory species of animal occurring within the study area.
- Conduct a floral survey to identify any threatened species of plant present or considered likely to occur within the proposal area & determine and describe the characteristics and condition of the vegetation communities and flora.
- Determine the presence, or likelihood of occurrence, of threatened biodiversity listed under the *Biodiversity Conservation Act 2016* or *Environment Protection and Biodiversity Conservation Act 1999* occurring within the study area.
- Describe and assess likely impacts of the project on biodiversity.
- Undertake significance assessments for threatened biodiversity that occur or have potential habitat within the study area.
- Propose amelioration measures to mitigate or minimise impacts on the ecological values of the study area.

Figure 1-1 Subject property-study area-subject site

Figure 1-2 Proposed Development

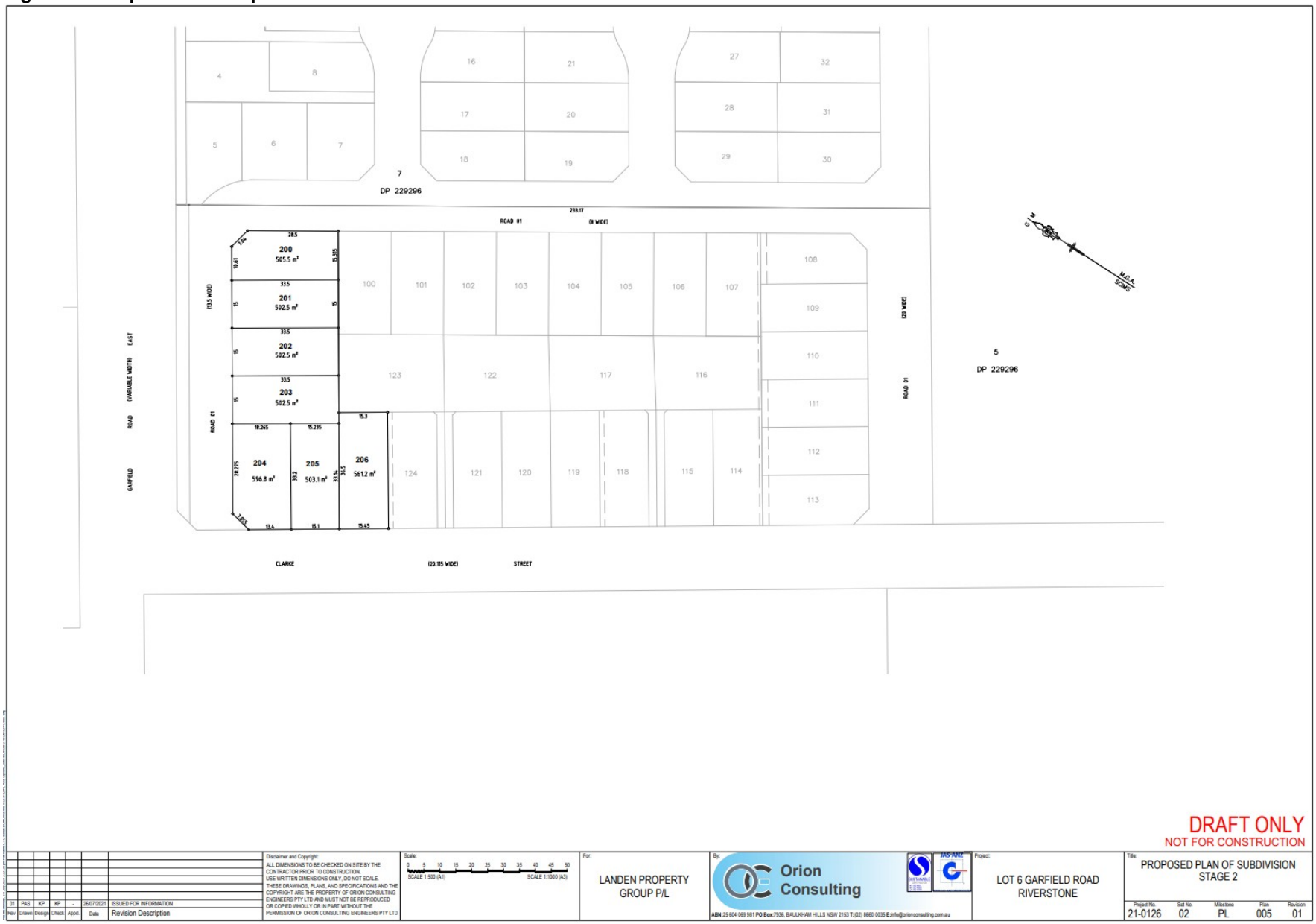
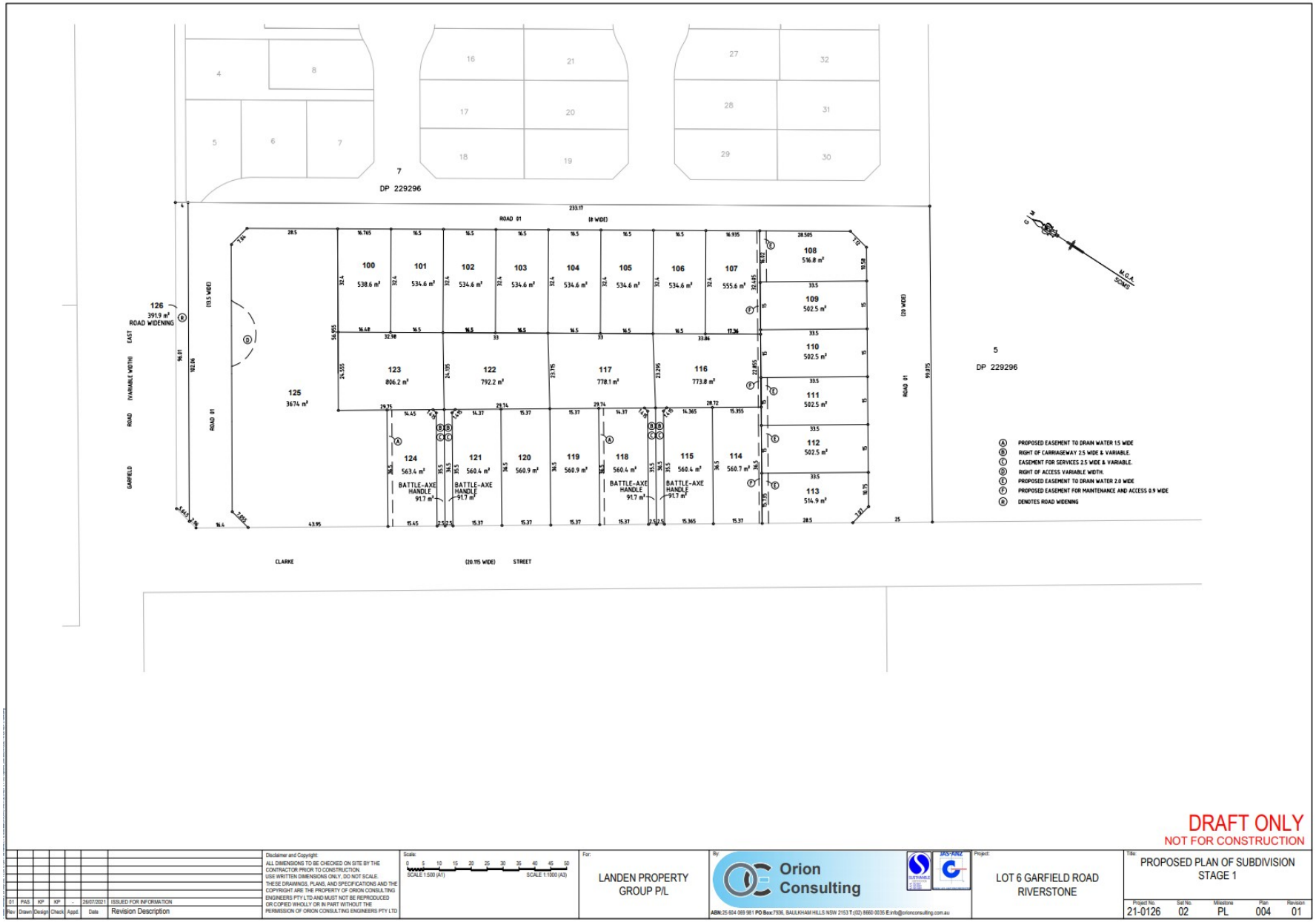


Figure 1-3 Proposed development



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Project: LOT 6 GARFIELD ROAD RIVERSTONE

Title: PROPOSED PLAN OF SUBDIVISION STAGE 1

Project No.	Sel No.	Milestone	Plan	Revision
21-0126	02	PL	004	01

2. Methodology

This ecological assessment was based on the results of a desktop review and site inspections on the 8th & 22nd of May, 22nd & 23rd of July 2021 by Mr John Whyte B.Bio.Sc (Majors Botany & Zoology). This assessment has been prepared to identify potential impacts as a result of the proposed activity upon biodiversity.

2.1 Licensing

All work was carried out under the appropriate licences, including a scientific licence as required under the *Biodiversity Conservation Act 2016,* and an Animal Research Authority issued by the Department of Industries and Investment formerly the Department of Industries & Investment (Agriculture).

2.2 Nomenclature

Names of plants used in this document follow Harden (Harden 1992; Harden 1993; Harden 2000; Harden 2002) with updates from PlantNet (Royal Botanic Gardens 2021). Scientific names are used in this report for species of plant. Scientific and common names of plants are listed in Appendices A and C.

Names of vertebrates follow the Census of Australian Vertebrates (CAVS) database maintained by the Department of Sustainability Environment Water Population and Communities (Department of Sustainability Environment Water Population and Communities 2021). Common names are used in the report for species of animal. Scientific names are included in species lists found in Appendices B and D.

2.3 Database searches and literature review

This assessment included a review of:

- Topographic maps & Aerial photographs
- Vegetation mapping of the area
- A review of Revised Native Vegetation Maps of the Cumberland Plain - Western Sydney (Department of Planning, Industry & Environment 2015) & the revised *Native Vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands. Version 12*, Department of Environment and Climate Change, Hurstville (Tozer, Turner et al. 2016).
- Database searches, as summarised in Table 2-1.

Table 2-1 Database searches

Database	Search date	Area searched	Reference
Bionet Atlas of NSW Wildlife	23rd of May 2021	Locality (10 km)	(Office of Environement & Heritage 2021)
PlantNet Database	23rd of May 2021	Locality (10 km)	(Royal Botanic Gardens 2021)
Protected Matters Search Tool	23rd of May 2021	Locality (10 km)	(Department of Sustainability, Environment, Water, Population and Communities 2021)

2.4 Field Survey

Inspections of the site were undertaken on the 8th & 22nd of May, 22nd & 23rd of July 2021 2021. This included:

- One quadrat & a random meander survey recording all species of plant encountered within the study area (Figure 2-1)
- Searching for specialised fauna habitat resources such as roosting/nesting hollows, foraging resources e.g. feed trees
- Targeted surveys for flora and fauna (Sections 2.5 & 2.6)
- Opportunistic fauna surveys during the flora survey

2.5 Flora Surveys

A combination of quadrat and traverse flora surveys was used to assess native floral diversity, dominant species, condition of vegetation communities and search for Threatened species within the study area. The flora survey effort was determined to exceed the suggested minimum survey requirements of the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)* (refer to table 3-2, Department of Environment and Conservation 2004).

Table 2-2 Suggested survey technique and effort for plant quadrats

Survey technique	Suggested minimum effort per stratification unit
Quadrat	**1 quadrat for areas <2 ha**
	2 quadrats for area 2-50 ha
	3 quadrats for areas 51-250 ha
	5 quadrats for areas 251-500 ha
	10 quadrats for areas 5,001-1,000 ha, plus 1 additional quadrat for each extra 100 ha thereof
Random Meander	30 minutes for each quadrat sampled within the same stratification unit as the quadrat

Source: *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (Department of Environment and Conservation 2004).

2.5.1 Quadrat surveys

Quadrat surveys were completed to provide a quantitative examination of species abundance in each vegetation community. Quadrat surveys are also likely to detect inconspicuous species that may be missed by random meander or transect surveys (Department of Environment and Conservation 2004).

One vegetation quadrat was placed randomly within the vegetation within the study area in an east-westerly direction to sample vegetation; the location co-ordinates for this quadrat is shown on (Figure 2-1). Vegetation quadrat was 400 m^2 (20 x 20 m) within which all floral species were identified and assigned a vegetative cover abundance rating based on the following modified Braun-Blanquet scale (Table 2-3).

Table 2-3 Modified Braun-Blanquet scale

Cover/abundance scale 1-6		
1	<5% - Rare or few individuals	3 or less individuals
2	<5% - Common	Consistent throughout plot
3	Cover >5% and <25%	
4	Cover >25% and <50%	
5	Cover >50% and <75%	
6	Cover >75%	

2.5.2 Random meander surveys

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993), whereby the recorder walks in a random manner throughout the site recording all species observed. The survey is continued until no additional species are observed within a patch. Random meander surveys also allow the boundaries between various vegetation communities and condition of vegetation to be recorded and are valuable for recording species that may not occur within quadrats including, Threatened species (Department of Environment and Conservation 2004).

Individual random meander surveys were separated whenever there was a significant change in vegetation community type or condition. For each random meander survey, the vegetation community was determined based on the dominant canopy species and the structure formation in accordance with Specht (1981) with reference to existing mapped vegetation communities. A random meander was conducted throughout the entire study area.

2.5.3 Vegetation condition

The condition of vegetation communities is an important criterion to determine suitable habitats for Threatened species and the conservation status of certain ecological communities. Vegetation within the study area was assigned to one of the following condition classes (refer Table 2-4).

Table 2-4 Vegetation community condition classes

Condition Class	Criteria
Good	Vegetation still retains the species complement and structural characteristics of the pre-European equivalent. Such vegetation has usually changed very little over time and displays resilience to weed invasion due to intact groundcover.
Moderate	Vegetation generally still retains its structural integrity, but has been disturbed and has lost some component of its original species complement. Weed invasion can be significant in such remnants
Poor	Vegetation that has lost most of its species and is significantly modified structurally. Often such areas now have a discontinuous canopy of the original tree cover and very few shrubs. Exotic species, such as introduced pasture grasses or weeds, replace much of the indigenous ground cover. Environmental weeds are often co dominant with the original indigenous species.

2.6 Terrestrial fauna

2.6.1 Fauna habitats

Fauna habitat assessments were undertaken to assess the likelihood of Threatened species of animal (those species identified from the literature and database review) to occur within the study area. Fauna habitat characteristics assessed included the:

- Structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- Presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles
- Composition of the ground cover vegetation, leaf litter, rocky outcrops and fallen timber to provide protection for ground-dwelling mammals, reptiles and amphibians
- Presence of waterways (ephemeral or permanent) and water bodies.

The assessment of these fauna habitat characteristics enabled an overall assessment of fauna habitat condition within the study area (refer Table 2-5).

Table 2-5 Fauna Habitat Condition Classes

Fauna habitat condition class	Description
Good	A full range of fauna habitat components are usually present (e.g. old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
Moderate	Some fauna habitat components may be missing (e.g. old growth trees, fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
Poor	Many fauna habitat elements in low quality remnants have been lost, including old growth trees (e.g. due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive past clearing.

2.6.1 State Environmental Planning Policy (Koala Habitat Protection) 2021

The site is located in the Blacktown City Local Government Area, which is not listed under Schedule 1 of State Environmental Planning Policy (Koala Habitat Protection) 2021. The likelihood of the site to be 'potential koala habitat' or 'core koala habitat' was assessed. Under State Environmental Planning Policy (Koala Habitat Protection) 2021 the following definitions apply:

'Koala Development Application Map'- means the State Environmental Planning Policy (Koala Habitat Protection) 2021—Koala Development Application Map.

'Core koala habitat' –

(a) an area of land where koalas are present, or

(b) an area of land—

(i) which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat, and

(ii) where koalas have been recorded as being present in the previous 18 years.

Koala habitat was assessed by inspecting all feed trees to identify indicative scratches on the trunk and droppings around the bases of feed trees.

2.6.2 Fauna survey

The presence of faunal species within the study area was determined primarily through consideration of suitable habitats, with species of animal identified opportunistically during the vegetation survey, habitat assessments and through direct targeted surveys. Although recording Threatened species during field survey can confirm their presence in an area, a lack of Threatened species records does not necessarily indicate the absence of the species from the study area when suitable habitat is present. By the very nature of their rarity, Threatened species are often difficult to detect. Suitable habitat is, therefore, an important factor to consider when determining the potential presence of Threatened species.

The following fauna surveys detailed below were conducted within the study area due to the presence of the following fauna habitat characteristics: ground cover vegetation, leaf litter, rocky outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians.

The assessment of these fauna habitat characteristics enabled an overall assessment of fauna habitat condition within the study area.

2.6.3 Diurnal Birds

Diurnal birds was recorded within the study area over 2 hour observation period on two mornings during the site visit. During the survey the entire study area was traversed and birds were identified either from sightings or characteristic calls. The number of each species and the activity at the time of sighting (foraging, breeding, or flying) was also recorded.

Additional birds species not recorded during this survey period were also opportunistically recorded throughout the study area whilst completing vegetation surveys and habitat assessments.

Birds were observed and identified using binoculars. Calls were generally identified in the field by the observer. If an unknown call was heard it is recorded and identified using reference libraries.

2.6.4 Amphibians

Frog searches were completed at all locations where frogs were heard vocalising to confirm species identification. Species were recorded by sightings, captures and call characteristics.

Amphibians were surveyed by vocal call identification, by using a recorder to record male calls in suitable places and then comparing these to known calls. Amphibians were also surveyed by habitat searches.

Any amphibians found are visually identified and when required to be examined are handled with Latex gloves and kept moist until release.

Species of herpetofauna were also opportunistically recorded whilst completing vegetation surveys and habitat assessments.

2.6.5 Reptiles

Searches for reptiles in likely localities such as under rubbish debris, branches and leaf litter throughout the study area. Surveys were undertaken during diurnal visit to the site.

2.7 Biodiversity Offset Scheme (BOS) Entry Threshold

Native vegetation is defined as follows:

a. The native vegetation that comprises the groundcover is:

i) less than 50% of the cover of indigenous species of vegetation, and

ii) not less than 10% of the area is covered with vegetation (whether dead or alive); and

iii) the assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum.

A BOSET search was undertaken over the subject property (Appendix F) which identified the entire study area as being affected by the Biodiversity Values (BV) Map. The application was lodged before addition of the BV mapping over the subject property on the 27th of November 2020 as such the proposal has the benefit of saving provisions under part 7 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. The proposal does not exceed the clearing threshold as identified in Table 2.6. No Biodiversity Development Assessment Report (BDAR) is deemed to be necessary in this instance.

Table 2-6 Biodiversity Threshold Report

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	23/05/2021 4:42 PM		**BDAR Required***
Total Digitised Area	0.05	ha	
Minimum Lot Size Method	LEP		
Minimum Lot Size	0.05	ha	
Area Clearing Threshold	0.25	ha	
Area clearing trigger Area of native vegetation cleared	no		no
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	yes		yes
Date of the 90 day Expiry	N/A		

2.8 Development or activity "likely to significantly affect threatened species"

(1) For the purposes of this Part, development or an activity is *likely to significantly affect threatened species* if:

(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or

Significance assessments were carried out for threatened species, populations or communities listed under the *BC Act* that were known or predicted to occur in the project locality (10 kilometres from the study area) and that had a moderate to high likelihood of occurring within the study site based on suitable habitat or observation in the field.

(b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or

The proposal will result in the removal of 0.05ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion calculated using the BOSET user guide, the proposal will not result in clearing beyond the designated threshold of 0.25ha or 2500m.

(c) it is carried out in a declared area of outstanding biodiversity value.

The study area has been mapped as containing biodiversity values as per the Biodiversity Value Map (NSW DoPE 2021) however as discussed in section 2.7 above the application was lodged before commencement of the mapping and therefore the proposal does not trigger entry into Biodiversity Offset Scheme.

2.9 Limitations

Within the study area varying degrees of non-uniformity of flora and fauna habitats are encountered. Hence no sampling technique can entirely eliminate the possibility that a species is present within a study area (e.g. species of plant present in the seed bank). The conclusions in this report are based upon data acquired for the study area and the environmental field surveys and are, therefore, merely indicative of the environmental condition of the study area at the time of survey, including the presence or otherwise of species. It should also be recognised that conditions of the study area, including the presence of threatened species, can change with time.

Habitat assessments were completed for all threatened fauna species identified as a result of the database searches (Table 2-1) to determine whether or not suitable habitat for threatened fauna species occurred within the study area. This is a more conservative approach and is likely to include species that are difficult to detect.

Figure 2-1 Flora survey locations within the study area

3. Results

3.1 Vegetation mapping

Two vegetation mapping projects have mapped vegetation within close proximity to the study area, these are: A Revised Classification and Map for the Coast and Eastern Tablelands. Revised Native Vegetation Maps of the Cumberland Plain - Western Sydney (Department of Planning, Industry & Environment 2015) & The Revised Classification and Map for the Coast and Eastern Tablelands vegetation (Tozer, Turner et al. 2010).

The subject property was mapped as containing plant community type (PCT) 724 Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion (Figure 3-1) & PCT 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Figure 3-2). PCT 849 was observed outside of the study area with certified lands however PCT 724 was absent from the subject property.

The Revised Native Vegetation Maps of the Cumberland Plain - Western Sydney (Department of Planning, Industry & Environment 2015) vegetation mapping project was found to be the most accurate mapping project. The vegetation was not mapped under the Revised Classification and Map for the Coast and Eastern Tablelands vegetation (Tozer, Turner et al. 2010).

Figure 3-1 PCT 724 extent mapped with the subject property Vegetation mapping (Department of Planning, Industry & Environment 2015)

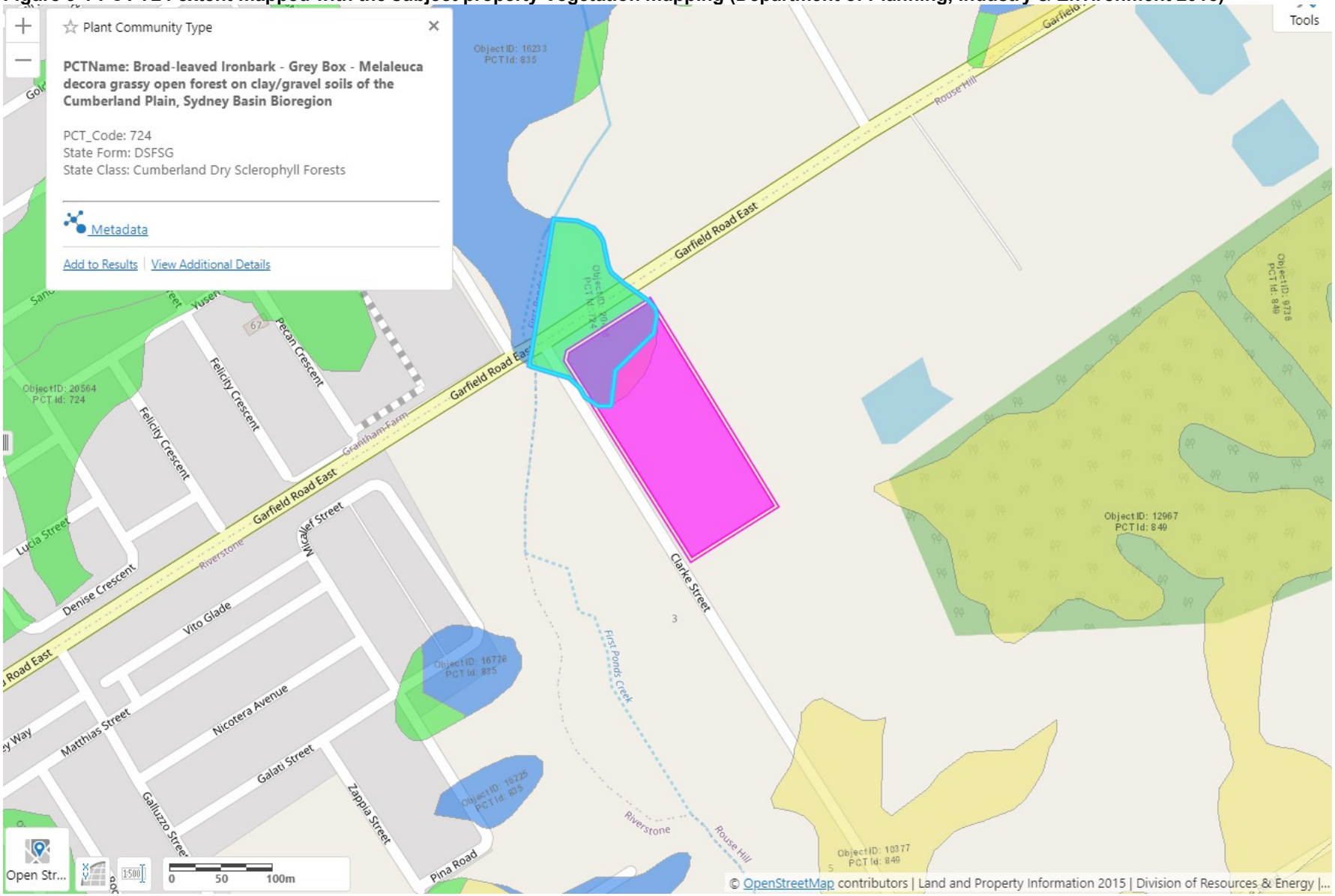
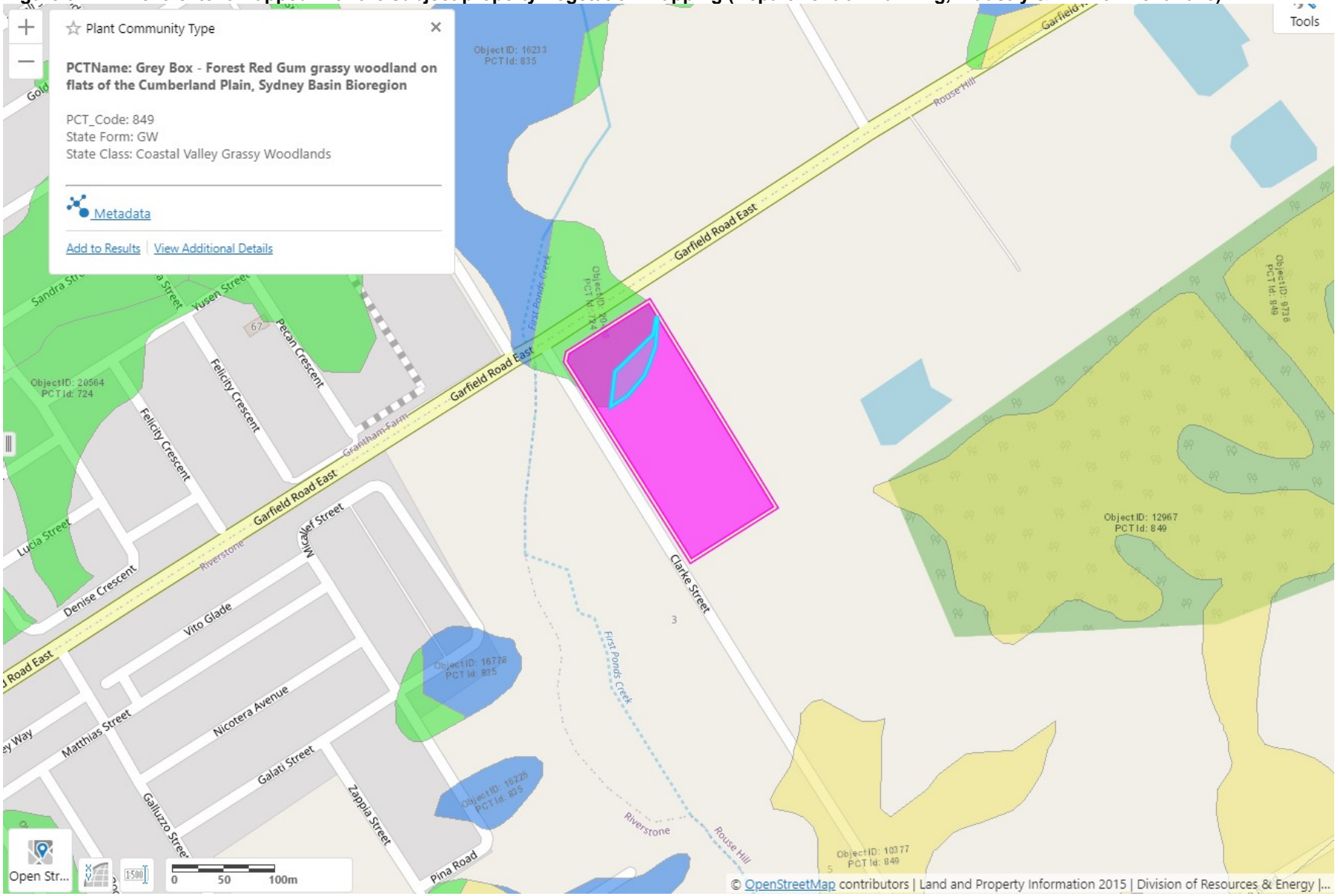


Figure 3-2 PCT 849 extent mapped with the subject property Vegetation mapping (Department of Planning, Industry & Environment 2015)



3.2 Vegetation communities

One vegetation community: PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion was identified from the study area (Figure 3-1). A detailed description of this community has been provided below.

3.2.1 PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion community was the dominate vegetation type identified from within the study area (Figure 3-3).

The canopy was dominated by *Casuarina glauca* (Swamp Oak) & *Eucalyptus amplifolia* (Cabbage Gum). Canopy trees ranged in height from approximately 8-13m. The projected foliage cover (PFC) of the canopy ranged from >5-20%.

No native shrubs were recorded from this community.

The groundcover was dominated by the following exotic species: *Pennisetum clandestinum* (Kikuyu Grass), *Ehrharta erecta* (Panic Veldtgrass), *Gamochaeta americana* (American Cudweed), Plantago lanceolata (Lamb's Tongues), *Onopordum acanthium* and *Verbena bonariensis* (Purpletop). Exotic ground layer was to a height of 0.1-.0.4m with a PFC of <80%.

Native groundcover species were primarily absent from this community with the following species recorded: *Cynodon dactylon* (Common Couch), *Dichondra repens* (Kidney Weed), *Oxalis perennans, Poranthera microphylla, Dichondra repens* & *Viola hederacea* (Native Violet). Native ground layer was to a height of 0.1-0.2m with a PFC of <20%.

Two exotic climbing species *Araujia sericifera* (Moth Vine) & *Asparagus aethiopicus* (Asparagus Fern) were recorded from the northern fence line adjacent to Garfield Road East.

Photograph 3-1 PCT 835 from the subject property

Photograph 3-2 PCT 835 from the subject property

Photograph 3-3 PCT 835 from the subject property

Figure 3-3 Field verified vegetation community from the study area

3.3 Species of plant

A total of thirty (30) species of plant was recorded from the project site, of which eight (8) were native (Appendix A).

Twenty-seven (27) species of weed were recorded from the study area (Appendix A). Of the exotic species, six of these species are High Threat Exotics (HTEs) as determined by the OEH high threat weeds list (OEH, 2021b).

3.4 Species of animal

3.4.1 Amphibians

One common species of frog: Common Eastern Froglet (*Crinia signifera*) was recorded calling outside of the study area on western side of Clarke Street in association with a box culvert located within First Ponds Creek. No suitable amphibious breeding habitats were identified from the study area.

No threatened frogs listed under the BC or EPBC Acts were identified within the study area, the habitat within the study area was not suitable for any threatened frogs species listed under both the BC & EPBC Acts.

3.4.2 Reptiles

Two common species of reptile the Garden Skink (*Lampropholis guichenoti*) & the Eastern Water Skink (*Eulamprus quoyii*) were recorded within the study area. No other reptile species were identified during the site inspections.

3.4.3 Birds

Nineteen species of bird were identified within the study area (Appendix B). The vegetation within the study area provides a range of foraging opportunities for birds.

The lack of diversity of tree and shrub species within the vegetation community provided limited nectar resources to maintain bird populations throughout the year. No Glossy Black-cockatoo (*Calyptorhynchus lathami*) or Gang-gang Cockatoo (*Callocephalon fimbriatum*). No Glossy-black or Gang-gang Cockatoos were identified from the study area despite targeted surveys being undertaken.

3.4.4 Mammals

Habitat for mammals was limited within the study area were limited with remnant trees providing marginal foraging habitat. Common species likely to utilise the remnant trees are those species adapted to urban/rural development e.g. the Brush-tailed Possum and the Common Ring-tail Possum. Habitats for threatened mammals were limited.

The blossoms of the juvenile canopy trees within the study area were not of maturity to provide suitable foraging resources for the Grey-headed Flying-fox (*Pteropus poliocephalus*); this species was not however recorded from the study area during the site inspections.

No suitable caves for threatened cave dwelling bats were recorded from the study area. A number of hollow-bearing trees were identified during the fauna surveys which would provide a suitable roosting site for hollow-dependent microbats species to utilise. All hollow-bearing trees are to be retained.

3.4.5 Fauna habitat types

The suitability, size and configuration of the terrestrial fauna habitats were found to correlate broadly with the structure, floristics, connectivity and quality of the local vegetation community described above. These habitats mostly comprised of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

The condition class of the habitats within PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion was assessed as being in a poor containing some fauna habitat components e.g. feeding and roosting resources.

3.4.6 Fauna microhabitat features

Tree hollows

Hollows develop in *Eucalypts* when the tree is under some form of stress, heartwood decay is present and the tree is sufficiently large to persist when decayed (Gibbons and Lindenmayer 2002). As such, hollows are more likely to occur in older and larger trees; however the abundance and size of hollows may vary within and between species.

Tree hollows typically provide den and nesting habitat for a range of common birds and arboreal mammal species (Gibbons and Lindenmayer 2002), including providing potential habitat for a number of Threatened species including microchiropteran bats and large forest owls. Whether or not tree hollows are used by animals, and which species use them, depends on a number of factors, including hollow characteristics (diameter, height, depth), the number of hollows in a tree, tree health, size, location and spacing (Gibbons and Lindenmayer 2002). No hollow-bearing trees were recorded from the study area however hollows were identified within bio-certified lands. Mitigation measures are proposed below to address removal of hollow-bearing trees as a result of the proposal.

Feeding resources

Fauna occurring in the project locality are likely to use a range of foraging resources including both native and exotic species. Floral feeding resources were limited within the study area notwithstanding Casuarina/Eucalypts provide some seasonal foraging resources for mobile species to utilise when in flower.

3.4.7 State Environmental Planning Policy (Koala Habitat Protection) 2021

The subject property is not mapped on the Koala Development Application Map. The subject property does not form part of an approved Koala plan of management.

PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion contains one Koala feed tree species: *Eucalyptus amplifolia* (Cabbage Gum*)* listed on Schedule 2 of State Environmental Planning Policy (Koala Habitat Protection) 2021.

No Koalas were observed during the fauna survey and there was no evidence (Scats or scratches) of previous Koala habitation in the area. The study area is also not considered to be ‘Core Koala Habitat’ as defined by State Environmental Planning Policy (Koala Habitat Protection) 2021.

As no Koalas or evidence of Koalas were detected within the study area no further assessment under this Policy is required.

3.5 Threatened biodiversity

This section details the threatened biodiversity recorded or likely to occur within the study area. This is based on those species recorded or predicted to occur within the locality from database searches (Table 2-1) and the nature of the habitats observed within the vicinity of the proposed works during field surveys (Appendices C and D).

No flora and fauna species were considered to have medium or high likelihood of occurrence within the study area; as such no significance assessment has been prepared.

3.5.1 Threatened ecological communities

Eleven endangered ecological communities were identified from desktop review to occur within the locality of the study area (Table 3-1).

Table 3-1 Endangered Ecological Communities known from the Locality

Scientific Name	Level of Threat
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	Endangered Ecological Community
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Maroota Sands Swamp Forest	Endangered Ecological Community
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	Endangered Ecological Community
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Shale/Sandstone Transition Forest	Critically Endangered Ecological Community
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Sydney Turpentine-Ironbark Forest	Critically Endangered Ecological Community
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	Endangered Ecological Community

One threatened Endangered Ecological Community (EEC) was recorded within the study area. PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion corresponds with the EEC known as River-Flat Eucalypt Forest on Coastal Floodplains (RFEFCF) (Figure 3-1), which is listed under the *BC Act*.

An impact assessment (5-part test) has been prepared in accordance with Section 7.3 of the *BC Act* to determine *w*hether the proposal would be likely to have a significant impact upon the River-Flat Eucalypt Forest on Coastal Floodplains community (refer Appendix C).

An assessment of significance under the EPBC Act was not required as the River-Flat Eucalypt Forest on Coastal Floodplains within the site does not meet the EPBC assessment criteria to be considered to be representative of this community.

3.5.2 Endangered populations

Two threatened populations were identified from the desktop review to occur within the locality of the study area:

- *Marsdenia viridiflora subsp. viridiflora* - endangered population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas; and
- *Dillwynia tenuifolia* - endangered population (Kemps Creek)

No endangered populations were identified within the study area despite suitable habitat being recorded from the study area

3.5.3 Threatened Flora

Forty-four threatened species of plant listed under the *BC Act* and/or *EPBC Act* were predicted to occur within the locality of the study area based on database searches (refer Appendix B).

Based on targeted surveys within the study area none are considered to have suitable habitat within the study area. No further consideration is required for threatened flora species.

3.5.4 Threatened fauna

Fifty threatened fauna species were identified as a result of the database searches as occurring or having potential to occur within the locality of the study area (Appendix D).

Based on the habitat assessment and targeted surveys there is potential habitat within the study area for seven threatened fauna species that may be impacted through the removal of foraging habitat (Appendix D). Impact assessments have been prepared for these species (Appendices E & F).

3.5.5 Migratory species

Migratory species are protected under the international agreement to which Australia is a signatory, including the Japan-Australia Migratory Bird Agreement, the China-Australia Migratory Bird Agreement and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered Matters of National Environmental Significance and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

Eleven migratory species were identified from the Department of Sustainability, Environment, Water, Population and Communities (Department of Sustainability, Environment, Water, Population and Communities 2021) within the locality (Appendix D). None were recorded during the site inspections. Two migratory species were considered to have suitable habitat within the study area (Table 3-2).

Table 3-2 Migratory Species considered to have suitable habitat within the study area

Scientific Name	Common Name	EPBC Act
Birds		
Monarcha melanopsis	Black-faced Monarch	M
Rhipidura rufifrons	Rufous Fantail	M

The study area is not considered to be important habitat for any Migratory species in accordance with the EPBC Act.

3.6 Critical habitat

Critical habitat is listed under both the *Biodiversity Conservation Act 2016* and the *Environment Protection and Biodiversity Conservation Act 1999.* Critical habitat is the whole or any part or parts of an area or areas of land comprising the habitat of an endangered species, an endangered population or an endangered ecological community that is critical to the survival of the species, population or ecological community (Department of Environment and Conservation 2004).

The Directors-Generals of both the State and Federal departments of environment (Department of Environment and Climate Change and the Department of the Environment, Water, Heritage and the Arts respectively) maintain a register of critical habitat. Habitat that is not listed on these register, however consistent with the definition above, may also be considered as critical habitat.

No listed critical habitat occurs within the study area and no critical habitat is likely to be affected by the proposal.

4. Impacts

The following discussion presents an assessment of the potential impacts of the proposal on biodiversity within the study area.

4.1 Impacts on threatened species, endangered populations and endangered ecological communities

One threatened Endangered Ecological Community (EEC) was recorded within the study area. PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion corresponds with the EEC River-Flat Eucalypt Forest on Coastal Floodplains (RFEFCF) (Figure 3-1), which is listed under the *BC Act*. This community is to be retained and protected within the study area.

Seven threatened fauna species listed under the *BC Act* and/ or the *EPBC Act* were recorded, predicted to occur, or have habitat within the vicinity (10 km radius) of the study area. Impact assessments have been prepared for these species which has concluded that the proposal is not likely to have a significant impact upon threatened species, endangered populations or endangered ecological communities (Appendices E & F).

4.2 Key threatening processes

Key Threatening Process under the *Biodiversity Conservation Act* that are likely to further increase within the study area are:

- Clearing of native vegetation.
- Infection of native plants by *Phytophthora cinnamomi* - key threatening process listing. The proposal has potential to introduce or spread *Phytophthora cinnamomi* within the development area and into adjacent bushland. Mitigation measures are to be implemented to prevent spread of *Phytophthora cinnamomi*. Mitigation measures have been put in place to reduce the chance of infection of *Phytophthora cinnamomi* into the study area.
- Human Caused Climate Change.

4.3 Mitigation measures

4.3.1 Animal welfare

Animal injury has potential to occur throughout various construction operations. In the event that any sick, injured or orphaned native animals are located during construction, WIRES should be contacted to assist in capture, handling and welfare of the animal (contact No: 13000 WIRES or 1300 094 737).

A suitably qualified ecologist or wildlife handler should be on site during clearing of vegetation associated with the future dwelling & creation of the asset protection zone. The qualified Ecologist is to hold a Section licence issued under part 2 of the BC Act by the Department of Planning, Industry and Environment and a current Animal Ethics licence issued by the Department of Industries and Investment.

Where possible, dead wood should be salvaged from felled trees and placed into retained vegetation within the study area.

4.3.2 Truck and machine wash down areas

Vehicles and other equipment to be used in clearing within the study area and general construction equipment (such as excavators etc) are to be received completely free of soil, seeds and plant material before entering the site to prevent the introduction of exotic plant species and pathogens, equipment failing inspection should be sent away for cleaning. Appropriate records of inspections shall be maintained.

Build-up of mud, soil and organic matter present on vehicles during wet and muddy conditions shall be manually removed prior to vehicles entering/leaving the construction site.

Works and vehicular movements shall cease if wet and muddy conditions develop/persist during construction zone clearing to limit the movement of soil and organic matter onto, through and from the study area, minimising the potential for the spread of weeds.

5. Significance Assessments

5.1 Background to the Five Part Test

No threatened flora are considered likely to be impacted upon as a result of the proposed development therefore no Significance assessments are considered to be required for those species identified as containing suitable habitat within the subject site (Table 5-1). The proposed development will not likely result in a significant impact to any Threatened species or community (Table 5-1).

Table 5-1 Suitable habitat (Fauna) from the subject site

Species Name		Conservation Status		Likely to be significantly affected
		State [1]	National [2]	
Endangered Ecological Communities				
River-Flat Eucalypt Forest on Coastal Floodplains	RFEFCF	**E**	**-**	**No**
Threatened Fauna				
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	**No**
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		**No**
Miniopterus schreibersii	Eastern Bent-wing Bat	V		**No**
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	**No**
Mormopterus norfolkensis	Eastern Freetail-bat	V		**No**
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V		**No**
Scoteanax rueppellii	Greater Broad-nosed Bat	V		**No**

Notes:

1. State conservation status: V= Vulnerable, E1 = Endangered, (*Biodiversity Conservation Act 2016* and *Fisheries Management Act 1994*). * indicates species listed under the *Fisheries Management Act 1994.*

2. National conservation status: V = Vulnerable, (*Environment Protection and Biodiversity Conservation Act 1999*)

6. Conclusions

Targeted surveys did not identify any threatened flora, endangered population's listed under the *BC* or the *EPBC Acts* within the study area.

One threatened Endangered Ecological Community (EEC) was recorded within the study area. PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion corresponds with the EEC known as River-Flat Eucalypt Forest on Coastal Floodplains which is listed under the *BC Act*.

The site contains a highly disturbed example of endangered ecological community River-Flat Eucalypt Forest on Coastal Floodplains as scattered canopy trees predominantly over exotic pasture.

The proposed development will remove approximately 0.05ha or 500m2 of the EEC River-Flat Eucalypt Forest on Coastal Floodplains. The area of vegetation loss is an overestimate and takes into consideration of potential soil seed bank. The Biodiversity Assessment Method describes ground cover as not native if:
The native vegetation that comprises the groundcover is:

I. less than 50% of the cover of indigenous species of vegetation, and

II. not less than 10% of the area is covered with vegetation (whether dead or alive), and

III. the assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum.

PCT 835 within the project site contained less than 50% ground vegetation therefore the mapping of the extent of this community could have been restricted to the canopies of the remnant trees which would have resulted in the area of clearing being approximately 0.025ha or 250m2.

The study area was identified as containing marginal foraging habitat for seven species of bats: the Large-eared Pied Bat, Eastern False Pipistrelle, Eastern Bent-wing Bat, Grey-headed Flying-fox, Eastern Freetail-bat, Yellow-bellied Sheathtail Bat and the Greater Broad-nosed Bat.

Significance assessments were undertaken for these Threatened flora and fauna species. These assessments concluded that the proposal was unlikely to have a significant impact on these species. This was based on the following criteria:

- The security of larger threatened flora populations within the locality of the study area
- relatively small size of foraging and roosting habitat to be removed as part of the proposal
- larger areas of better quality vegetation were noted at the time of the survey to the north & north-east and within reserves and retained elsewhere within the study area.
- these species are all highly mobile and would utilise vegetation within the locality and not the study area exclusively

As such, the project is unlikely to have a significant impact on the ecological features of the local area.

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Appendix A

Species of flora recorded

Table 7-1 Flora species recorded within the study area

Family Name	Scientific Name	Common Name	Native	Q1	RM
Asclepiadaceae					
	Araujia sericifera	Moth Vine	N	1	X
Asparagaceae					
	Asparagus aethiopicus	Asparagus Fern	N	1	X
Asteraceae					
	Bidens pilosa	Cobbler's Pegs	N	-	X
	Cirsium vulgare	Spear Thistle	N	-	X
	Conyza albida	Tall Fleabane	N	1	X
	Conyza bonariensis	Flaxleaf Fleabane	N	1	X
	Gamochaeta americana	American Cudweed	N	3	X
	Onopordum acanthium		N	2	X
	Senecio madagascariensis	Fireweed	N	1	X
	Sonchus oleraceus	Common Sowthistle	N	-	X
	Vittadinia cuneata	Fuzzweed	Y	1	X
Casuarinaceae					
	Casuarina glauca	Swamp Oak	Y	3	X
Convolvulaceae					
	Dichondra repens	Kidney Weed	Y	3	X
Euphorbiaceae					
	Poranthera microphylla		Y	-	X
Fabaceae (Faboideae)					
	Trifolium repens	White Clover	N	-	X
Malvaceae					
	Sida corrugata	Vaiable Sida	Y	1	X
	Sida rhombifolia	Paddy's Lucerne	N	1	X
Myrtaceae					
	Eucalyptus amplifolia	Cabbage Gum	Y	2	X
Oleaceae					
	Ligustrum lucidum	Large-leaved Privet	N	1	X
Oxalidaceae					
	Oxalis perennans		Y	2	X
Plantaginaceae					
	Plantago lanceolata	Lamb's Tongues	N	3	X
Poaceae					
	Cynodon dactylon	Common Couch	Y	3	X
	Ehrharta erecta	Panic Veldtgrass	N	3	X
	Paspalum dilatatum	Paspalum	N	3	X
	Pennisetum clandestinum	Kikuyu Grass	N	3	X
	Setaria gracilis	Slender Pigeon Grass	N	2	X
Polygonaceae					
	Rumex crispus	Curled Dock	N	1	X
Primulaceae					
	Anagallis arvensis	Scarlet/Blue Pimpernel	N	-	X
Solanaceae					
	Solanum linnaeanum	Apple of Sodom	N	1	X
Verbenaceae					
	Verbena rigida	Veined Verbena	N	1	X
Cover/abundance scale 1-6					
1	<5% - Rare or few individuals	3 or less individuals			
2	<5% - Common	Consistent throughout plot			
3	Cover >5% and <25%				
4	Cover >25% and <50%				
5	Cover >50% and <75%				
6	Cover >75%				

Appendix B

Species of animal recorded

Table 7-2 Fauna species recorded during flora and fauna survey

Family Name	Common Name	Scientific Name	Observation Type
Amphibians			
Myobatrachidae	Common Eastern Froglet	*Crinia signifera*	C
Reptiles			
Scincidae	Eastern Water Skink	*Eulamprus quoyii*	O
Scincidae	Garden Skink	*Lampropholis guichenoti*	O
Birds			
Anatidae	Australian Wood Duck	*Chenonetta jubata*	O, C
Anatidae	Grey Teal	*Anas gracilis*	Fl
Artamidae	Australian Magpie	*Gymnorhina tibicen*	O, C
Artamidae	Pied Butcherbird	*Cracticus nigrogularis*	O
Artamidae	Grey Butcherbird	*Cracticus torquatus*	O
Cacatuidae	Galah	*Cacatua roseicapilla*	O, C
Cacatuidae	Sulphur Crested -Cockatoo	*Cacatua galerita*	O
Columbidae	Spotted Turtle-Dove	*Streptopelia chinensis*	O
Dicruridae	Magpie-lark	*Grallina cyanoleuca*	O, C
Dicruridae	Willie Wagtail	*Rhipidura leucophrys*	O
Halcyonidae	Laughing Kookaburra	*Dacelo novaeguineae*	O,F
Meliphagidae	Noisy Miner	*Manorina melanocephala*	O
Meliphagidae	Red Wattlebird	*Anthochaera carunculata*	O
Meliphagidae	White-eared Honeyeater	*Lichenostomus leucotis*	O
Passeridae	House Sparrow	*Passer domesticus*	O
Psittacidae	Australian King-Parrot	*Alisterus scapularis*	O
Psittacidae	Crimson Rosella	*Platycercus elegans*	O
Psittacidae	Rainbow Lorikeet	*Trichoglossus haematodus*	O, C
Sturnidae	Common Myna	*Acridotheres tristis*	O
Mammals			
Petauridae	Common Ringtail Possum	*Pseudocheirus peregrinus*	Sc
Phalangeridae	Common Brushtail Possum	*Trichosurus vulpecula*	Sc

Key:

A - Anabat II	C	-	Call Identification
D - Diggings	Ct	-	Cage Trap
E - Elliot Trap	Fl	-	Flying over study area
O - Observation	P	-	Call Playback Response
F - Feather	S	-	Habitat Search
Sp - Spotlight	Sc	-	Scat, Track

Appendix C

Threatened flora species recorded in the locality

Appendix C Threatened Flora species recorded in the locality

This appendix details the Threatened species of plant that have either been recorded in the local area based on records the Bionet *Atlas of NSW Wildlife* Department of Planning, Industry and Environment, 2021, data received 23rd of May 2021 and records from the Royal Botanical Gardens. Threatened species with habitat likely to occur in the locality were also considered based on records from the *EPBC Protected Matters Search Tool* Department of Sustainability, Environment, Water, Population and Communities 2021, data received 23rd of May 2021.

Table 7-3 Threatened flora species recorded in the locality

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Asclepiadaceae	*Cynanchum elegans*	White-flowered Wax Plant	E1	E	3Ei	Occurs from the Gloucester district to the Wollongong area and inland to Mt Dangar where it grows in rainforest gullies, scrub and scree slopes {Harden, 1992 #3}. This species typically occurs at the ecotone between dry subtropical forest/woodland communities {NSW National Parks and Wildlife Service, 2002 #70; James, 1997 #69}.	**Low** No suitable habitat exists from the study area for this species.
Asclepiadaceae	*Marsdenia viridiflora ssp. viridiflora*	Native Pear				Occurs in subcoastal and southern Queensland but rarely in NSW with a disjunct occurrence near Sydney. It occurs as scattered plants in remnant woodland and scrub {NSW Scientific Committee, 2000 #80; Harden, 2002 #5}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Casuarinaceae	*Allocasuarina glareicola*		E1	E		Restricted to the Sydney basin where it occurs north east of Penrith in or near Castlereagh State Forest. Grows on lateritic soil in open forest {Harden, 2000 #2}.	**Low** No suitable habitat exists from the study area for this species.
Epacridaceae	*Epacris purpurascens var. purpurascens*		V		2K	Occurs in Gosford and Sydney districts where it grows in sclerophyll forest, scrub and swamps {Harden, 1992 #3}. Usually found in sites with a strong shale influence {NSW National Parks and Wildlife Service, 2002 #67}.	**Low** No suitable habitat exists from the study area for this species..

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Fabaceae (Faboideae)	*Dillwynia tenuifolia*		V	V	2Vi	Occurs on the Cumberland Plain from the Blue Mountains to Howes Valley area where it grows in dry sclerophyll woodland on sandstone, shale or laterite {Harden, 2002 #5}. Specifically, occurs within Castlereagh woodlands, particularly in shale gravel transition forest. Associated species include *Eucalyptus fibrosa, E. sclerophylla, Melaleuca decora, Daviesia ulicifolia, Dillwynia juniperina* and *Allocasuarina littoralis* {James, 1997 #69}.	**Low** No suitable habitat exists from the study area for this species.
Epacridaceae	*Leucopogon fletcheri ssp. fletcheri*		E1		2R	Grows in dry eucalypt woodland or in shrubland on clay, lateritic soils or Hawkesbury sandstone {Fairley, 2004 #523}. Found on sandstone ridges and upper slopes in heath or woodland, sometimes in or below sandstone-shale ecotone; often associated with lateritic soils with some clay influence {James, 1999 #68; James, 1997 #521}.	**Low** No suitable habitat exists from the study area for this species.
Fabaceae (Faboideae)	*Pultenaea parviflora*		E1	V	2E	Restricted to the Cumberland Plain where it grows in dry sclerophyll forest on Wiannamatta shale, laterite or alluvium {Harden, 2002 #5}. Locally abundant within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. Also occurs in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland {NSW National Parks and Wildlife Service, 2002 #82; James, 1997 #69}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E1	V	3V	Occurs south of Dora Creek-Morisset area to Berrima and the Illawarra region and west to the Blue Mountains. It grows mainly in heath and dry sclerophyll forest on sandy soils {Harden, 2002 #5}. Seems to prefer open, sometimes disturbed sites such as trail margins and recently burnt areas. Typically occurs in association with *Corymbia gummifera, Eucalyptus haemastoma, E. gummifera, E. parramattensis, E. sclerophylla, Banksia serrata* and *Angophora bakeri* {NSW National Parks and Wildlife Service, 1999 #61}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Fabaceae (Mimosoideae)	*Acacia gordonii*		E1	E	2K	Occurs in the lower Blue Mountains from Bilpin to Faulconbridge and also in the Glenorie district. Grows on sandstone outcrops and amongst rock platforms in dry sclerophyll forest and heath {Harden, 2002 #5; NSW Scientific Committee, 1997 #298}. Specifically this species occurs in Sydney Sandstone Ridgetop Communities {James, 1997 #69}.	**Low** No suitable habitat exists from the study area for this species.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	3Va	Restricted to the Sydney Region from Bilpin to the Georges River and also at Woodford where it usually grows in open sclerophyll forest and woodland on clay soils. Typically it occurs at the intergrade between shales and sandstones in gravely soils often with ironstones {Harden, 2002 #5;NSW National Parks and Wildlife Service, 2003 #14}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Haloragaceae	*Haloragis exalata ssp. exalata*		V	V	3Va	Found in the south coast, central coast and north west slopes botanical regions where it appears to require protected and shaded damp situations in riparian habitats {Harden, 2002 #5; Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Darwinia biflora*		V	V	2Va	Occurs from Cheltenham to Hawkesbury River where it grows in heath on sandstone or in the understorey of woodland on shale-capped ridges {Harden, 2002 #5}. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated over-storey species include *Eucalyptus haemastoma, Corymbia gummifera* and/or *E. squamosa.* The vegetation structure is usually woodland, open forest or scrub-heath {Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Eucalyptus camfieldii*	Heart-leaved Stringybark	V	V	2Vi	Occurs from Tomago to the Royal National Park where it grows in coastal shrub heath in sandy soils on sandstone {Harden, 2002 #5}.	**Low** No suitable habitat exists from the study area for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	3V	Occurs from Niangala to Glenn Innes where it grows in grassy sclerophyll woodland on shallow relatively infertile soils on shales and slates (Harden, 1991; DLWC, 2001). Endemic on the NSW Northern Tablelands, of limited occurrence, particularly in the area from Walcha to Glen Innes; often on porphyry or granite (Brooker and Kleinig 1999).	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Eucalyptus scoparia*		E1	V	2Vi	Occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from three locations all near Tenterfield in the far northern New England Tableland Bioregion where it grows on well drained granitic hilltops, slopes and outcrops, often as scattered trees in open forest and woodland {Royal Botanic Gardens, 2004 #9}.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Leptospermum deanei*		V	V	2V	Only occurs near the watershed of Lane Cove River where it grows on forested slopes {Harden, 2002 #5}.Woodland on lower hills and slopes or near creeks, sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub- e.g. *Tristaniopsis laurina, Baechea myrtifolia*, Woodland- e.g. *Eucalyptus haemstoma* and Open Forest - e.g. *Angophora costata, Leptospermum trinervium* and *Banksia ercifolia*.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Melaleuca biconvexa*	Biconvex Paperbark	V	V		Occurs as disjunct populations in coastal New South Wales from Jervis Bay to Port Macquarie, with the main concentration of records is in the Gosford/Wyong area {NSW Scientific Committee, 1998 #145}. Grows in damp places, often near streams, or low-lying areas on alluvial soils of low slopes or sheltered aspects {Harden, 2002 #5; Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	*Melaleuca deanei*		V	V	3R	Occurs in coastal districts, including western Sydney (e.g. Baulkham Hills, Liverpool shires) from Berowra to Nowra where it grows in wet heath on sandstone and shallow/skeletal soils near streams or perched swamps {James, 1997 #69; Harden, 2002 #5}.	**Low** No suitable habitat exists from the study area for this species.
Myrtaceae	Micromyrtus minutiflora		E1	V	2V	Occurs in the western part of the Cumberland Plain between Richmond and Penrith where it grows on Tertiary sediments in dry sclerophyll forest {NSW Scientific Committee, 2002 #98; Harden, 2002 #5}.	**Low** No suitable habitat exists from the study area for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	V	V	3Ri	Occurs between Buladelah and St Georges Basin where it grows in subtropical and littoral rainforest on sandy soils or stabilized dunes near the sea {Harden, 2002 #5}. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities {Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V	V	3V	Occurs south from the Gibraltar Range, chiefly in coastal districts but also extends on to tablelands. Grows in swamp-heath and drier forest on sandy soils on granite & sandstone. Occurs in small, localised colonies most often on the flat plains close to the coast but also known from some mountainous areas growing in moist depressions and swampy habitats {Harden, 1993 #4; NSW National Parks and Wildlife Service, 1999 #502}.	**Low** No suitable habitat exists from the study area for this species.
Orchidaceae	*Genoplesium baueri*		V		3R	Grows in sparse sclerophyll forest and moss gardens over sandstone; from the Hunter Valley to Nowra district {Royal Botanic Gardens, 2004 #9}.	**Low** No suitable habitat exists from the study area for this species.
Orchidaceae	*Pterostylis gibbosa*		E1	E	2E	Occurs in the southern part of the Central Coast region with a disjunct population in the Hunter Valley. Grows among grass in sclerophyll forest {Harden, 2002 #5}. In the Illawarra it grows in Coastal Grassy Red Gum Forest and in Lowland Woolybutt-Melaleuca forest {NSW National Parks and Wildlife Service, 2003 #73}.	**Low** No suitable habitat exists from the study area for this species.
Orchidaceae	*Pterostylis saxicola*	Sydney Plains Greenhood	E1	E		Known now only from Freemans Reach to Picton district. Grows in Sydney Sandstone Gully Forest in shallow or skeletal soils over sandstone shelves, often near streams {Harden, 1993 #4; James, 1997 #69; Department of Environment and Climate Change, 2007 #1653}	**Low** No suitable habitat exists from the study area for this species.
Polygonaceae	*Persicaria elatior*	Tall Knotweed	V	V	3V	Occurs infrequently in coastal regions where it grows in damp places especially beside streams and lakes. Also occasionally occurs in swamp forest or associated with disturbance {Department of Environment and Conservation, 2005 #762; Harden, 2000 #2}.	

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Proteaceae	*Grevillea juniperina ssp. juniperina*		V			Restricted to western Cumberland Plain, Marsden Park, Rooty Hill, Riverstone, Plumpton, Castlereagh NR, Blacktown, Penrith and north to Pitt Town, where it grows in open dry sclerophyll (eucalypt-dominated) forest or woodland, at altitudes of less than about 50 m, in sandy to clay-loam soils and red pseudolateritic or sandy gravels {Royal Botanic Gardens, 2005 #404; Fairley, 2004 #523}. More specifically it grows in Cumberland Plain Woodland and Castlereagh Woodland, typically in moist sites, often beside creeks on acidic soils and often recorded on road verges. Restricted to red sandy to clay soils (often lateritic) on Wianamatta Shale and Tertiary Alluvium {NSW Scientific Committee, 2000 #582}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Proteaceae	*Grevillea parviflora ssp. parviflora*	Small-flower Grevillea	V	V		Mainly known from the Prospect area (but now extinct there) and lower Georges River to Camden, Appin and Cordeaux Dam areas, with a disjunct populations near Putty, Cessnock and Cooranbong. Grows in heath or shrubby woodland in sandy or light clay soils usually over thin shales {NSW Scientific Committee, 1998 #78; Harden, 2002 #5}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Proteaceae	*Persoonia hirsuta*		E1	E	3Ki	Occurs in central coast and central tableland districts where it grows in woodland to dry sclerophyll forest on sandstone {Harden, 2002 #5} and rarely shale {NSW Scientific Committee, 1998 #64}. Often occurs in areas with clay influence, in the ecotone between shale and sandstone {James, 1997 #69}.	**Low** No suitable habitat exists from the study area for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Proteaceae	*Persoonia mollis ssp. maxima*		E1	E	2E	Restricted to the Hornsby Heights, Mt Colah area north of Sydney. It occurs on sheltered upper hillsides of narrow gullies of Hawkesbury sandstone characterised his by steep side slopes, rocky benches and broken scarps, with creeks fed by small streams and intermittent drainage depressions. It grows in moist, tall forest (*Angophora costata, Eucalyptus piperita, Corymbia gummifera*), often with warm temperate rainforest influences (*Syncarpia glomulifera, Ceratopetalum apetalum, Callicoma serratifolia*). Sometimes recorded in low densities on the dry upper-hillsides of gullies and in more exposed aspects in association *with E. haemastoma* and *E. punctata* {NSW National Parks and Wildlife Service, 2000 #19}.	**Low** No suitable habitat exists from the study area for this species.
Proteaceae	*Persoonia nutans*	Nodding Geebung	E1	E	2Ei	Confined to the Cumberland Plain where it grows in Castlereagh Scribbly Gum Woodlands and Agnes Banks Woodlands {NSW National Parks and Wildlife Service, 2001 #77; Harden, 2002 #5; James, 1997 #69}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.
Rhamnaceae	*Pomaderris brunnea*		V	V	2V	Confined to the Colo and Upper Nepean Rivers where it grows in open forest {Harden, 2000 #2}; in western Sydney (Camden to Picton area) known from sandy alluvium on levee and creek banks {James, 1997 #69}.	**Low** No suitable habitat exists from the study area for this species.
Sterculiaceae	*Lasiopetalum joyceae*		V	V	2R	Occurs on lateritic to shaley ridgetops of the Hornsby Plateau where it grows in heath and open woodland in sandy soils on sandstone {NSW Scientific Committee, 1999 #18;Harden, 2000 #2;Fairley, 2002 #15}.	**Low** No suitable habitat exists from the study area for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Santalaceae	*Thesium australe*	Austral Toadflax	V	V	3Vi	Grows in grassland or woodland often in damp sites. It is a semi-parasitic herb and hosts are likely to be Themeda australis and Poa spp. {Harden, 1992 #3; Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.
Thymelaeaceae	*Pimelea curviflora var. curviflora*		V	V		Confined to coastal areas around Sydney where it grows on sandstone and laterite soils. It is found between South Maroota, Cowan, Narrabeen, Allambie Heights, Northmead and Kellyville, but its former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Usually occurs in woodland in the transition between shale and sandstone, often on Lucas Heights soil landscape {NSW Scientific Committee, 1998 #65; James, 1997 #69; James, 1999 #68; Harden, 2000 #2}.	**Low** No suitable habitat exists from the study area for this species.
Thymelaeaceae	*Pimelea spicata*		E1	E	3Ei	This species occurs in two disjunct areas: in coastal districts from Lansdowne to Shellharbour, and in Cumberland Plain Woodland inland to Penrith. In western Sydney it grows on Wianamatta Shales in Greybox - Ironbark Woodland with *Bursaria spinosa* and *Themeda australis*. In the Illawarra, it occurs on well structured clay soils in grassland or open woodland {NSW National Parks and Wildlife Service, 2000 #75; Harden, 2000 #2; James, 1997 #69}.	**Low** Targeted surveys have been undertaken for this species which failed to detect this species within the study area. No impact assessment is considered to be warranted for this species.

Family Name	Scientific Name	Common Name	BC Act[1]	EPBC Act[3]	ROTAP[2]	Habitat	Likelihood of occurrence within the study area
Tremandraceae	*Tetratheca glandulosa*		V	V	2V	Occurs from Mangrove Mountain to the Blue Mountains where it grows in sandy or rocky heath or scrub {Harden, 1992 #3}. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridge tops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Benson & Howell's Sydney Sandstone Ridge top Woodland (Map Unit 10ar). Common woodland tree species include: *Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa,* and/or *E. sparsifolia*, with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae {Department of Environment and Climate Change, 2008 #1913}.	**Low** No suitable habitat exists from the study area for this species.

1) V= Vulnerable, E1 = Endangered (BC Act) E2= Endangered Population **2)** ROTAP (Rare or Threatened Australian Plants, Briggs and Leigh 1996) is a conservation rating for Australian plants. 1 = Species only known from one collection. 2 = Species with a geographic range of less than 100km in Australia. 3 = Species with a geographic range of more than 100km in Australia, X = Species presumed extinct; no new collections for at least 50 years. E = Endangered species at risk of disappearing from the wild state if present land use and other causal factors continue to operate, V = Vulnerable species at risk of long-term disappearance through continued depletion. R = Rare, but not currently considered to be endangered. K = Poorly known species that are suspected to be threatened. C = Known to be represented within a conserved area. a = At least 1,000 plants are known to occur within a conservation reserve(s). i = Less than 1,000 plants are known to occur within a conservation reserve(s). The reserved population size is unknown. t = The total known population is reserved. + = The species has a natural occurrence overseas. **3)** V = Vulnerable, E = Endangered *(Environment Protection and Biodiversity Conservation Act 1999*).

Appendix D

Threatened fauna species recorded in the locality

Appendix D Threatened Fauna species recorded in the locality

This appendix details the Threatened species of plant that have either been recorded in the local area based on records the *Atlas of NSW Wildlife* Department of Environment & Heritage, 2021, data received 23rd of May 2021 and records from the Royal Botanical Gardens. Threatened species with habitat likely to occur in the locality were also considered based on records from the *EPBC Protected Matters Search Tool* Department of Sustainability, Environment, Water, Population and Communities 2020, data received 23rd of May 2021.

Table 7-4 Threatened fauna species recorded in the locality

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Amphibians					
Heleioporus australiacus	Giant Burrowing Frog	V	V	Appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin, from Wollemi National Park in the north and extending south to Jervis Bay; and a southern population occurring in disjunct pockets from about Narooma south into eastern Victoria. In the northern population there is a marked preference for sandstone ridge-top habitat and broader upland valleys. In these locations the frog is associated with small headwater creek-lines and along slow flowing to intermittent creek-lines. The vegetation is typically woodland, open woodland and heath and may be associated with 'hanging swamp' seepage lines and where small pools form from the collected water. They have also been observed occupying artificial ponded structures such as fire dams, gravel 'borrows', detention basins and box drains that have naturalised over time and are still surrounded by other undisturbed habitat. In the southern population, records from Narooma, Bega, Bombala and eastern Victoria appear to be associated with Devonian igneous and sedimentary formations and Ordovician metamorphics and are generally from more heavily timbered areas. However, again there appears to be an association with ridge-tops, headwaters and slow flowing streams. Do not appear to inhabit areas that have been cleared for agriculture or for urban development. Breed in summer and autumn in burrows in the banks of small creeks. Often spends significant periods of time underground during unfavourable conditions and to avoid detection during the day. (Cogger 2000; NSW National Parks and Wildlife Service 2001).	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Litoria aurea	Green and Golden Bell Frog	E1	V	Has a fragmented distribution of mainly near coastal locations from Lakes Entrance (Victoria) to south of the NSW-Queensland border;as far west as Bathurst in the more elevated southern tablelands and central slopes of NSW. Various types of habitat utilised has been documented. For breeding utilises a wide range of waterbodies, including both natural and man-made structures, such as marshes, dams and stream sides, and ephemeral locations that are more often dry than wet. Is found in various small pockets of habitat in otherwise developed areas and has the tendency of often turning up in highly disturbed sites. Lotic situations such as fast flowing streams appear to be one of the few water bodies not utilised, at least for breeding purposes. Habitat attributes associated with the various waterbodies occupied by the GGBF, and that appear to make such habitat more likely to be occupied, include that the water body is shallow, still or slow flowing, ephemeral and/or widely fluctuating, unpolluted and without heavy shading. Permanent waterbodies are also known to be used and there is historical evidence of occupation of large, often deep and permanent bodies of water. There is a clear preference shown by GGBF for sites with a complexity of vegetation structure and associated terrestrial habitat attributes that appear to favour the species include extensive grassy areas and an abundance of shelter sites such as rocks, logs, tussock forming vegetation and other cover, considered to be used for foraging and shelter. Over-wintering sites may be adjacent to or some distance away from breeding sites; such sites include the bases of dense vegetation tussocks, beneath rocks, timber, within logs or beneath ground debris, including human refuse such as sheet iron, but the full range of possible habitat used for this purpose is not yet well understood {Department of Environment and Conservation, 2004 #397; Department of Environment and Conservation, 2005 #398} .	**Low** No suitable habitat was recorded from the study area for this species.
Litoria littlejohni	Heath Frog	V	V	Distributed along the eastern slopes of the Great Dividing Range from Watagan State Forest near Wyong, south to Buchan in north-eastern Victoria. It appears to be restricted to sandstone woodland and heath communities at mid to high altitude. It forages both in the tree canopy and on the ground, and it has been observed sheltering under rocks on high exposed ridges during summer. It is not known from coastal habitats (NSW Scientific Committee 2000).	**Low** No suitable habitat was recorded from the study area for this species.
Mixophyes balbus	Stuttering Frog	E1	V	Terrestrial species, found in rainforest, Antarctic beech forest or wet sclerophyll forest. The species depends on freshwater streams and riparian vegetation for breeding and habitation. No records are known from riparian habitat that has been disturbed (Cogger 2000; NSW Scientific Committee 2003).	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Mixophyes iteratus	Giant Barred Frog	E1	E	Terrestrial species which occurs in rainforests, antarctic beech or wet sclerophyll forests. Feeds on insects and smaller frogs (Cogger 2000). The species is associated with permanent flowing drainages, from shallow rocky rainforest streams to slow-moving rivers in lowland open forest. It is not known to utilise still water areas (NSW Scientific Committee 1999). More prevalent at lower altitudes and in larger streams than its congeners, although has been recorded up to 1000 metres asl. (NSW National Parks and Wildlife Service 1999).	**Low** No suitable habitat was recorded from the study area for this species.
Fish					
Macquaria australasica	Macquarie Perch		E	The natural range of Macquarie Perch included the upper and middle reaches of the Murray-Darling basin as well as the Shoalhaven and Hawkesbury Rivers. However, this species has recently been sighted in only a few localities within these river systems. Preferred habitat is deep holes covered with rocks, and spawning occurs above shallow running water. Macquarie Perch is a schooling species (Department of the Environment and Water Resources, 2007).	**Low** No suitable habitat was recorded from the study area for this species.
Prototroctes maraena	Australian Grayling		V	It is a mid-water, freshwater species that occurs most commonly in clear, gravely streams with a moderate flow. Prefers deep, slow flowing pools (NSW Fisheries 2004).	**Low** No suitable habitat was recorded from the study area for this species.
Invertebrates					
Petalura gigantea	Giant Dragonfly	E1		Found in permanent wetlands, both coastal and upland from moss Vale northwards to southern Queensland (Department of Environment and Conservation 2005).	**Low** No suitable habitat was recorded from the study area for this species.
Birds					
Apus pacificus	Fork-tailed Swift		M	Breeds from central Siberia eastwards through Asia, and is migratory, wintering south to Australia. Individuals never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks (Higgins 1999).	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Ardea alba	Great Egret		M	Great Egrets occur throughout most of the world. They are common throughout Australia, with the exception of the most arid areas. Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups. In Australia, the breeding season of the Great Egret is normally October to December in the south and March to May in the north. This species breeds in colonies, and often in association with cormorants, ibises and other egrets. (Australian Museum 2003).	**Low** No suitable habitat was recorded from the study area for this species.
Ardea ibis	Cattle Egret		M	*Subsepecies A. i. coromanda* is found across the Indian subcontinent and Asia as far north as Korea and Japan, and in South-east Asia, Papua New Guinea and Australia (McKilligan 2005).	**Low** No suitable habitat was recorded from the study area for this species.
Callocephalon fimbriatum	Gang-gang Cockatoo	V		Occurs in wetter forests and woodland from sea level to an altitude over 2000 metres, timbered foothills and valleys, coastal scrubs, farmlands and suburban gardens (Pizzey and Knight 1997).	**Low** No suitable habitat was recorded from the study area for this species.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		Occurs in eucalypt woodland and forest with Casuarina/Allocasuarina spp. Characteristically inhabits forests on sites with low soil nutrient status, reflecting the distribution of key Allocasuarina species. The drier forest types with intact and less rugged landscapes are preferred by the species. Nests in tree hollows (NSW National Parks and Wildlife Service 1999; Garnett and Crowley 2000).	**Low** No suitable habitat was recorded from the study area for this species.
Climacteris picumnus	Brown Treecreeper	V		Occurs in eucalypt woodland and adjoining vegetation. Feeds on ants, beetles and larvae on trees and from fallen timber and leaf litter. Usually nests in hollows (Garnett and Crowley 2000).	**Low** No suitable habitat was recorded from the study area for this species.
Hieraaetus morphnoides	Little Eagle	V		The little eagle is a medium sized bird, the Little Eagle occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia Woodlands of interior NSW are also used. Nest in tall living trees within a remnant patch, where pairs build a large nest stick nest in winter.	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Artamus cyanopterus	Dusky Woodswallow	V		Habitat; woodlands and dry open sclerophyll forest usually dominated by eucalypts including mallee associations. It has been recorded from shrublands and heathlands and various forms of modified habitat including regenerating forest and very occasionally in moist forest and rainforests.	**Low** No suitable habitat was recorded from the study area for this species.
Botaurus poiciloptilus	Australasian Bittern	V		Occurs in shallow, vegetated freshwater or brackish swamps. Requires permanent wetlands with tall dense vegetation, particularly bulrushes and spikerushes. When breeding, pairs are found in areas with a mixture of tall and short sedges but will also feed in more open territory. {Garnett, 2000 #21; NSW National Parks and Wildlife Service, 2002 #320}.	**Low** No suitable habitat was recorded from the study area for this species.
Ninox strenua	Powerful Owl	V		A sedentary species with a home range of approximately 1000 hectares it occurs within open eucalypt, casuarina or callitris pine forest and woodland. It often roosts in denser vegetation including rainforest of exotic pine plantations. Generally feeds on medium-sized mammals such as possums and gliders but will also eat birds, flying-foxes, rats and insects. Prey are generally hollow dwelling and require a shrub layer and owls are more often found in areas with more old trees and hollows than average stands (Garnett and Crowley 2000).	**Low** No suitable habitat was recorded from the study area for this species.
Lophoictinia isura	Square-tailed Kite	V		This species hunts primarily over open forest, woodland and mallee communities as well as over adjacent heaths and other low scrubby habitats in wooded towns. It feeds on small birds, their eggs and nestlings as well as insects. Seems to prefer structurally diverse landscapes {Garnett, 2000 #21}.	**Low** No suitable habitat was recorded from the subject site for this species.
Melithreptus gularis gularis	Black-chinned Honeyeater	V		Found in dry eucalypt woodland particularly those containing ironbark and box. Occurs within areas of annual rainfall between 400-700 mm. Feed on insects, nectar and lerps {Garnett, 2000 #21}.	**Low** No suitable habitat was recorded from the subject site for this species
Neophema pulchella	Turquoise Parrot	V		Occurs in the foothills of the great dividing range in eucalypt woodlands and forests with a grassy or sparsely shrubby understorey. Nests in hollows in trees, stumps or even fence posts. It feeds on seeds of both native and introduced grass and herb species {Garnett, 2000 #21}.	**Low** No suitable habitat was recorded from the subject site for this species

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Oxyura australis	Blue-billed Duck	V		Relatively sparse throughout species range. Regularly found breeding in south-east Queensland, north-east South Australia and throughout New South Wales. Found on temperate, fresh to saline, terrestrial wetlands, and occupies artifical wetlands. Prefers deep permanent open water, within or near dense vegetation. Nest in rushes, sedge, Lignum Muehlenbeckia cunnighamii and paperbark Melaleuca {Garnett, 2000 #21}.	**Low** No suitable habitat was recorded from the subject site for this species.
Burhinus grallarius	Bush Stone-curlew	E1		Require sparsely grassed, lightly timbered, open forest of woodland. In southern Australia they often occur where there is a well structured litter layer and fallen timber debris. Feed on a range of invertebrates and small vertebrates, as well as seeds and shoots {NSW National Parks and Wildlife Service, 1999 #53; NSW National Parks and Wildlife Service, 2003 #54}.	**Low** No suitable habitat was recorded from the study area for this species.
Petroica phoenicea	Flame Robin	V		Breeds in upland tall moist eucalypt forest and woodland often on ridges and slopes. Prefers clearing or areas with open understorey. The groundlayer of breeding habitat is dominated by native grasses and shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest and also in herb fields heathlands shrublands and sedgeland in high altitudes.	**Low** No suitable habitat was recorded from the study area for this species.
Calidris ferruginea	Curlew Sandpiper		M	Occurs in inter-tidal mudflats of estuaries, lagoons, mangrove channels and also around lakes, dams, floodwaters and flooded saltbush surrounding inland lakes {Morcombe, 2003 #992}.	**Low** No suitable habitat was recorded from the study area for this species.
Daphoenositta chrysoptera	Varied Sittella	V		Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	**Low** No suitable habitat was recorded from the study area for this species.
Falco subniger	Black Falcon	V		The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Glossopsitta pusilla	Little Lorikeet	V		Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards	**Low** No suitable habitat was recorded from the study area for this species.
Haliaeetus leucogaster	White-bellied Sea-Eagle		M	Occurs in coastal areas including islands, estuaries, inlets, large rivers, inland lakes and reservoirs. Builds a huge nest of sticks in tall trees near water, on the ground on islands or on remote coastal cliffs (Pizzey and Knight 1997).	**Low** No suitable habitat was recorded from the study area for this species.
Hirundapus caudacutus	White-throated Needletail		M	Occurs in airspace over forests, woodlands, farmlands, plains, lakes, coasts and towns. Breeds in the northern hemisphere and migrates to Australia in October-April (Pizzey and Knight 1997).	**Low** No suitable habitat was recorded from the study area for this species.
Lathamus discolor	Swift Parrot	E1	E	Breeding occurs in Tasmania, majority migrates to mainland Australia in autumn, over-wintering, particularly in Victoria and central and eastern NSW, but also south-eastern Queensland as far north as Duaringa. Until recently it was believed that in New South Wales, swift parrots forage mostly in the western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region, but new evidence indicates that the forests on the coastal plains from southern to northern NSW are also extremely important. In mainland Australia is semi-nomadic, foraging in flowering eucalypts in eucalypt associations, particularly box-ironbark forests and woodlands. Preference for sites with highly fertile soils where large trees have high nectar production, including along drainage lines and isolated rural or urban remnants, and for sites with flowering *Acacia pycnantha*, is indicated. Sites used vary from year to year. (Garnett and Crowley 2000),(Swift Parrot Recovery Team 2001).	**Low** No suitable habitat was recorded from the study area for this species.
Merops ornatus	Rainbow Bee-eater		M	Usually occur in open or lightly timbered areas, often near water. Breed in open areas with friable, often sandy soil, good visibility, convenient perches and often near wetlands. Nests in embankments including creeks, rivers and sand dunes. Insectivorous, most foraging is aerial, in clearings (Higgins 1999).	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Monarcha melanopsis	Black-faced Monarch		M	Occurs in rainforests, eucalypt woodlands, coastal scrubs, damp gullies in rainforest, eucalypt forest and in more open woodland when migrating (Pizzey and Knight 1997).	**Low/Medium** A targeted survey was undertaken for this species which failed to detect this species within the study area.
Myiagra cyanoleuca	Satin Flycatcher		M	Occurs in heavily vegetated gullies, in forests and taller woodlands. During migration it is found in coastal forests, woodlands, mangroves, trees in open country and gardens (Pizzey and Knight 1997).	**Low** A targeted survey was undertaken for this species which failed to detect this species within the study area.
Stagonopleura guttata	Diamond Firetail	V		Occurs in a range of eucalypt dominated communities with a grassy understorey including woodland, forest and mallee. Most populations occur on the inland slopes of the dividing range. Feed on seeds, mostly of grasses {Garnett, 2000 #21}.	**Low** A targeted survey was undertaken for this species which failed to detect this species within the study area
Pyrrholaemus sagittatus	Speckled Warbler	V		Occurs in a wide range of eucalypt dominated vegetation with a grassy understorey and is often found on rocky ridges or in gullies. It feeds on seeds and insects and builds domed nests on the ground {Garnett, 2000 #21}.	**Low** A targeted survey was undertaken for this species which failed to detect this species within the study area
Petroica boodang	Scarlet Robin	V		The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	**Low** A targeted survey was undertaken for this species which failed to detect this species within the study area.
Rhipidura rufifrons	Rufous Fantail		M	Occurs in a range of habitats including the undergrowth of rainforests/wetter eucalypt forests/gullies, monsoon forests paperbarks, sub-inland and coastal scrubs, mangroves, watercourses, parks and gardens. When migrating they may also be recorded on farms, streets and buildings. Migrates to SE Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range (Pizzey and Knight 1997).	**Low/Medium** A targeted survey was undertaken for this species which failed to detect this species within the study area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Melanodryas cucullata	Hooded Robin	V		Found in south-eastern Australia, generally east of the Great Dividing Range. Found in eucalypt woodland and mallee and acacia shrubland. This is one of a suite of species that has declined in woodland areas in south-eastern Australia {Traill, 2000 #42; Garnett, 2000 #21}.	**Low** A targeted survey was undertaken for this species which failed to detect this species within the study area
Xanthomyza phrygia	Regent Honeyeater	E1	EM	Occurs mostly in box-ironbark forests and woodland and prefers the wet, fertile sites such as along creek flats, broad river valleys and foothills. Riparian forests with *Casuarina cunninghamiana* and *Amyema cambagei* are important for feeding and breeding. Important food trees include *Eucalyptus sideroxylon* (Mugga Ironbark), *E. albens* (White Box) , *E. melliodora* (Yellow Box) and *E. leucoxylon* (Yellow Gum) (Garnett and Crowley 2000).	**Low** No suitable habitat was recorded from the study area for this species.
Invertebrates					
Meridolum corneovirens	Cumberland Plain Land Snail	E1		Restricted to the Cumberland Plain and Castlereagh Woodlands of Western Sydney and also along the fringes of River Flat Forest, especially where it meets Cumberland Plain Woodland. It is typically found under logs and other debris, amongst leaf litter and bark around bases of trees. It is also sometimes found under grass clumps and where possible it will burrow into loose soil {NSW National Parks and Wildlife Service, 1999 #41}.	**Low** Targeted survey was undertaken for this species which failed to detect this species from the study area for this species.
Pommerhelix duralensis	Dural Land Snail	E1	E	The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris. Migration and dispersal is limited, with overnight straight-line distances of under 1 metre identified in the literature and studies. The species is active from approximately one hour after dusk until dawn and no confirmed diurnal activity is reported. It exhibits no roost-site behaviour.	**Low** No suitable habitat was recorded from the study area for this species.
Mammals					
Bettongia gaimardi	Tasmanian Bettong	E4	X	*Bettongia gaimardi* is found in terrestrial, temperate habitats including grasslands, grassy woodlands, dry eucalyptus forests, and sclerophyll forests (i.e., forests containing plants with hard, short and usually spiky leaves). This species is found from sea level to elevations around 1,000 m.	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Occurs in moderately wooded habitats and roosts in caves, mine tunnels and the abandoned, bottle-shaped mud nests of Fairy Martins. Thought to forage below the forest canopy for small flying insects (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Occurs from the Bundaberg area in south-east Queensland, south through NSW to western Victoria and Tasmania. In NSW, it occurs on both sides of the Great Dividing Range and north-east NSW represents a national stronghold (NSW National Parks and Wildlife Service 1999). Occurs in wide range of forest types, although appears to prefer moist sclerophyll and rainforest forest types, and riparian habitat. Most common in large un-fragmented patches of forest. It has also been recorded from dry sclerophyll forest, open woodland and coastal heathland, and despite its occurrence in riparian areas, it also ranges over dry ridges. Nests in rock caves and hollow logs or trees. Feeds on a variety of prey including birds, terrestrial and arboreal mammals, small macropods, reptiles and arthropods (NSW National Parks and Wildlife Service 1999; NSW National Parks and Wildlife Service 1999).	**Low** No suitable habitat was recorded from the study area for this species.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		Usually roosts in tree hollows in higher rainfall forests. Sometimes found in caves (Jenolan area) and abandoned buildings. Forages within the canopy of dry sclerophyll forest. It prefers wet habitats where trees are more than 20 metres high (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Isoodon obesulus	Southern Brown Bandicoot	E1	E	Occurs in a variety of habitats in south-eastern Australia, including heathland, shrubland, dry sclerophyll forest with heathy understorey, sedgeland and woodland. Many of the habitats are prone to fire (NSW National Parks and Wildlife Service 1999).	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Miniopterus schreibersii	Eastern Bent-wing Bat	V		Usually found in well timbered valleys where it forages on small insects above the canopy. Roosts in caves, old mines, stormwater channels and sometimes buildings and often return to a particular nursery cave each year (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	Occurs in inland and sub-coastal south eastern Australia where it inhabits rock slopes. It has a preference for rocks which receive sunlight for a considerable part of the day. Windblown caves, rock cracks or tumbled boulders are used for shelter. Occur in small groups or "colonies" each usually separated by hundreds of metres (NSW National Parks and Wildlife Service 2003).	**Low** No suitable habitat was recorded from the study area for this species.
Phascolarctos cinereus	Koala	V		Found in sclerophyll forest. Throughout New South Wales, Koalas have been observed to feed on the leaves of approximately 70 species of eucalypt and 30 non-eucalypt species. However, in any one area, Koalas will feed almost exclusively on a small number of preferred species. The preferred tree species vary widely on a regional and local basis. Some preferred species in NSW include Forest Red Gum *Eucalyptus tereticornis*, Grey Gum *E. punctata*, Monkey Gum *E. cypellocarpa* and Ribbon Gum *E. viminalis*. In coastal areas, Tallowwood *E. microcorys* and Swamp Mahogany *E. robusta* are important food species, while in inland areas White Box *E. albens*, Bimble Box *E. populnea* and River Red Gum *E. camaldulensis* are favoured (NSW National Parks and Wildlife Service 1999; NSW National Parks and Wildlife Service 2003).	**Low** Not located with Koala development application area.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Potorous tridactylus	Long-nosed Potoroo	V	V	Disjunct distribution along coastal south-east Australia from near Gladstone in Queensland, to south-west Victoria and in Tasmania. Found from sea level up to 1500 metres in altitude generally in areas with rainfall greater than 760 millimetres. In NSW, it is found throughout coastal and sub-coastal areas. Occurs in a range of habitats: coastal forest and woodland with a moderately dense heathy understorey, dense coastal scrubs or heath, wet and dry sclerophyll forest and sub-tropical, warm temperate and cool temperate rainforest of the eastern slopes and highlands. Often associated with gullies and forest ecotones. Open areas are used for foraging while areas of dense groundcover or understorey provide areas for shelter and protection from predators. Relatively thick ground cover is a major habitat requirement and it seems to prefer areas with light sandy soils. Feeds at dusk on roots, tubers, fungi, insects and their larvae and other soft bodied animals in the soil. Moves up and down slope as food resources become seasonally available (Johnston 1995; NSW National Parks and Wildlife Service 1999).	**Low** No suitable habitat was recorded from the study area for this species.
Pseudomys fumeus	Smoky Mouse	E1	E	The Smoky Mouse is currently limited to a small number of sites in western, southern and eastern Victoria, south-east NSW and the ACT. In NSW there are 3 records from Kosciuszko National Park and 2 records adjacent to the park in Bondo and Ingbyra State Forests; the remainder are centred around Mt Poole, Nullica State Forest and the adjoining S. E. Forests National Park. The Smoky Mouse appears to prefer heath habitat on ridge tops and slopes in sclerophyll forest, heathland and open-forest from the coast (in Victoria) to sub-alpine regions of up to 1800 metres, but sometimes occurs in ferny gullies. Seeds and fruits from leguminous shrubs form the main summer and autumn diet, with some invertebrates, e.g., Bogong Moths in the high country. Hypogeal (truffle-like) fungi dominate in winter and spring, with some flowers, seeds and soil invertebrates. May occur singly, as pairs or small communal groups based around patches of heath, sometimes comprising a male and up to five females sharing a burrow system. Breeding is in spring with one or two litters produced of up to four young. Nesting burrows have been found in rocky localities among tree roots and under the skirts of Grass Trees *Xanthorrhoea spp*. The persistence of colonies appears to be very ephemeral. It is not known how much this is due to natural fluctuations in food availability, but predation from feral carnivores appears to be implicated.	**Low** No suitable habitat was recorded from the study area for this species.

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Urban gardens and cultivated fruit crops also provide habitat for this species. Feeds on the flowers and nectar of eucalypts and native fruits including lilly pillies. It roosts in the branches of large trees in forests or mangroves (Churchill 1998; NSW National Parks and Wildlife Service 2001).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Mormopterus norfolkensis	Eastern Freetail-bat	V		Thought to live in sclerophyll forest and woodland. Small colonies have been found in tree hollows or under loose bark. It feeds on insects above the forest canopy or in clearings at the forest edge (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Myotis adversus	Large-footed Myotis	V		Colonies occur in caves, mines, tunnels, under bridges and buildings. Colonies always occur close to bodies of water where this species feeds on aquatic insects (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V		Occurs in eucalypt forest where it feeds above the canopy and in mallee or open country where it feeds closer to the ground. Generally a solitary species but sometimes found in colonies of up to 10. It roosts in tree hollows. Thought to be a migratory species (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of occurrence within the study area
Scoteanax rueppellii	Greater Broad-nosed Bat	V		The preferred hunting areas of this species include tree-lined creeks and the ecotone of woodlands and cleared paddocks but it may also forage in rainforest. Typically it forages at a height of 3-6 metres but may fly as low as one metre above the surface of a creek. It feeds on beetles, other large, slow-flying insects and small vertebrates. It generally roosts in tree hollows but has also been found in the roof spaces of old buildings (Churchill 1998).	**Low/Medium** Suitable habitat for this species was recorded from the study area. An Impact Assessment has been prepared for this species (Appendix E).
Reptiles					
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	A nocturnal species that occurs in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they generally use rock crevices and exfoliating rock during the cooler months and tree hollows during summer (Webb and Shine 1994; Webb and Shine 1998).	**Low** No suitable habitat was recorded from the study area for this species.

1) V= Vulnerable, E1 = Endangered (BC Act) E2= Endangered Population 2) ROTAP (Rare or Threatened Australian Plants, Briggs and Leigh 1996) is a conservation rating for Australian plants. 1 = Species only known from one collection. 2 = Species with a geographic range of less than 100km in Australia. 3 = Species with a geographic range of more than 100km in Australia, X = Species presumed extinct; no new collections for at least 50 years. E = Endangered species at risk of disappearing from the wild state if present land use and other causal factors continue to operate, V = Vulnerable species at risk of long-term disappearance through continued depletion. R = Rare, but not currently considered to be endangered. K = Poorly known species that are suspected to be threatened. C = Known to be represented within a conserved area. a = At least 1,000 plants are known to occur within a conservation reserve(s). i = Less than 1,000 plants are known to occur within a conservation reserve(s). The reserved population size is unknown. t = The total known population is reserved. + = The species has a natural occurrence overseas. **3)** V = Vulnerable, E = Endangered *(Environment Protection and Biodiversity Conservation Act 1999*).

Appendix E

BC Assessments of Significance

Assessment of Significance

The threatened species test of significance is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the *Environmental Planning and Assessment Act 1979*.

The test of significance is set out in s.7.3 of the Biodiversity Conservation Act 2016.

If the activity is likely to have a significant impact, or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS).

The environmental impact of activities that will not have a significant impact on threatened species will continue to be assessed under s.111 of the Environmental Planning and Assessment Act 1979.

If a proposed activity will have a significant impact or will be carried out in an area of outstanding biodiversity value, and the proponent does not opt in to the Biodiversity Offsets Scheme, a SIS must be prepared and agreement sought from the Chief Executive of Department of Planning, Industry and Environment .

The requirements of an SIS are set out in s.7.6 of the Biodiversity Conservation Regulation 2017. The proponent must also seek and comply with the Department of Planning, Industry and Environment Chief Executive's requirements for SIS preparation.

The "subject site" is defined as the area directly affected by the proposal.

The "study area" is the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area extends as far as is necessary to take all potential impacts into account.

The "local occurrence" of a community is that which occurs in the study area or beyond to include those areas where the movement of individuals and genetic exchange can be demonstrated

The "risk of extinction" is the likelihood that the local occurrence of the community will become extinct in either the short or long term as a result of direct or indirect impacts arising from the proposal.

The "composition" of the community includes both plant and animal species as well as its physical structure

The following 5 part test of significance relies on the ecological assessment provided in Sections 2 & 3, & Appendices C & D above and should be read as such. It is considered that the study area provides potential habitat for the following threatened species and will be assessed accordingly in the following five-part test:

Species Name		Conservation Status	
		State [1]	National [2]
Endangered Ecological Communities			
River-flat Eucalypt Forest on Coastal Floodplains	River-flat Eucalypt Forest on Coastal Floodplains	E	-
Threatened Fauna			
Mammals			
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Miniopterus schreibersii	Eastern Bent-wing Bat	V	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Mormopterus norfolkensis	Eastern Freetail-bat	V	
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	
Scoteanax rueppellii	Greater Broad-nosed Bat	V	

7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

The '5 part test of significance' is as follows.

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity 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,

Detailed flora investigations of the study area, together with habitat assessments and targeted surveys, have resulted in the identification of potential habitat for a variety of threatened species. An assessment of these species is as follows:

***Chalinolobus dwyeri* (Large-eared Pied Bat)**

It is probable that the Large-eared Pied Bat forages for insects below the forest canopy. During the day these bats may roost in caves, mine tunnels and the abandoned nests of Fairy Martins (Hoye and Dwyer 1998). The Large-eared Pied Bat may also utilise tree hollows (Schultz, Coles et al. 1999). The Large-eared Pied Bat is mainly found in drier habitat including dry sclerophyll and woodland, east and west of the Great Dividing Ranges. However Hoye (Hoye and Dwyer 1998) suggest that from records of the species in subalpine woodland, moist eucalypt forest and near rainforest, it may tolerate a greater range of habitats. The distribution of this bat ranges from inland and south-eastern QLD to central-eastern and north-eastern NSW. It is considered that the study area provides potential foraging habitat for this species. Despite the presence of potential habitat within the study area, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

***Falsistrellus tasmaniensis* (Eastern False Pipistrelle)**

The Eastern False Pipistrelle usually roosts in tree hollows in higher rainfall forests. Sometimes found in caves (Jenolan area) and abandoned buildings. Forages within the canopy of dry sclerophyll forest. It prefers wet habitats where trees are more than 20 metres high. It is considered that the study area provides potential foraging habitat for this species. Despite the presence of potential habitat within the study area, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

***Miniopterus schreibersii* (Eastern Bent-wing Bat)**

The Eastern Bentwing-bat is confined to areas where there are caves with potential temperature, humidity and physical dimensions to permit breeding. This species occupies a range of habitats, mainly near the coast and utilises caves, old mines, stormwater channels, under bridges and occasionally buildings for roosting. It is considered that the study area provides potential foraging habitat for this species. Despite the presence of potential habitat within the study area, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

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

The Grey-headed Flying-fox is found in a variety of habitats including rainforest, mangroves, paperbark swamps, wet and dry sclerophyll forests and cultivated areas (Churchill 2008). Grey-headed Flying Foxes congregate in large camps of up to 200,000 individuals, depending on availability of surrounding blossoming plants, from early until late summer (Churchill 2008). Camps are commonly formed in gullies, typically not far from water and in vegetation with a dense canopy. Roost sites are an important resource where mating, birth and rearing of young occurs as well as providing refuge (Strahan 1995) These bats eat the fruit or blossoms of more than 80 species of plants. Their major food source is eucalypt blossom and native fruits from a variety of tree species. Native figs (*Ficus spp*) account for a large percentage of the fruit eaten. They are also known to rain orchids of cultivated fruit. The Grey headed Flying-fox has a nightly feeding range of 20 to 50km from their camp (Churchill 2008).

The proposed development will retain all foraging habitat for this highly mobile species. As such it is considered that the proposal is unlikely to have an adverse effect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

***Mormopterus norfolkensis* (Eastern Freetail-bat)**

The Eastern Freetail-bat forages above and within the canopy of open forests and woodlands, feeding on small insects. The Eastern Freetail-bat is thought to roost predominantly in tree hollows and occasionally in buildings. It is considered that the study area provides potential foraging habitat for this species. It is considered that the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

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

The Yellow-bellied Sheathtail-bat inhabits open country, mallee, eucalypt forests, rainforests, heathland and water bodies. The Yellow-bellied Sheathtail-bat roosts in tree hollows and has been found inhabiting the abandoned nests of Sugar Gliders. It is considered that the study area provides potential foraging habitat for

this species. It is considered that the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

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

The Greater Broad-nosed Bat inhabits open forests and woodlands, foraging throughout these forest types and also along creeks and small river systems. This species roosts in tree hollows and occasionally old buildings. Despite the presence of potential habitat within the study area, the proposal is unlikely to

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(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

Response:

One threatened Endangered Ecological Communities (EEC) was recorded within the study area. PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion community corresponds with the EEC known as River-Flat Eucalypt Forest on Coastal Floodplains.

This response requires an exploration of the definition of the local occurrence of the community.

Although the extent of a community is technically and fully described by all of its components (including soil microbes and soil seedbanks), it is only the above-ground parts that can be seen by normal and standard survey practices. It is for this reason that mapping of vegetation types by all scientific authorities in NSW is restricted to visible above ground vegetation and sometimes restricted further to the appearance and presence of canopy trees. This is also the case for vegetation mapping undertaken and relied upon by Council.

However, the local occurrence of this community extends beyond the boundaries of the site and includes by definition those trees beyond the site that probably exchange genetic material with trees within the site. This includes native canopy trees within the flying distances of known pollinators that are likely to visit the trees of the subject site, including pollen and nectar feeders such as the Grey-headed Flying Fox and many birds such as Rainbow Lorikeets.

Southerton et al. (2004) demonstrated that pollen- and / or nectar-feeding lorikeets and bats make a unique contribution to eucalypt population structure because of their capacity to move viable pollen large distances. Birds and bats may travel upwards of 50 kilometres per day during feeding, and further during migration or feeding bouts over several days.

For example, Rainbow Lorikeet roosts are frequently 35 kilometres distant from their feeding areas, particularly during their non-breeding phase over summer and autumn when most of the tree species of the subject site are in flower. Scouting parties frequently move distances of 5–10 kilometres and feeding flocks may travel up to 10 kilometres between feeding and mid-day rest areas (Southerton et al. 2004).

Radio-tracking studies have revealed that Grey-headed Flying-foxes may travel more than 45 kilometres to feeding areas and over 80 kilometres during the night whilst foraging for nectar. They are highly mobile during the night, moving between several trees within a stand, and between flowering stands separated by many kilometres (Southerton et al. 2004).

The effect of pollen transfer by birds and bats on the genetic structure of widespread eucalypt species is potentially greatest in fragmented forests where these animals can traverse gaps of several kilometres between discontinuous stands (Southerton et al. 2004). In the fragmented urban landscape, this means that all patches across these large distances are functionally connected and form part of the local occurrence of the vegetation community.

The site has been managed for greater than 70 years as a rural residential property. Given that qualification, the River-Flat Eucalypt Forest on Coastal Floodplains community on site is largely restricted to those areas that support locally-native species of plants and these are in turn largely restricted to the areas of canopy trees and residual understorey species at the bases of remnant trees.

In many situations, the conspicuous trees are the only elements of the community that remain in urban situations and so this restrictive definition denies the reality of the functional connection of these trees with each other and with other larger and intact remnants afforded by their mobile pollinators.

The remnant River-Flat Eucalypt Forest on Coastal Floodplains community is continuous with vegetation within Garfield East Road outside of the subject property. The canopy is highly fragmented in a north-southerly direction and is continuos with surrounding lands.

The proposal will result in the removal of native trees which comprises part of River-Flat Eucalypt Forest on Coastal Floodplains.

In many situations, the conspicuous trees are the only elements of the community that remain in urban situations and so this restrictive definition denies the reality of the functional connection of these trees with each other and with other larger and intact remnants afforded by their mobile pollinators.

Despite the loss of 0.05ha or 500m2 of River-Flat Eucalypt Forest on Coastal Floodplains, large stand of this community is located on the northern side of Garfield Road East in association with First Ponds Creek to the north and is to be retained, it is therefore considered that the proposed development is unlikely to have an adverse effect on the extent of this ecological community such that its local occurrence is likely to be placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

The proposed development will result in the loss of 0.05ha of EEC River-Flat Eucalypt Forest on Coastal Floodplains.

Despite the loss of 0.05ha of River-Flat Eucalypt Forest on Coastal Floodplains, approximately 22+ha of River-Flat Eucalypt Forest on Coastal Floodplains will remain within then locality of the study area adjacent to First Ponds Creek.

The proposal will entail the removal of 005ha of River-Flat Eucalypt Forest on Coastal Floodplains which comprises poor habitat for the aforementioned threatened species known from the locality, as such it is considered that the proposal is unlikely to create an important impact on the long-term survival of threatened species in the locality and is not considered to be significant.

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

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

Response:

i.) The proposal will entail the disturbance/modification of 0.05ha of River-Flat Eucalypt Forest on Coastal Floodplains which provides limited foraging habitat for threatened fauna species.

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

Response:

The proposal will remove approximately 0.05ha of River-Flat Eucalypt Forest on Coastal Floodplains which provides poor habitat for aforementioned threatened fauna species. Despite this the proposal will not fragment or isolate currently connected areas of habitat. Connectivity of vegetation across the study area will remain connected to surrounding lands. All threatened fauna species which are potentially to be impacted upon are highly mobile and capable of flight and movement across large distances and would not utilise the habitats within the study area exclusively.

Therefore, it is considered that known habitat for a threatened species within the local area and the region are unlikely to become isolated or fragmented as a result of the proposal.

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

Response:

The habitat to be removed is of poor quality due to its small size, location within a rural front yard, highly modified understorey and many of the trees are in poor condition it cannot of itself be considered to be important to the long term survival of the community in the local area.

However, it is part of an Endangered Ecological Community and is part of a remnant patch in the immediate area that occupies at greater than 12 hectares. Thus the remnant trees/ native vegetation on site is an important area in that it contributes to the long term viability of other areas. The loss of a small number of trees however is unlikely to threaten the long term survival of the community in the local area.

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

Response:

The proposed development or activity is not likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly) within the provisions of the *BC Act* (1995).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Response:

The proposal is likely to entail or perpetuate the following key threatening process under the *BC Act* within the site.

- Clearing of native vegetation.
- Infection of native plants by *Phytophthora cinnamomi*.
- Human Caused Climate Change.

Conclusion

The proposal will modify/remove approximately 0.05ha of River-Flat Eucalypt Forest on Coastal Floodplains which provides poor (habitat) for threatened species.

The loss of 0.05ha from the onsite River-Flat Eucalypt Forest on Coastal Floodplains EEC is unlikely to have an adverse effect on the extent of this ecological community such that its local occurrence is likely to be placed at risk of extinction.

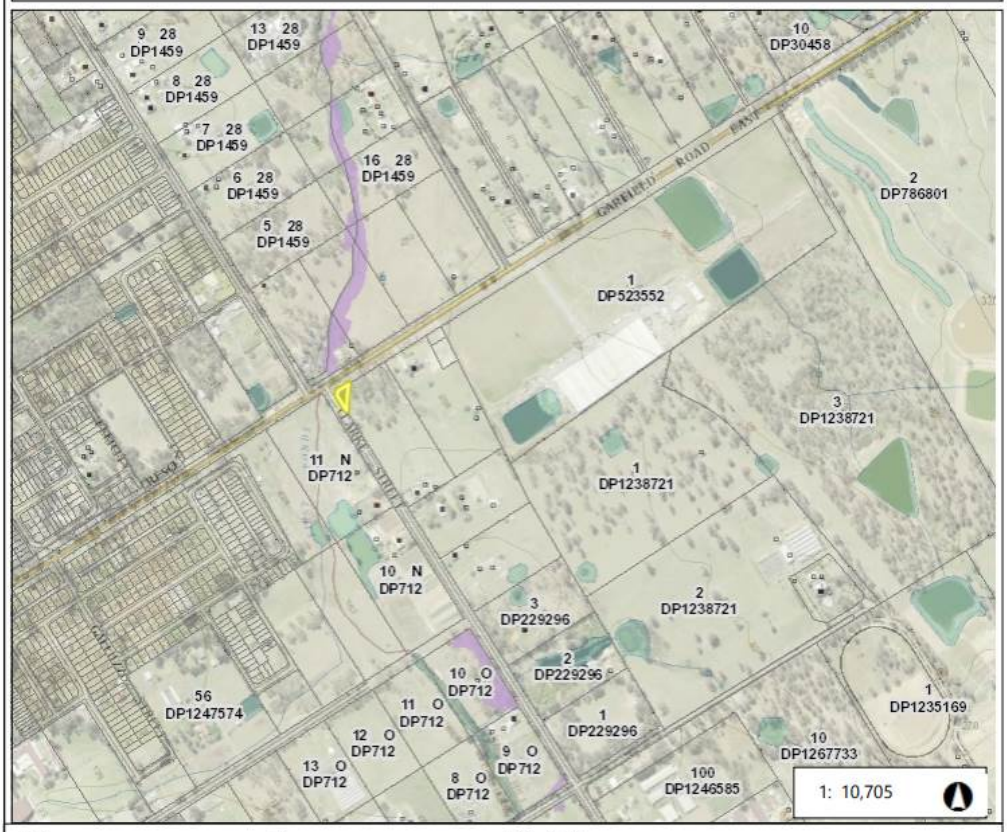
Critical habitat will not be affected and the proposal will not interfere with the recovery actions for threatened species. The impact to habitats for threatened species, endangered populations & endangered ecological communities from the locality is not considered to be significant.

Appendix F

BOSET

NSW GOVERNMENT

Biodiversity Offset Scheme (BOS) Entry Threshold Map



Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

NSW GOVERNMENT

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	23/05/2021 4:42 PM		**BDAR Required***
Total Digitised Area	0.05	ha	
Minimum Lot Size Method	LEP		
Minimum Lot Size	0.05	ha	
Area Clearing Threshold	0.25	ha	
Area clearing trigger Area of native vegetation cleared	no		no
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	yes		yes
Date of the 90 day Expiry	N/A		

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is '"likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies will all aspects of the *Biodiversity Conservation Act 2016*.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature____ _____ Date: 23/05/2021 04:42 PM

Appendix G

EPBC Protected Matters Search

EPBC Assessment of Significance (Grey-headed Flying-fox)

Under the *Environment Protection and Biodiversity Conservation Act 1999*, an action is likely to have a significant impact on a vulnerable species if it affects an important population of the species. Under the Principle Significant Impact Guidelines (Department of the Environment and Heritage 2006) an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species range.

The animals that may use the site are not considered to be part of an important population.

Will the action lead to a long-term decrease in the size of an important population of a species?

Grey-headed Flying-fox utilising the study area would not constitute an important population. The proposal will entail the direct removal of 0.05ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion which provides foraging habitat for this species. Modification of this small area represents a small loss of the local extent of similar habitat. Clearing of this small area of habitat represents a small loss of the local extent of similar habitat. No Grey-headed Flying-fox camps will be affected by the proposal. As such, the proposal is unlikely to lead to a long-term decrease in the size of the local population.

Will the action reduce the area of occupancy of an important population?

Grey-headed Flying-fox utilising the site would not be part of an important population. The Grey-headed Flying-fox is a highly mobile and it may travel up to 50 km each night to forage. Therefore, the local population would not be restricted to habitat resources within the site only.

Will the action fragment an existing important population into two or more populations?

Grey-headed Flying-foxes using the site for foraging purposes would not be part of an important population.

Will the action adversely affect habitat critical to the survival of a species?

No critical habitat has been listed for Grey-headed Flying-fox under the *Environment Protection and Biodiversity Conservation Act 1999*. Known Grey-headed Flying-fox camps may however be considered critical to the survival of local populations. No camps were identified within or near the study area.

Will the action disrupt the breeding cycle of an important population?

Grey-headed Flying-foxes using the study area would not be part of an important population.

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

The study area contains suitable foraging resources for Grey-headed Flying-fox. The action is unlikely to significantly decrease the availability of foraging habitat in the locality. The proposal will entail the direct removal of 0.05ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion which provides foraging habitat for this species. Modification of this small area represents a small loss of the local extent of similar habitat. The large home range of this species allows offsite foraging resources to be accessed and isolation of habitat would not result from the development.

It is unlikely that the development would isolate and decrease the availability of quality habitat to the extent that the species is likely to decline.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species´ habitat?

It is highly unlikely that invasive species (such as introduced predators) that are harmful to the Grey-headed Flying-fox would become more established as a result of the action.

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

The proposal would not increase the likelihood of a disease becoming established or proliferating in the local population that would result in a decline of the species.

Will the action interfere with the recovery of the species?

No recovery or threat abatement plans have been prepared for this species. Therefore it is considered that the proposal is unlikely to interfere within the recovery of the Grey-headed Flying-fox.

Conclusion

The Grey-headed Flying-fox is unlikely to be significantly affected by the proposal.

EPBC Assessment of Significance (Large-eared Pied Bat)

Under the *Environment Protection and Biodiversity Conservation Act 1999*, an action is likely to have a significant impact on a vulnerable species if it affects an important population of the species. Under the Principle Significant Impact Guidelines (Department of the Environment and Heritage 2006) an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans, and/or that are:

key source populations either for breeding or dispersal
populations that are necessary for maintaining genetic diversity
populations that are near the limit of the species range.
The animals that may use the site are not considered to be part of an important population.

Will the action lead to a long-term decrease in the size of an important population of a species?

Large-eared Pied Bats utilising the site would not constitute an important population. The proposal will entail the direct removal of 0.05ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion which provides foraging habitat for this species. Modification of this small area represents a small loss of the local extent of similar habitat. represents a small loss of the local extent of similar habitat. No Large-eared Pied Bat roosting sites will be affected by the proposal. As such, the proposal is unlikely to lead to a long-term decrease in the size of the local population.

Will the action reduce the area of occupancy of an important population?

Large-eared Pied Bats utilising the site would not be part of an important population. Development of the study area will remove suitable foraging habitat for this species. The Large-eared Pied Bat is a highly mobile species. Therefore, the local population would not be restricted to habitat resources within the site only.

Will the action fragment an existing important population into two or more populations?

Large-eared Pied Bat utilising the foraging resources within the study area would not be part of an important population.

Will the action adversely affect habitat critical to the survival of a species?

No critical habitat has been listed for Large-eared Pied Bat under the *Environment Protection and Biodiversity Conservation Act 1999*. Known Large-eared Pied Bat maternity caves may however be considered critical to the survival of local populations. No maternity caves were identified within or near the study area.

Will the action disrupt the breeding cycle of an important population?

Large-eared Pied Bats using the study area would not be part of an important population. The breeding patterns of the Large-eared Pied Bat are not likely to be disrupted as this species breeds within a maternity caves, which were absent from the study area. As such it is considered that the proposal is unlikely to disrupt the breeding cycle of an important population of Large-eared Pied Bats.

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

The study area contains foraging resources for Large-eared Pied Bat. The action is unlikely to significantly decrease the availability of foraging habitat in the locality despite the direct removal of 0.05ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion which provides foraging habitat for this species. The large-eared Pied Bat has a large home range as such this species would not feed exclusively within the study area.

It is unlikely that the development would isolate and decrease the availability of quality habitat to the extent that the species is likely to decline.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species´ habitat?

It is highly unlikely that invasive species (such as introduced predators) that are harmful to the Large-eared Pied Bat would become more established as a result of the action.

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

The proposal would not increase the likelihood of a disease becoming established or proliferating in the local population that would result in a decline of the species.

Will the action interfere with the recovery of the species?

No recovery or threat abatement plans have been prepared for this species. Therefore it is considered that the proposal is unlikely to interfere within the recovery of the Large-eared Pied Bat.

Conclusion

The Large-eared Pied Bat is unlikely to be significantly affected by the proposal.

Appendix H

EPBC Protected Matters Search

Australian Government
Department of Agriculture, Water and the Environment

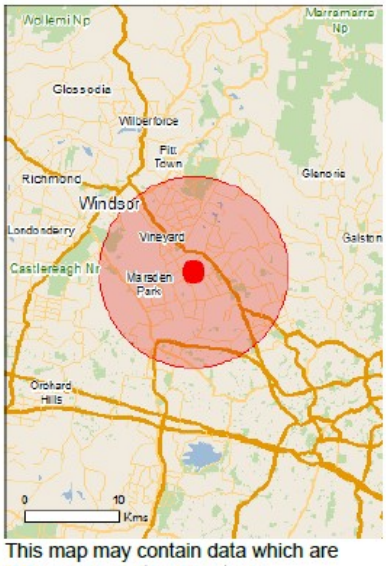
EPBC Act Protected Matters Report

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: 29/07/21 14:11:38



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

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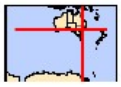

Summary

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:	8
Listed Threatened Species:	57
Listed Migratory Species:	17

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:	11
Commonwealth Heritage Places:	1
Listed Marine Species:	24
Whales and Other Cetaceans:	None
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:	None
Invasive Species:	52
Nationally Important Wetlands:	1
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
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community may 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 ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat may occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known 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
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely 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
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour known to occur within area
Other		
Pommerhelix duralensis Dural Land Snail [85268]	Endangered	Species or species habitat known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat known to occur within area
Acacia gordonii [5031]	Endangered	Species or species habitat likely to occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat likely to occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Darwinia biflora [14619]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus sp. Cattai (Gregson s.n., 28 Aug 1954) [89499]	Critically Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Haloragodendron lucasii Hal [6480]	Endangered	Species or species habitat may occur within area
Lasiopetalum joyceae [20311]	Vulnerable	Species or species habitat known to occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat known to occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat known to occur within area
Olearia cordata [6710]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	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
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Zieria involucrata [3087]	Vulnerable	Species or species habitat likely to 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		
Apus pacificus Fork-tailed Swift [678]		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

Name	Threatened	Type of Presence within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	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 may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known 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 known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area