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FLORA AND FAUNA ASSESSMENT REPORT

74 WILLANDRA ROAD

NARRAWEENA

PREPARED FOR: Vigormaster

OUR REFERENCE: 18 6573

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Executive Summary

This report describes the biological environment of 74 Willandra Road, Narraweena and assesses the potential effects on threatened and migratory species, endangered populations and ecological communities of the proposal to construct a boarding house.

A desktop search for threatened species within a 10 km radius of the site was generated, and a flora (3 hours) and fauna (3 hours) assessment was undertaken to ascertain if any threatened species were on site or might use the site.

No threatened species, endangered populations or endangered ecological communities listed on the schedules of the *NSW Biodiversity Conservation Act 2016*, or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* were recorded in the study area.

Following the application of Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, as required by the five factors (section 7.3) from the *NSW Biodiversity Conservation Act 2016*, in accordance with relevant assessment guidelines, it is concluded that the proposal is unlikely to have a significant effect on threatened species, endangered populations, ecological communities, or their habitats.

Following consideration of the administrative guidelines for determining significance under the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

A number of impact mitigation and amelioration strategies have been recommended for the proposal. These strategies mitigate the effects of the proposal on threatened species, endangered populations, ecological communities, or their habitats and minimise the impacts of the proposal on the flora and fauna values of the study area in general.

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1. Introduction

This report determines the presence of threatened species, habitats, populations (and their associated habitats) as well as ecological communities within the subject property. It is written in accordance with the requirements of the *Environmental Planning and Assessment Act* (1979), *Biodiversity Conservation Act* (2016) and the *Environment Protection and Biodiversity Conservation Act* (1999).

1.1 Aims

The aim of this report is to produce a flora and fauna assessment to:

- Assess the ecological resources of the study site;
- Fulfil the requirements of the *Environmental Planning and Assessment Act* (1979)*;*
- To assess the impact of the development on matters of conservation significance;
- Assess the potential for threatened flora and fauna species and Endangered Ecological Communities (EECs) to occur within the study site which may be listed under commonwealth and state legislation;
- Suggest measures, which may alleviate the disturbance, in alignment with the *Biodiversity Conservation Act,* (2016) and the *Environmental Conservation and Biodiversity Act*, (1999).

The specific objectives of the report are to:

- Conduct a database search of the study site;
- Plan and undertake field surveys, designed in accordance with the *Working Draft Threatened Biodiversity Assessment Guidelines for Developments and activities (2004)*
- Identify habitat for threatened species on the study site that are listed in the schedules of the BC Act and the EPBC Act that are known or are likely to occur in the study area;
- Undertake an Assessment of Significance in accordance with the BC Act and significant impact criteria assessments under the EPBC Act for threatened species, communities and populations that can be impacted by the proposal, either directly or indirectly; and,
- Provide recommendations to mitigate the impacts of the proposed action

1.2 Project Context

Table 1: Name and address of client

Client Name	
Address	74 Willandra Road, Narraweena
Local government area	The Northern Beaches Council

1.3 Description of Study Area

Table 2: Description of study area

Size of Property	2.832 Ha
Proposed land use	Boarding House.
Map of study site	Refer to Figure 1.

1.4 Proposed Development

Table 3: Description of proposed development

Proposed Development	Boarding House and APZ.

The concept plan for the proposed development is provided in Appendix 1.

1.5 Site details

Figure 1: Aerial Map of 74 Willandra Road, Narraweena (Six Maps viewer)

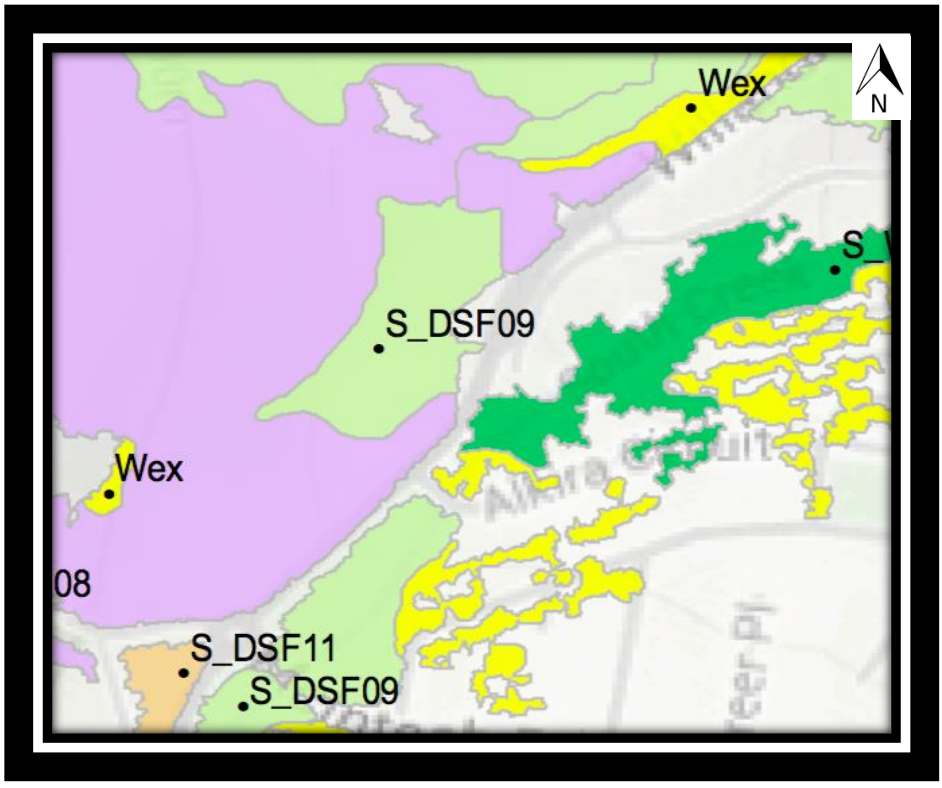

Figure 2: Vegetation map of 74 Willandra Road, Narraweena (OEH 2013).

S_DSF09 Coastal Sandstone Gully Forest (NSW PCT No 1250)

S_HL08 Coastal Sandstone Heath-Mallee (NSW PCT No 882)

2. Legislative Requirements and International Agreements

Biodiversity Conservation Act, 2016 (New South Wales)

The central aim of the *Biodiversity Conservation Act* is to protect any threatened flora and fauna occurring in NSW, omitting marine plants and fish. The Act provides information for the identification, conservation and recovery of threatened species as well as their associated populations and communities, and any threats that are imposed on those species. If a proposed action is likely to have an effect on a threatened species, population or ecological community, then this is considered in the development approval process. If the impact is considered significant then a Species Impact Statement (SIS) must be prepared and submitted to the Director General and further agreement and approval is needed. In certain circumstances, the Minister for the Environment may additionally be consulted.

Environmental Planning and Assessment Act 1979 (NSW)

The primary objective of the *Environmental Planning and Assessment Act* (1979), is focused on the protection of the environment. This includes the protection of native flora and fauna, threatened species, populations, ecological communities and their associated habitats. The secondary objective of this act is to implement the precautionary principle, outlined in the *Protection of the Environment Administration Act* (1991). Under section 5A of the Act and Section 7.3 of the *Biodiversity Conservation Act* (2016), five listed factors collectively termed the '5-part assessment of significance', allows the determination of the likely impact of a proposed action on threatened species, population or endangered ecological communities. If the proposed action is assessed as likely to have an effect on any of these, then a SIS is required.

Environment Protection and Biodiversity Conservation Act (1999; Commonwealth legislation)

The EPBC Act is legislation of the Commonwealth. In accordance with this act, all proposed actions are to be assessed to determine impacts on *Matters of National Environmental Significance*. These matters include: World heritage properties; Natural heritage; Wetlands of national importance (RAMSAR, CAMBA, JAMBA and ROKAMBA wetlands); Threatened species and ecological communities; Migratory species; Marine areas in the Commonwealth; and Nuclear actions.

International migratory animal agreements include:

a. Appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;
b. The recognised agreement between Australia and the People's Republic of China for the Protection of Migratory Birds in Danger of Extinction and their Environment (CAMBA);
c. The recognised agreement between Australia and the Republic of Korea on the Protection of Migratory Birds (ROKAMBA); and,
d. The recognised agreement between Australia and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).

If the proposed action is likely to affect a *Matter of National Environmental Significance*, it is necessary that this action is assessed via the EPBC Acts 'considerations' assessment. If there is likely to be a significant impact on these matters, referral to the Commonwealth Environment Minister is required for review. Approval for the proposed action may then be granted, so long as accompanied control measures alleviate likely impacts.

3. Methodology

3.1 Literature and Database Search

A database review was conducted prior to undertaking onsite surveys. This was done to give Envirotech ecologists an insight into which threatened or migratory species should be targeted during field surveys. Table 4 provides an overview of the desktop review.

Table 4: Overview of Desktop Search

Search Tool	Description	Search Parameters
The NSW Bionet *Atlas of New South Wales Wildlife*	Used to generate a list of species listed under the TSC Act.	Parameters set to a 10km radius of the study site (Flora, Fauna and Vegetation Communities).
Commonwealth *Protected Matters Search Tool*	Used to generate a list of species protected under the EPBC Act.	Parameters set to a 10km radius of the study site (Flora, Fauna and Vegetation Communities).
Vegetation Information System	Used to generate a map of the vegetation community onsite.	OEH 2013 – Sydney Metropolitan Vegetation (Figure 2)

3.2 Terrestrial Flora Survey

Envirotech ecologist Shane Maloney conducted a flora survey at 10:00 am on Wednesday 29th August 2018 for approximately 3 hours. It was a warm day.

The methodology employed was designed in accordance with the *Working Draft Threatened Biodiversity Assessment Guidelines for Developments and activities (2004).* Table 5 refers to specific techniques employed.

Table 5: Survey techniques employed to target threatened flora

Survey Type	Description	Effort	Is this in accordance with Guidelines?
Random Meander	The site was traversed and the flora species observed were recorded.	3 Hours	Yes, however the survey was limited in effort and time (See section 3.5)

3.2.1 Habitat Assessment

The degree to which the vegetation on the site resembled natural, undisturbed vegetation was used to determine the habitat potential of the site. This included the following criteria:

- The composition of the species (diversity, degree of weed invasion); and
- Structure of the vegetation (how many original layers of vegetation existed).

Criteria used to evaluate the habitat values of the area in general terms, were *good, moderate, poor* and *cleared/disturbed*. These are detailed in table 6.

Table 6: Criteria used to assess habitat quality for threatened flora

Score	Criteria
Good	There is a high diversity of species, no weeds are extant or those weeds that are present only occur on the edges of the study site, the vegetation represents many layers (i.e. ground, shrub, canopy layers) and these are readily identifiable
Moderate	There are a high number of native species, some weed invasion but these only occur in small patches, one or more of the vegetation layers are disturbed but these are relatively intact;
Poor	There is a low number of native species, many of the plants that are on the site consist of exotic species that occur in dense patches, more than one of the vegetation layers has been disturbed or removed;
Cleared and disturbed	This represents a significantly modified landscape that has less than three native species, invasive species are mostly dominant, there is little representation of vegetation layers, the soil profile is disturbed and there is the likelihood that the area will not regenerate to its natural condition and that revegetation techniques would need to be implemented in order to achieve this.

3.2.2 Detailed Vegetation Description

The site at 74 Willandra Road, Narraweena is 2.786 hectares in area. There is a large area adjacent to Willandra Road that has been cleared. The vegetation map for the site is presented in Figure 2 (OEH 2013). This resource has indicated that the vegetation communities:-

1. Coastal Sandstone Gully Forest; and
2. Coastal Sandstone Heath-Mallee

are present on the site. The vegetation survey undertaken on site concurs with the mapped vegetation communities found on site, in addition to an area that has been cleared (Figure 1);

The following descriptions are for :-

Coastal Sandstone Gully Forest

The area which has been mapped, with this vegetation community contains trees approximately 15 m in height, such as *Angophora costata, Corymbia gummifera, Eucalyptus piperita and Eucalyptus siebieri*. The mid storey is made up of smaller trees of the same species and *Allocasuarina littoralis, Banksia serratta and Cerapetalum gummifferum (in the gullies);* the shrub layer includes *Leptospermum trinervium, Persoonia levis, Banksia ericifolia subsp. ericifolia, Dillwynia retorta, Platysace linearifolia, Acacia terminalis, Acacia suaveolens, Pimelea linifolia, Epacris longiflora, Lambertia formosa, Petrophile pulchella, Pultenaea stipularis, Woollsia pungens, Bossiaea heterophylla;* with ground cover that includes *Entolasia stricta, Lomandra longifolia, Caustis flexuosa, Gonocarpus teucrioides, Lomatia silaifolia, Pteridium esculentum, Xanthosia tridentata, Lomandra obliqua, Dianella caerulea, Lepidosperma laterale and Xanthosia pilosa.*

Coastal Sandstone Heath-Mallee

The area which has been mapped, with this vegetation community contains trees approximately 8 m in height, such as *Angophora hispida, Banksia serrata, Corymbia gummifera, Eucalyptus haemastoma and Eucalyptus multicaulis;* the shrub layer includes *Banksia ericifolia subsp. ericifolia, Boronia ledifolia, Leptospermum trinervium, Leucopogon microphyllus, Acacia suaveolens, Leptospermum arachnoides, Grevillea oleoides, Hakea teretifolia, Banksia oblongifolia, Hakea dactyloides, Lambertia formosa, Leptospermum squarrosum, Darwinia fascicularis, Conospermum taxifolium, Hakea gibbosa, Pimelea linifolia, Epacris microphylla, Epacris pulchella, Kunzea capitata, Persoonia lanceolata, Petrophile pulchella, Pultenaea tuberculata, Banksia marginata, Allocasuarina distyla*

Cleared Area

There is a large cleared area of approximately 3000 m^2 where the building footprint is proposed, within this area there is bare sandstone (see photos below for example), and shrubs in the south western area and adjacent to Willandra Road (for example - *Greviilea speciosa, Grevillea buxifolia, Grevillea sericea, Hakea teretifolia, Allocasuarina dystyla)* and sedges sparsely across the cleared area. The area to the north and adjacent to Willandra Road contained many weed species and there appeared to be some form of rehabilitation undertaken on the northern edge of the cleared area.

Using the criteria listed in Table 6, the vegetation in the area for the building footprint would be classified as poor, and the vegetation within the areas to be retained as good.

Photograph 1: Proposed building footprint (cleared area), looking south from Lot entrance.

Photograph 2: Proposed building footprint (cleared area), looking north from Lot entrance.

3.3 **Terrestrial Fauna Survey**

A fauna survey was conducted by Envirotech ecologist Shane Maloney on Wednesday the 28th August 2018 for approximately three hours.

Methodology employed was in accordance with the *Working Draft Threatened Biodiversity Assessment Guidelines for Developments and activities (2004)* and consisted of the following survey methods (Table 7):

Table 7: Survey techniques employed to target threatened fauna

Survey Type	Description	Does this match guidelines?
Frog	The site was surveyed for potential habitat and any calls emitted from species present.	Yes, however the survey was limited in effort and time. (see section 3.5)
Reptile Search	A targeted habitat search was undertaken, across the site. Techniques used to locate species included peeling back loose bark from trees, upturning logs and disturbing leaf litter.	Yes, however the survey was limited in effort and time. (see section 3.5)
Bird point Count Survey	Point count surveys were undertaken onsite, for a period of 20 minutes, using both visual and aural detection.	Yes, however the survey was limited in effort and time. (see section 3.5)
Opportunistic (Diurnal),	The entire site was traversed with emphasis on searches for mammal scats, tracks, burrows, diggings and scratchings.	Yes, however the survey was limited in effort and time. (see section 3.5)

3.3.1 Habitat Assessment

A number of habitat values were recorded during the site inspection (Table 8).

The potential for the site to provide habitat for threatened fauna species was based upon habitat values provided in Table 8, and the specific habitat requirements of threatened species. Criteria used to evaluate the overall quality of the habitat, were *good, moderate, and poor*. This criteria is detailed in Table 9.

Table 8: Description of fauna habitat values

Habitat Value	Description
Hollow Bearing Trees	There were no hollows on the proposed footprint.
Stags	There were no stags on the footprint.
Connectivity	There was connectivity towards the South, West and North.
Water	There was no watercourse on site
Rocky Outcrops	The rocky outcrops at the site were plentiful above the proposed footprint;
Leaf Litter	The study area had a moderate to good covering of leaf litter and grasses within the areas outside the proposed building footprint.

Table 9: Criteria used to assess habitat quality for the site

Score	Criteria
Good	The presence of the ground flora consists of a diverse range of native species, the assemblages of species of the vegetation, leaf litter, significant number of refuge, feeding and breeding sites and the presence of a diverse range of native fauna species
Moderate	The ground flora contains a relatively high number of native species, the assemblages of species is relatively undisturbed, leaf litter, the presence of some refuge, feeding and breeding sites and diverse presence of native fauna
Poor	There was a low diversity of ground flora and very little presence of native flora, the assemblages of species of vegetation is low, poor presence of leaf litter, little or no refuge, feeding and breeding sites and a low diversity of fauna species.

3.3.2 Detailed Fauna habitat description

The proposed building footprint indicates disturbances in the past, such as clearing, and a regeneration area. There is a main road to the East, with houses adjacent to the road; and the site is connected to other areas of native vegetation, being predominantly to the South, North and west (Figure 1).

The fauna habitats at the site within the vegetation to be retained , range from a tall canopy (up to 15m), to a mid storey and shrub layer down to a groundcover with litter and shelter. The study area generally contains the following fauna habitats (not the building footprint):

- Nectar, pollen and insect foraging resources for mammals and birds from canopy and sub-canopy trees;
- Rocky shelfs, leaf litter and ground shelter for small mammals, reptiles and amphibians;
- Hollows and stags for arboreal mammals and birds.

The rocky shelfs and grassy groundcover would provide shelter and foraging for terrestrial fauna. The hollows on site would avail these resources for hollow dependent fauna. Habitat connectivity to other areas of native vegetation occurs at the Southern, Western and Northern ends of the study area (see Figure 1).

Overall the site was assessed to have a good habitat quality assessment (see Table 9 above), for the areas of vegetation on site that will remain in situ. The proposed building footprint was assessed as having a poor habitat quality assessment as there has been clearing undertaken previously; and some regeneration to compensate for this clearing.

3.4 Key Threatening Processes

A list of the Key Threatening Processes, listed under the *Environmental Protection and Biodiversity Conservation Act* (1999) and *Threatened Species Act* (1995), was generated by conducting a desktop search of the *Species Profile and Threats* database. During the site inspection, the presence or absence of these processes occurring on the site were documented, with additional threats not otherwise being listed, considered (refer to section 4.5 Key Threatening processes for a more detailed assessment).

3.5 Limitations of the Report

The methodological design employed for the purposes of this report was habitat based, in accordance with Section 5A of the *Environment Planning and Assessment Act* (1979).

In respect to the timing of the survey and the survey effort employed, a considerable continuum of fauna and flora species and assessments of the ecological processes that are likely to be imposed on the study site, have been derived through desktop searches, and background and literature searches. Therefore, a full inventory of flora and fauna and the ecological processes likely to occur on the study site and surroundings cannot be fully provided in this report.

It is also acknowledged that the presence and detection of threatened and migratory species can alter in respect to time, which includes seasonal weather and climatic cycles. These limitations have been mitigated by identifying any potential habitat for flora and fauna species and by assessing the likelihood of occurrence of these species, with respect to previous records, the habitat present, the land use on the study site and the landscape context of the wider area.

The report has collected data from publically available data sources and is bound by the limitations of the collection, processing and management of those databases used (Table 4).

4. Results

4.1 Vegetation Communities

Results of the desktop research are provided in Table 10, with a vegetation community map of the study site provided in Figure 3 and 4.

Table 10. Results of Bionet and Protected Matters Search tool, identifying endangered ecological communities recorded within 10 km of the site.

Community name	**NSW Status**	**Commonwealth status**	**Occurrence**
Agnes Banks Woodland in the Sydney Basin Bioregion	Endangered	Critically Endangered	Not detected
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered	Critically Endangered	Not detected
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	Endangered	Critically Endangered	Not detected
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	Vulnerable	Not listed	Not detected
Castlereagh Swamp Woodland Community	Endangered	Not listed	Not detected
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Vulnerable	Not detected

Community name	NSW Status	Commonwealth status	Occurrence
Coastal Upland Swamp in the Sydney Basin Bioregion	Endangered	Endangered	Not Detected
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	Endangered	Not Listed	Not Detected
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Critically Endangered	Not Detected
Duffys Forest Ecological Community in the Sydney Basin Bioregion	Endangered	Not Listed	Not Detected
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion	Endangered	Endangered	Not Detected
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion	Endangered	Not Listed	Not Detected
Freshwater wetland on coastal floodplains of the New South Wales North Coast, Sydney Basin and South East corner bioregions	Endangered	Not listed	Not Detected
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Critically Endangered	Not Detected
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	Endangered	Critically Endangered	Not Detected
Moist Shale Woodland in the Sydney Basin Bioregion	Endangered	Critically Endangered	Not Detected
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Endangered	Not Listed	Not Detected
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales, North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Not listed	Not Detected
Shale Gravel Transition Forest in the Sydney Basin Bioregion	Endangered	Critically Endangered	Not Detected

Community name	NSW Status	Commonwealth status	Occurrence
Shale/Sandstone Transition Forest in the Sydney Basin Bioregion	Critically Endangered	Critically Endangered	Not Detected
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	Endangered	Not listed	Not Detected
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Not listed	Not Detected
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Not Listed	Not Detected
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	Endangered	Not Listed	Not Detected
Sydney turpentine Ironbark Forest	Endangered	Critically Endangered	Not Detected
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Not Listed	Not Detected
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	Endangered	Critically Endangered	Not Detected

Note: The survey undertaken did not detect on site any of the Endangered Ecological Communities listed above in Table 10.

4.2 Flora

4.2.1 Desktop Research

Results of the desktop research is provided in Table 12. A total of 21 threatened flora species have been recorded within a 10km radius of the study site. This includes:

- 21 species listed under the TSC Act
- 16 species listed under the EPBC Act

4.2.2 Site Habitat Features (Flora surveys)

Flora surveys revealed the following habitat features for the study area (Table 11): A total of 112 species were recorded during the survey 87 (78%) were native and 26 (22%) were exotic; (Appendix 2).

Table 11: Habitat features present onsite for threatened flora (building footprint)

Feature	**Quantity**	**Description**
Species diversity	Low on the building footprint and Moderate to high in the retained vegetation	During the vegetation survey 87 native species and 26 exotic species were recorded.
Structural integrity	Low on the building footprint and Moderate to high in the retained vegetation	The area where the proposed footprint will occur has a modified landscape (cleared area), some small areas have structural integrity, and other areas are managed.
Habitat quality	Low on the building footprint and Moderate to high in the retained vegetation	The site represents modified habitat in the area for the proposed building footprint,
Disturbances	High on the building footprint and low in the retained vegetation	The area for the proposed building footprint has a high level of disturbance, compared to the area to be retained

4.2.3 Assessment of Occurrence (Flora)

Table 12 below provides a summary of the results from desktop and field surveys, findings indicate there is:

- A low likelihood of the occurrence of 21 species to be present onsite

For these twenty-one flora species a 5 Part Test of Significance was deemed not to be required for the proposal, as no specific habitat will be removed for the proposal (see also Table 17).

Where required, species nationally protected have had an impact assessment undertaken with respect to the EPBC Act presented in Appendix 4.

Details of the assessment of available habitat resources onsite, specific to threatened flora species is provided in Table 12.

Table 12: An analysis of threatened flora species likely to occur onsite (Using species habitat requirements and site habitat features (Table 11) and surveys).

Species	**Common name**	**NSW status**	**Commonwealth status**	**Habitat**	**Likelihood of occurrence on the study site**
Acacia bynoeana	Bynoe's Wattle	Endangered	Vulnerable	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Low
Callistemon linearifolius	Netted bottlebrush	Vulnerable	Not Listed	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer	Low
Darwinia biflora		Vulnerable	Vulnerable	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa. The vegetation structure is usually woodland, open forest or scrub-heath.	Low
Deyeuxia appressa		Endangered	Endangered	Given that D. appressa hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. Flowers spring to summer and is mesophytic (grows in moist conditions).	Low

Species	Common name	NSW status	Commonwealth status	Habitat	Likelihood of occurrence on the study site
Epacris purpurascens var. purparascens		Vulnerable	Not Listed	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Low
Eucalyptus camfieldi	Camfields Stringybark	Vulnerable	Vulnerable	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of E. oblonga Narrow-leaved Stringybark, E. capitellata Brown Stringybark and E. haemastoma Scribbly Gum.	Low
Eucalyptus nicholii	Narrow-leaved Black peppermint	Vulnerable	Vulnerable	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire. Tends to grow on lower slopes in the landscape.	Low
Eucalyptus scoparia	Wallangarra White Gum	Endangered	Vulnerable	Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high	Low

Species	Common name	NSW status	Commonwealth status	Habitat	Likelihood of occurrence on the study site
				altitudes. At lower elevations can occur in less rocky soils in damp situations.	
Genoplesium bauera	Bauer's Midge Orchid	Endangered	Endangered	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.	Low
Grevillea caleyi	Caley's grevillea	Endangered	Endangered	All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by Eucalyptus sieberi and E. gummifera. Commonly found in the endangered Duffys Forest ecological community.	Low
Haloragodrendron lucasii		Endangered	Endangered	Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels.	Low
Hibbertia puberula		Endangered	Not Listed	Flowering time is October to December, sometimes into January. Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied.	Low

Species	Common name	NSW status	Commonwealth status	Habitat	Likelihood of occurrence on the study site
Hibbertia superans		Endangered	Not Listed	The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	Moderate
Leptospermum deanei		Vulnerable	Vulnerable	Woodland on lower hill 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, Banksia ericifolia.	Low
Melaleuca deanei	Deane's Paperbark	Vulnerable	Vulnerable	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	Low
Microtis angusli	Angus's Onion Orchid	Endangered	Endangered	Exists as subterranean tubers during most of the year. Produces leaves and then flowering stems in late winter and spring and flowers from May to October. By summer, the above ground parts have withered leaving no parts above ground. Reported to be associated with Duffy's forest.	Low

Species	Common name	NSW status	Commonwealth status	Habitat	Likelihood of occurrence on the study site
Persoonia hirsuta	Hairy Geebung	Endangered	Endangered	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Low
Pimelea curviflora subsp. *Curviflora*		Vulnerable	Vulnerable	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Moderate
Prostanthera marifolia	Seaforth Mintbush	Endangered	Critically Endangered	Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	Low
Syzygium paniculatum		Endangered	Vulnerable	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.	Low
Tetratheca glandulosa		Vulnerable	Not Listed	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow,	Low

4.3 Terrestrial Fauna

4.3.1 Desktop Research

Results of the desktop research are provided in Table 14. A total of 37 threatened fauna species have been recorded within a 10 km radius of the study site. This includes:

- 34 species listed under the TSC Act
- 10 species listed under the EPBC Act (and a further 3 migratory species see Table 15)

Note: The New Holland Mouse is not listed in NSW threatened species legislation, and the White Bellied sea eagle is listed in state legislation and as migratory.

4.3.2 Fauna Surveys

A list of the species recorded onsite during the survey period is presented in Appendix 2. In total, 23 species were recorded on site, 20 birds, 1 mammal and 2 reptiles.

No threatened species were recorded.

4.3.3 Habitat Assessment

An overview of the habitat assessment is provided in the Table 13 below.

Table 13: Habitat features onsite for threatened fauna (building footprint)

Habitat Value	**Quantity**	**Description**
Hollow Bearing Trees	Low	There were no hollows observed
Stags	Low	The site contained no stags
Connectivity	Moderate	The site is connected on the west and east.
Water	Low	There was no watercourse on site
Rocky Outcrops	Moderate	There were sandstone shelfs.
Leaf Litter	High	The leaf litter and grassy groundcover would provide a good level of shelter and foraging for terrestrial fauna in the area to be retained

4.3.4 Assessment of Occurrence:

Table 14 below provides the results from desktop and field surveys, it has been determined that there is:

- A low likelihood for the occurrence of 34 threatened species to be present on the study site;

The proposal is highly unlikely to have a significant impact on any of the species listed in Table 14 which have been recorded within 10 km of the site, as no habitat of which they require or utilise for breeding and roosting (nesting) will be removed by the proposal. Accordingly 5 part tests of significance have been deemed not to be required for any of the species listed in Table 14 (see Table 17).

Where required, species nationally protected have had an impact assessment undertaken, with respect to the EPBC Act presented in Appendix 4. No nationally protected species were recorded on site, any species recorded within 10km of the site (Tables 14 and 15) are not considered likely to be impacted by the proposed development as, the proposed action will not remove any habitat of which these species might require or utilise.

Table 14: An analysis of threatened fauna species likely to occur onsite (Using species habitat requirements and habitat features of the site (Table 13) and surveys).

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Herpetofauna					
Giant Burrowing Frog	Heleioporus australiacus	Vulnerable	Vulnerable	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size.	Low
Pseudophryne australis	Red-crowned Toadlet	Vulnerable	Not Listed	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Litoria aurea	Green and Golden Bell Frog	Endangered	Vulnerable	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	Low
Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	Not Listed	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals.	Low
			Aves		
Ptilinopus superbus	Superb Fruit-Dove	Vulnerable	Not Listed	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	Low
Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Listed	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Halioeetus leucogaster	White-bellied Sea Eagle	Vulnerable	C	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	Low
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Listed	Occupies open eucalypt forest, woodland or open woodland. She-oak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Low
Lophoictinia isura	Square-tailed Kite	Vulnerable	Not Listed	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Low
Esacus magnirostris	Beach Stone Curlew	Endangered	Not Listed	Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Not Listed	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.	Low
Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable	Not listed	Occurs in open forest and woodland mostly on the coast. It prefers vegetation of Sheoak and Forest Sheoak (*Allocasuarina ssp.*) on which it feeds.	Low
Glossopsitta pusilla	Little lorikeet	Vulnerable	Not listed	Found where it will feed on the canopy species in Eucalyptus forest and woodland.	Low
Lathamus discolor	Swift Parrot	Endangered	Endangered	Found where eucalypts are flowering profusely or where lerp infestations are evident. Will return to feed areas where there is foraging resources. Favoured species include Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens* in the winter. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Ninox connivens	Barking Owl	Vulnerable	Not Listed	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils.	Low
Ninox strenua	Powerful Owl	Vulnerable	Not Listed	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Low
Tyto tenebricosa	Sooty Owl	Vulnerable	Not Listed	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation. Nests in very large tree-hollows.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Endangered	The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Low
Daphoenositta chrysoptera	Varied sitella	Vulnerable	Not listed	This species occurs in Eucalypt forests particularly where rough barked species are found.	Low
Artamus cyanopterus	Dusky Wood-swallow	Vulnerable	Not Listed	The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moistforests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris. Birds are also often observed in farm land, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Petroica boodang	Scarlet Robin	Vulnerable	Not Listed	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
			Mammalia		
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered	This species occurs in a range of habitat types which encompass woodland, rainforest, open forest and heath. This species requires fallen logs, caves, rock crevices and rocky cliff faces for refuge.	Low
Isodon obesulus	Southern Brown Bandicoot	Endangered	Endangered	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil.	Low
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable	This species occurs in Eucalypt woodlands and forests. Require a home range of 2 hectares up to several hundred hectares.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Cercartetus nanus	Eastern pygmy Possum	Vulnerable	Not listed	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable.	Low
Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Listed	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites.	Low
Pteropus poliocephalus	Grey-headed Flying Fox	Vulnerable	Vulnerable	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Low
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Listed	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
				range, with and without trees; appears to defend an aerial territory.	
Mormopterus norfolkensis	Eastern Freetail Bat	Vulnerable	Not Listed	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	Low
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.	Low
Miniopterus australis	Little Bent-wing Bat	Vulnerable	Not Listed	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Low
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	Not Listed	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Likelihood of occurrence on study site
Myotis macropus	Southern Myotis	Vulnerable	Not listed	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Low
Scoteanax rueppelli	Greater Broad nosed Bat	Vulnerable	Not listed	This species occurs in a wide range of habitats. It is mostly found in tall wet forest. Forages along creek and river edges.	Low
Pseudomys novaehoolandiae	New Holland Mouse	Protected	Vulnerable	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid stages of vegetation succession typically induced by fire	Low

4.4 Migratory Species

4.4.1 Desktop Research

Results of the desktop research are provided in Table 15. A total of 3 migratory species have been recorded within a 10km radius of the study site.

4.4.2 Fauna Surveys

No migratory species were recorded onsite during the fauna surveys.

4.4.3 Assessment of Occurrence

In collating results from desktop and field surveys, it has been determined that there is a low likelihood of the occurrence of the 3 migratory species potentially occurring on the study site.

Table 15. Results of the Desktop research, showing the occurrence of migratory species within a 10km radius of the site (C=CAMBA; J=JAMBA, K=ROKAMBA)

Species	**Common Name**	**NSW Status**	**Commonwealth Status**	**Habitat**	**Occurrence on Study Site**
Apus pacificus	Fork Tailed Swift	Not Listed	C, J, K	n Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	Low

Species	Common Name	NSW Status	Commonwealth Status	Habitat	Occurrence on Study Site
Hirundapus caudacutus	White-throated Needletial	Not Listed	C, J, K	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.	Low
Haliaeetus leucogaster	White-bellied Sea Eagle	Not Listed	C	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats	Low

4.5 Key Threatening Processes

Key threatening processes listed under the *Environmental Protection and Biodiversity Conservation Act* (1999) and *Threatened Species Act* (1995) relevant to the site have been listed in Table 16.

Where the proposal is shown to contribute to KTP, these are further considered in section 5.

Table 16: Key threatening processes relating to the development

Threatening Process	**Act**	**Likely to Occur on site at present**	**Proposal may contribute**
Bushrock removal	TSC	No	No
Clearing of native vegetation	TSC/EPBC	No	Yes
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	TSC/EPBC	No	No
Invasion of native plant communities by exotic perennial grasses	TSC	Yes	No
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	TSC/EPBC	Yes	No
Loss of Hollow-bearing Trees	TSC	No	No

Notes:

1. The clearing of native vegetation will be for the building footprint, associated APZ, the site has been chosen as this area has been cleared previously, and some rehabilitation is evident. No trees will be removed for the proposal. The APZ to the north will be within the area that is covered with weed species.

5. Impacts of the Proposed Development

5.1 Potential Impacts on Endangered Ecological Communities (EECs)

The proposed action is not likely to have an effect on any of the Endangered Ecological Communities (EEC's), as none of the EEC's listed in Table 10 were identified on site. The native vegetation on site approximated the vegetation communities Coastal Sandstone Gully Forest and Coastal Sandstone Heath-Mallee a total of approximately 2.5 ha (90% of the Lot area); and a cleared area of 3000 m^2 (10% of the Lot area), with the larger area of native vegetation being retained on site.

The clearing of native vegetation will be for the building footprint, associated APZ, the site has been chosen as this area has been cleared previously, and some rehabilitation is evident. No trees will be removed for the proposal. The APZ to the north will be within the area that is covered with weed species.

5.2 Potential Impacts on Threatened Flora Species

The proposal is **unlikely** to cause the following impacts on threatened flora species:

- Removal of habitat
- Individual death or injury
- A disturbance to reproduction
- Functional and structural changes within flora populations

Table 17 provides a justification for the conduct of a Five Part Test, in relation to individual flora species.

A five-part test of significance was deemed not to be required for the 21 species listed in Table 17, as no specific habitat will be removed for the proposal.

This assessment has determined that the development will **NOT** have a significant impact upon the twenty-one threatened flora species with suitable habitat represented onsite and recorded within 10 km of the site (Table 17).

An assessment of considerations under the *Environmental Protection and Biodiversity Conservation Act* (1999) has also determined that it is **unlikely** that this development will lead to the local extinction of the sixteen threatened species listed (Table 12 and 17).

Table 17: The potential impact on threatened flora species that have habitat represented on site, and whether a Five Part Test is required (BC Act has been applied) or Commonwealth assessment.

Scientific Name	TSC Act	EPBC Act	Individual death or injury	Disturbance to reproduction	Impact assessment applied?
Acacia bynoeana	Endangered	Vulnerable	Unlikely	Unlikely	No
Callistemon linearifolius	Vulnerable	Not Listed	Unlikely	Unlikely	No
Darwinia biflora	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Deyeuxia appressa	Endangered	Endangered	Unlikely	Unlikely	No
Epacris purpurascens var. purparascens	Vulnerable	Not Listed	Unlikely	Unlikely	No
Eucalyptus camfieldi	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Eucalyptus nicholii	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Eucalyptus scoparia	Endangered	Vulnerable	Unlikely	Unlikely	No
Genoplesium bauera	Endangered	Endangered	Unlikely	Unlikely	No
Grevillea caleyi	Endangered	Endangered	Unlikely	Unlikely	No
Haloragodrendron lucasii	Endangered	Endangered	Unlikely	Unlikely	No
Hibbertia puberula	Endangered	Not Listed	Unlikely	Unlikely	No
Hibbertia superans	Endangered	Not Listed	Unlikely	Unlikely	No

Scientific Name	TSC Act	EPBC Act	Individual death or injury	Disturbance to reproduction	Impact assessment applied?
Leptospermum deanei	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Melaleuca deanei	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Microtis angusli	Endangered	Endangered	Unlikely	Unlikely	No
Persoonia hirsuta	Endangered	Endangered	Unlikely	Unlikely	No
Pimelea curviflora subsp. *Curviflora*	Vulnerable	Vulnerable	Unlikely	Unlikely	No
Prostanthera marifolia	Endangered	Critically Endangered	Unlikely	Unlikely	No
Syzygium paniculatum	Endangered	Vulnerable	Unlikely	Unlikely	No
Tetratheca glandulosa	Vulnerable	Not listed	Unlikely	Unlikely	No

5.3 Potential Impacts on Threatened Fauna Species

The potential impacts of the proposal on threatened fauna species, can be assessed by utilising the information from Table 14 (regarding the potential habitat available), and whether a threatened species was recorded on site; this information is used to determine if the proposal is likely to cause any of the following impacts on threatened fauna species:

- Death of individuals
- Injury of individuals
- Reduction and loss of breeding resources
- Reduction and loss of foraging resources
- Disturbance to a larger habitat area
- Loss of connectivity within and between habitats

Table 18 outlines the potential impacts that the proposal may have on threatened species and determines whether a five Part Test (TSC Act) is to be applied.

As the proposed action will not remove any habitat that the species listed in Table 18 require or utilise, it has been determined that it is **unlikely** that the proposed action will cause:-

- any death or injury to any of these species,
- a reduction and loss of breeding resources and foraging resources for these species,
- a disturbance to a larger habitat area for these species
- a loss of connectivity within and between habitats for these species

It has been determined that these species **do not** require that a seven part test of significance or a Commonwealth assessment is to be applied as part of this assessment (See Table 18).

Table 18: The potential impact on threatened fauna species, and whether a Five Part Test is required (BC Act has been applied) or Commonwealth assessment.

Common name	**Scientific name**	**TSC Act**	**EPBC Act**	**Individual death or injury**	**Loss or disturbance to limiting of foraging resources**	**Loss or disturbance of breeding resources**	**Impact assessment applied?**
Giant Burrowing frog	*Heleiopurus austaliacus*	Vulnerable	Vulnerable	Unlikely	Unlikely	Unlikely	No
Red Crowned toadlet	*Pseudophryne australis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Green and Golden bell Frog	*Litoria aurea*	Endangered	Vulnerable	Unlikely	Unlikely	Unlikely	No
Rosenberg's Goanna	*Varanus rosenberg*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Fork-tailed Swift	*Apus pacificus*	Not Listed	C. J, K	Unlikely	Unlikely	Unlikely	No
White-throated Needletail	*Hirundapus caudacutus*	Not Listed	C, J, K	Unlikely	Unlikely	Unlikely	No
Black Bittern	*Ixobrychus flavicollis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Spotted Harrier	*Circus assimilis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
White-bellied Sea Eagle	*Haliaeetus leucogaster*	Not Listed	C	Unlikely	Unlikely	Unlikely	No

Little Eagle	*Hieraaetus morphnoides*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Square-tailed Kite	*Laphoictinia isura*	Vulnerable	Not Listed	Unlikely	Unlikely	Not likely	No
Beach Stone-curlew	*Esacus magnirostris*	Endangered	Not listed	Unlikely	Unlikely	Unlikely	No
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Glossy Black Cockatoo	*Calyptorhynchus lathami*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Swift Parrot	*Lathamus discolor*	Endangered	Endangered	Unlikely	Unlikely	Unlikely	No
Barking Owl	*Ninox connivens*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Powerful Owl	*Ninox strenua*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Sooty Owl	*Tyto tenebricosa*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Regent Honeyeater	*Anthochaera phrygia*	Endangered	Critically Endangered	Unlikely	Unlikely	Unlikely	No
Varied sittella	*Daphoenositta chrysoptera*	Vulnerable	Not listed	Unlikely	Unlikely	Unlikely	No
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No

Scarlet Robin	*Petroica boodang*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable	Endangered	Unlikely	Unlikely	Unlikely	No
Southern Brown Bandicoot	*Isodon obesulus*	Endangered	Endangered	Unlikely	Unlikely	Unlikely	No
Koala	*Phascolarctus cinereus*	Vulnerable	Vulnerable	Unlikely	Unlikely	Unlikely	No
Eastern Pygmy Possum	*Cercartetus nanus*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	No
Grey-headed flying fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	Unlikely	Unlikely	Unlikely	No
Yellow-bellied Sheath-bat	*Saccolaimus flaviventris*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	Yes
Eastern Freetail Bat	*Mormopterus nofolkensis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable	Unlikely	Unlikely	Unlikely	Yes
Little Bent-wing Bat	*Miniopterus australis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	Yes

Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	Yes
Southern Myotis	*Myotis macropus*	Vulnerable	Not listed	Unlikely	Unlikely	Unlikely	Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Vulnerable	Not Listed	Unlikely	Unlikely	Unlikely	Yes
New Holland Mouse	*Pseudomys novaehollandiae*	Not Listed	Vulnerable	Unlikely	Unlikely	Unlikely	No

6. Conclusion

This report assesses whether any threatened flora and fauna species, endangered populations and endangered ecological communities, are likely to be impacted upon by the proposed residential development. It addresses the *Threatened Species Conservation Act* (1995) and the *Environmental Protection and Biodiversity Conservation Act* (1999).

No threatened species, endangered populations or endangered ecological communities listed on the schedules of the *NSW Threatened Species Conservation Act 1995 (Biodiversity Conservation Act 2016)*, or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* were recorded in the study area.

Following the application of Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, as required by the five factors (section 7.3) from the *NSW Biodiversity Conservation Act 2016*, in accordance with relevant assessment guidelines, it is concluded that the proposal is unlikely to have a significant effect on threatened species, endangered populations, ecological communities, or their habitats.

A Species Impact Statement is not required for the proposal.

Following consideration of the administrative guidelines for determining significance under the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

A number of impact mitigation and amelioration strategies have been recommended for the proposal. These strategies mitigate the effects of the proposal on threatened species, endangered populations, ecological communities, or their habitats and minimise the impacts of the proposal on the flora and fauna values of the study area in general.

7. Recommendations

The following recommendations are suggested in order to mitigate and ameliorate the impacts of the proposal on threatened flora and fauna species and endangered communities:

Vegetation Removal:

- Clearing for the proposal should be undertaken such that areas of native vegetation to be retained are not impacted upon during construction works.
- Invasive exotic perennial grass species listed in the Final Determination of the NSW Scientific Committee for this key threatening process should not be sown within 10m of vegetation to be retained intact. Sterile cover crops should be sown if necessary to stabilise exposed surfaces, and native grasses or non-invasive exotic grasses should be sown to provide the final vegetative cover in these areas if required.
- Native plants from the species list in Appendix 2 of this report should be considered in any landscaping for the proposal.
- Known weed or invasive species should not be planted for landscaping purposes.
- Any invasive weeds and escaped garden plants should be removed from the site.

Offsetting the Impacts:

- If any fauna is injured during construction works WIRES should be called immediately.
- Appropriate sediment control measures should be established before the commencement of work on the proposal and retained in place until all bare areas have been revegetated.
- Vehicles and earthmoving machinery should only be parked in restricted areas in order to protect the off-site habitat surrounding the study site.

8. References

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Appendix 1: Detailed Site Plan

Figure 3: Plans for the proposed action at, 74 Willandra Road, Narraweena.

Appendix 2: Species Recorded Onsite

Flora

* Denotes exotic species

Plant Family	Scientific Name	Common Name	Conservation/Weed Status
Alliaceae	*Agapanthus praecox**	Agapanthus	
Amaranthaceae	*Alternanthera denticulate*	Lesser Joyweed	
Apiaceae	*Actinotis helianthi*	Flannel Flower	
Apiaceae	*Platysace linearifolia*	Carrot Tops	
Apiaceae	*Xanthosia pilosa*	Woolly Xanthosia	
Apiaceae	*Xanthosia tridentate*	Rock Xanthosia	
Apocynaceae	*Parsonsia straminae*	Common Silkpod	
Apocynaceae	*Vinca major**	Blue periwinkle	
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern	
Asparagaceae	*Asparagus asparagoides**	Bridal Creeper	
Asteraceae	*Ageratina adenophora**	Crofton Weed	
Asteraceae	*Bidens pilosa**	Cobblers Pegs	
Asteraceae	*Cassinia compacta*	Bushy Cassinia	
Asteraceae	*Onopordum acanthium**	Scotch Thistle	
Asteraceae	*Senecio madagascariensis**	Fireweed	Class 4 Noxious Weed
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern	
Casuarinaceae	*Allocasuarina distyla*		
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak	
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush	
Cyperacea	*Caustis flexuosa*	Curly Wigs	
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge	
Cyperaceae	*Lepidosperma laterale*	Variable Swordsedge	
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	
Epacridaceae	*Epacris longiflora*		
Epacridaceae	*Epacris microphylla*		
Eapacridaceae	*Epacris pulchella*		
Epacridaceae	*Leucopogon microphyllus*		
Epacridaceae	*Woollsia pungens*		
Fabaceae	*Acacia terminalis*	Sandstone Wattle	
Fabaceae	*Acacia saligna*	Coastal Wattle	
Fabaceae	*Acacia suaveolens*	Blue Wattle	
Fabaceae	*Bossiaea heterophylla*		
Fabaceae	*Bossiaea scolopendria*	Spiny Bossiaea	
Fabaceae	*Dillwynia retorta*		

Fabaceae	*Glycine microphylla*		
Fabaceae	*Hardenbergia violacea*	False Sarsaparilla	
Fabaceae	*Pultenaea blakelyi*	Blakely's Bush Pea	
Fabaceae	*Pultenaea stipularis*		
Fabaceae	*Pultenaea tuberculata*		
Gleicheniaceae	*Sticherus flabellatus*	Shiny Fan Fern	
Haloragaceae	*Gonocarpus teucroides*	Germander Raspwort	
Juncaceae	*Juncus usitatus*	Common Rush	
Lauraceae	*Cassytha glabella*	Devil's Twine	
Lauraceae	*Cassytha pubescens*	Old Mans Beard	
Lilliaceae	*Dianella caerulea*	Blue flax Lily	
Lilliaceae	*Patersonia sericea*	Silky Purple Flag	
Lobeliaceae	*Pratia purpurascens*	White Root	
Lomandraceae	*Lomandra cylindica*	Needle Matt-rush	
Lomandraceae	*Lomandra filiformis*		
Lomandraceae	*Lomandra longifolia*	Spiny-headed Matt-rush	
Lomandraceae	*Lomandra oblique*	Fish Bones	
Loranthaceae	*Amyema congener*	Mistletoe	
Malvaceae	*Sida rhombifolia**	Arrowleaf Sida	
Malvaceae	*Modiola caroliniana**	Red Flower Mallow	
Myrsinaceae	*Anagallis arvensis**	Scarlet Pimpernel	
Myrtaceae	*Angophora hispida*	Dwarf Apple	
Myrtaceae	*Angophora costata*	Sydney Red Gum	
Myrtaceae	*Corymbia gummifera*	Red Bloodwood	
Myrtaceae	*Conospermum taxifolium*		
Myrtaceae	*Darwinia fascicularis*		
Myrtaceae	*Eucalyptus haemastoma*	Scribbly Gum	
Myrtaceae	*Eucalyptus multicaulis*		
Myrtaceae	*Eucalyptus*		
Myrtaceae	*Kunzea capitata*		
Myrtaceae	*Leptospermum arachnoides*		
Myrtaceae	*Leptospermum trinervium*		
Oxalidaceae	*Oxalis corniculata**	Yellow Wood Sorrel	
Oxalidaceae	*Oxalis bowiei**	Bowie Wood Sorrel	
Oxalidaceae	*Oxalis articulate**	Shamrock Oxalis	
Oxalidaceae	*Oxalis debilis**	Pink Shamrock	
Pittosporaceae	*Pittosporum undulatum*	Native Daphne	
Plantaginaceae	*Plantago lanceolata**	Lambs Tongue	
Plantaginaceae	*Plantago major**	Greater Plantain	
Poaceae	*Aristida vagans*	Three-awn Speargrass	
Poaceae	*Cortaderia selloana**	Pampas Grass	Environmental Weed
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	
Poaceae	*Cynodon dactylon**	Couch	
Poaceae	*Echinopogon caespitosus*	Hedgehog Grass	

Poaceae	*Entolasia stricta*		
Poaceae	*Imperata cylindrical*	Blady Grass	
Poaceae	*Pennisetum clandestinum**	Kikuyu	
Poaceae	*Poa labilliardieri*	Tussock Grass	
Poaceae	*Themeda australis*	Kangaroo Grass	
Primulaceae	*Anagallis arvensis**	Pimpernel	
Proteaceae	*Banksia ericifolia*	Candle Banksia	
Proteaceae	*Banksia marginate*		
Proteaceae	*Banksia oblongifolia*		
Proteaceae	*Banksia serratta*	Old Man Banksia	
Proteaceae	*Grevillea buxifolia*	Grey Spider Flower	
Proteceae	*Grevillea oleoides*		
Proteaceae	*Grevillea sericea*		
Proteaceae	*Grevillea speciosa*		
Proteaceae	*Hakea dactyloides*		
Proteaceae	*Hakea gibbosa*		
Proteaceae	*Hakea teritifolia*		
Proteaceae	*Lambertia Formosa*	Mountain Devil	
Proteaceae	*Lomatia silaifolia*		
Proteaceae	*Persoonia lanceolata*		
Proteaceae	*Persoonia levis*		
Proteaceae	*Petrophile pulchella*	Old Cones	
Pteridaceae	*Cheilanthes sieberi* subsp. *Sieberi*	Poison Rock Fern	
Rubiaceae	*Pomax umbellate*	-	
Rutaceae	*Boronia ledifolia*	Sydney Boronia	
Solanaceae	*Solanum mauritianum**	Wild Tobacco	
Solanaceae	*Solanum prinophyllum*	Forest Nightshade	
Solanaceae	*Solanum sisymbriifolium**	Sticky Nightshade	
Stylidiaceae	*Stylidium lineare*	Narrow Leaved Trigger Plant	
Thymeleaceae	*Pimelea linifolia*	Slender Rice Flower	
Verbenaceae	*Lantana camara**	Lantana	Class 4 Noxious Weed
Verbenaceae	*Verbena bonariensis**	Purple Top	
Xanthorrhoeaceae	*Xanthorrhoea media*	Grass Tree	

Fauna *Denotes introduced species - # Denotes Threatened species

SCIENTIFIC NAME	COMMON NAME
Aves	
Acanthiza chrysorrhoa	Yellow Rumped Thornbill
Acathanza lineata	Striated Thornbill
Acanthorhynchus tenuirostris	Eastern Spinebill
Rhipidura albiscapa	Grey Fantail
Rhipidura leucophrys	Willy Wagtail
Cracticus torquatus	Butcherbird
Platycercus eximius	Eastern Rosella
Smicrornis brevirostris	Weebill
Manorina melanocephala	Noisy Miner
Gymnorhina tibicen	Magpie
Grallina cyanoleuca	Magpie Lark
Hirundo neoxena	Welcome Swallow
Corvus coronoides	Raven
Eopsaltria australis	Eastern Yellow Robin
Dacelo novaeguineae	Kookaburra
Trichoglossus moluccanus	Rainbow Lorikeet
Coracina novaehollandiae	Black-faced Cuckoo Shrike
Malurus cyaneus	Superb Blue Wren
Sericornis frontalis	White-browed Scrubwren
Anthochaera chrysoptera	Brush Wattlebird
Mammals	
Petaurus breviceps	Sugar Glider (Incisions)
Reptiles	
Varanus	Lace Monitor
Lampropholis guichenoti	Common Garden skink

Appendix 3: EPBC Act Considerations

An assessment of the impact of the proposed development upon threatened species, populations, ecological communities, World Heritage values, and migratory species listed under the *Environment Protection and Biodiversity Conservation Act 1999* are listed below.

Impacts on threatened species and ecological communities

An action has, will have, or is likely to have a significant impact on a threatened species if it does, will, or is likely to:

- Lead to a long-term decrease in the size of a population
- Reduce the area of occupancy of the species
- Fragment an existing population into two or more populations
- Adversely affect habitat critical to the survival of a species
- Disrupt the breeding cycle of a population
- Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat; or
- Interfere with the recovery of the species

Critically endangered and endangered species

No critically endangered or endangered species were observed on the subject site, however potential habitat exists for the endangered species *Deyeauxia appressa, Genoplesium bauera, grevillea clayi, Haloragodendron lucasii, Microtus angusli, Persoonia hirsute and Prosthanthera marifolia.* These species were not detected in the study area however may potentially occur in the soil seedbank.

It is considered that the proposed development will not disrupt the lifecycle of these species such that any potentially viable local population would be placed at increased risk of extinction. The potential impacts of the proposed development is not likely to lead to significant exacerbation of those points listed above.

Vulnerable Species

No vulnerable species were recorded at the study site, however potential habitat exists for the vulnerable flora species *Acacia bynoeana, Darwinia biflora, Eucalyptus camfieldi, eucalyptus nicholii, Eucalyptus scoparia, Leptospermum deanei, melaleuca deanei, Pimelea curviflora*

var. *curviflora and Syzygium paniculatum*. These species were not detected in the study area however may potentially occur in the soil seedbank.

It is considered that the proposed development will not disrupt the lifecycle of these species such that any potentially viable local population would be placed at increased risk of extinction. The potential impacts of the proposed development is not likely to lead to significant exacerbation of those points listed above.

Critically endangered and endangered ecological communities

An important population is one that is necessary for a species long-term survival and recovery. This may include populations that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

The proposal will not have a significant impact on any Endangered Ecological Community as there was no Listed vegetation community detected on site.

Impacts on migratory species

An action has, will have, or is likely to have a significant impact on a migratory species if it does, will, or is likely to:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species;
- Result in invasive species that are harmful to the migratory species, and prevent the species becoming established in an area of important habitat;
- Seriously disrupt the lifecycle (breeding, feeding, migration or nesting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant portion of the population of the species
- Habitat utilised by a migratory species which is at the limit of the species range; or
- Habitat within an area where the species is declining.

Three (3) migratory species (Fork Tailed Swift, White-throated Needletail and White-bellied Sea Eagle), were recorded within a 10km radius of the site (Table 15). The proposed development will not significantly decrease habitat available for these species, or disrupt the lifecycle of these species such that viable populations are likely to be placed at risk of extinction. The proposed development is therefore not likely to have a significant impact

on these species and is not likely to result in any points listed above under the migratory species provisions of the EPBC Act.

EPBC Act Assessment

- The proposed action will not significantly impact on any of the 16 flora and 10 fauna species listed under the EPBC Act and recorded within a 10 km radius of the site (Tables 12 and 14).
- The proposed action will not significantly impact on any Endangered Ecological Community.
- The proposed action will not significantly impact on the 3 migratory species that are listed under the EPBC Act and recorded within a 10km radius of the site (Table 15).

Referral Recommendation

The proposed development will **not** require referral to the Commonwealth Minister for the Environment for consideration under the EPBC Act.