# Flora and Fauna Assessment for 113 Orchard Street, Warriewood

# **Final Report**

By Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands October 2019 – updated May 2020



# About this document



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#### Statement of Authorship

This study and report was undertaken by Ecological Consultants Australia at Studio 1/33 Avalon Parade, Avalon. The author of the report is Geraldene Dalby-Ball with qualifications BSc. majoring in Ecology and Botany with over 20 years' experience in this field.

#### **Limitations Statement**

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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# **Executive Summary**

#### Introduction

- This Flora and Fauna was prepared for Mr Tony McLain of Tony McLain Architects on behalf of the owners of 113 Orchard Street, Warriewood (the site). It relates to the proposed development of the site.
- The proposed development involves the construction of a horse arena, day yards, paddocks, access drive, turning and parking as well as additions to the existing dwelling. The works also involve associated earth and landscape works including gabion walls.
- Recommendations have been provided to reduce the likelihood of impact and mitigate loss if the proposal is approved.

#### Methods

- On-ground survey took place on 18<sup>th</sup> of September 2018 by Senior Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars, Anabat SD2 Active Bat Detector and physical examination. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- Review of proposed development: the footprint of the proposed horse arena, day yards, paddocks, access drive, turning and parking as well as additions to the existing dwelling were assessed for potential environmental impacts.

#### Results

- No threatened plant species were found during site assessments. Canopy tree composition is consistent with that of Sydney Turpentine-Ironbark Forest which is listed as a critically endangered ecological community on Part 3 of Schedule 1 of the Act. The location and soil type, however, is not indicative of this community. A 5-part test has not been conducted.
- Turpentine trees are growing on the lower slopes of the escarpment (such as on the subject site) transitioning into *Angophora costata* with the increasing slope and decreasing soil nutrient levels. There are few Turpentine trees above the property boundary. Loss of the trees on the site would constitute a loss of Turpentine trees in the local area (Escarpment base).
- Foraging habitat is available for threatened species that are known to be in the immediate area (within 400m) including Grey Headed Flying Fox, Powerful Owl, Glossy Black Cockatoo and species of microbats including Little bent Wing bats. Other threatened species have potential habitat on-site including Swift parrots and Regent Honey Eaters. Test of Significance (5-Part Tests) have been conducted for species with habitat on-site. None came up individually significant. the loss of habitat in the area for these species is contrary to the recovery plans of the species.
- Recent (May-July) Anabat surveys didn't pick up microbats however they may be?? on-site and surrounds. Surveys are best in warm months. Microbats have been assumed to be present on-site.
- The site is habitat for a diversity of locally native fauna species.
- Tree removal would be the greatest impact from this development. See Arborist report (V. Beecher 2019) for details. 30 trees are proposed for removal as they are currently in proposed development areas including horse arenas. The trees that would be removed were not observed to be bearing

hollows suitable for tree roosting microbat species. This indicates a low potential for the life cycles of local populations to be put at risk from a breeding perspective however the site may be used primarily for foraging resources.

- The proposed actions would be expected to have a lesser impact upon cave dwelling species including the Eastern Bentwing-bat and the Southern Myotis. Trees do not comprise breeding habitat for these species and would not impact their life cycles.
- Environmental weeds are present on-site turf makes up 95% of understory. Weeds of National Significance (WoNS) were not observed on-site nor were any listed on the BioSecurity Act;

#### **Mitigation Measures**

If the development is approved mitigation works will be required.

Before works:

- Tree Protection as per Arborist report and long term retention to be covered in VMP.
- Removal of weeds to prevent spread of seed.
- Effective site management to ensure sediment
- Vegetation Management Plan (VMP) as per Guidelines to provide direction on long-term vegetation management including remnant native vegetation and long-term success of compensatory tree planting.

During works:

- Preserve and protect native flora, sandstone outcrops and floaters and understory species.
- Dead wood including upright dead trees and fallen logs on the ground should be retained and protected during works as they provide high quality habitat for threatened fauna species, refer to Arborist report.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

- Revegetation works will be conducted as per Landscaping Plan for flora species.
- Retained dead wood (over 10cm diameter) and sandstone to be reintroduced to the site as habitat retention.
- Management of the sites interface with the reserve to be detailed in a VMP.
- Management of horse manure and associated nutrients.

Legislation: Various pieces of legislation apply to this location and the proposed works are in keeping with the objective of the Acts. Key acts are listed below.

- Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Biodiversity Conservation Act 2016 (BC Act).

- Fisheries Management Act 1994 (FM Act).
- National Parks & Wildlife Act 1974 (NP&W Act).
- Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).

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# 1 Introduction

## **1.1** Scope of works

Ecological Consultants Australia (ECA) has been contracted by Tony McLain Architects, to provide a "Flora and Fauna Assessment" to assess potential direct and indirect impacts on any threatened species, populations and communities as per section 5A of the Environmental Planning & Assessment Act 1979. The 'Assessment of Significance' has been undertaken in accordance with the NSW Department of Environment & Climate Change 'Threatened species assessment guidelines' and BioBanking legislation.

It is understood that this report is to form part of a Development Application for the horse arena, day yards, paddocks, access drive, turning and parking as well as additions to the existing dwelling. The works also involve associated earth and landscape works including gabion walls.

The objectives of this Flora and Fauna Impact Assessment are to:

- Identify any native vegetation communities, significant species or significant habitat features present within the study area.
- Identify any known or potential habitat for threatened species.
- Review the implications of relevant biodiversity legislation and policy.
- Identify potential impacts on significant ecological communities, species or habitats from the proposed development and provide recommendations to assist with the mitigation of those potential impacts during the construction and operation stages.
- Targeted searches for significant species are based on the authors' knowledge of the site.

Works included a site survey/assessment, review of project design the arborist assessments and any additional reports and review of available literature to produce site specific ecological and environmental effects report.

# **1.1** Limitations of the Study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular environmental circumstances related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, biological life-cycle patterns as in the case of small plants such as species of orchids etc. No specific invertebrate surveys were conducted.

Surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame and assess the suitability of habitat for particular species.

Considering the site and habitat availability Kingfisher are confident that this survey is representative of the likely species and vegetation community and that future studies at other times would not change the conclusions in this report.

# 1.2 The Site

The subject site identified as 113 Orchard Street, Warriewood – Lot 6 DP 749791, a proposed development with an addition to existing dwelling, horse arena, day yards, paddocks, access driveway and parking, and associated landscape/earth works located on the Eastern side of the block. The site is zoned RU2 'Rural Landscape' within Northern Beaches Council LEP 2014. It is a rural square block of 9500m<sup>2</sup> (under 1ha).



Figure 1. Location of the site. Source: Six Maps, 2018.

Existing site features are indicated on the survey (Figure 2) and include:

- An existing residential dwelling
- Easterly aspect
- Sandstone outcrops with elevated tors to rear of property (where it notes extent of survey)

• Vegetation is native canopy species (seen on survey) with a turf understory that has remnant native ground and vine species scattered throughout – at low abundance.



Figure 2. Site Survey including contours – NB see survey with DA for clear copy

# 2 Proposed Actions

The proposed actions involve horse arena, day yards, paddocks, access drive, turning and parking as well as additions to the existing dwelling. The works also involve associated earth and landscape works including gabion walls. Figure 3a is a plan diagram (see DA submission for higher resolution copy).



# 2.1 Legislation and policy

The implications for the proposal were assessed in relation to key biodiversity legislation and policy including:

• Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

A Protected Matters Search was conducted – see results section.

• Environmental Planning and Assessment Act 1979 (EP&A Act).

The EPA Act requires that the assessing body, in this case local government, consider the impact of the development on the surroundings – with respect to this ecology report the impacts on the environment are assessed. The proposal indicates no significant impact on threatened species, populations or communities.

• Biodiversity Conservation Act 2016 (BC Act).

Recently replacing the Threatened Species Conservation Act this includes the test of significance for impacts on threated species, communities. The test of significance has been conducted and the proposal was found to not have a significant impact on the current ecology of the site, providing the Mangroves are protected and stormwater is well managed. The proposed development is complaint with the BC Act.

• National Parks & Wildlife Act 1974 (NP&W Act).

The proposed development is complaint with the NP&W Act.

• Biosecurity Act

The Biosecurity Act replaced the Noxious Weeds Act and the objectives of this Act is to manage, and eradicate and Weeds that cause a high level of environmental, economic or social harm. With the removal of Pampas Grass and management of weeds in the riparian zone, as per the VMP, then the sites work with be complaint with the objectives of this Act.

# 3 Methods

## 3.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball assessed the site in September 2018 (during the afternoon and evening). She is also very familiar (over 30 years) with the flora and fauna of the neighbouring Warriewood Escarpment and Warriewood Wetlands.

Weather was fine and sunny during day-time then cooler in the evening survey.

During site visits, notes and photos were taken of the vegetation types, flora and fauna present. Due to the small area of proposed impacts, detailed or systematic surveys were not performed. However, a microbat survey was conducted on-site using an Anabat SD2 Active Bat Detector. There were no microbat species recorded on site (May to July 2019) over 5 nights of surveying. Ecologists have assumed their presence as the survey took place in a cooler period when microbat species are known to be absent at the site.

Surveys were general and opportunistic in nature and were performed by traversing the site. Surveys included one diurnal bird and fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified.

## **3.2** Previous studies

Bionet, previous studies and the author's knowledge of the local area, were used to determine the possible occurrence of endangered ecological communities and threatened plant species on-site. The Bionet records accessed cover a 10km<sup>2</sup> area extending from the site and include recordings from 1993 to the present day.

Records from the following databases were collated and reviewed:

- Atlas of NSW Wildlife (Bionet). New South Wales, Office of Environment and Heritage (OEH).
- NSW Threatened Species Information (OEH).
- VIS Vegetation Mapping information NSW.
- PlantNET (The Royal Botanic Gardens and Domain Trust 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Other sources of biodiversity information:

- Relevant vegetation mapping, including:
  - Vegetation Information System, VIS Mapping (OEH) and mapping of Plant Community Types (PCTs) as per Biobanking methods.

The following plans and reports were also reviewed:

- Plan Showing Detail & Levels Over LOT 6 in DP749791, prepared by Axiom Surveying, dated 22.02.18.
- Proposed Horse Arena and Facilities Site Plan, prepared by Tony McLain Architect, Drawing number DA01, rev D, dated July 2018.
- Proposed Horse Arena and Facilities Site Plan, prepared by Tony McLain Architect, Drawing number DA01, rev A, dated July 2018.
- Proposed Horse Arena and Facilities Site Sections, prepared by Tony McLain Architect, Drawing number DA02, rev A, dated July 2018.
- Proposed Horse Arena and Facilities Addition to House, prepared by Tony McLain Architect, Drawing number DA03, rev A, dated July 2018.
- Arborist Report (Oct 2018) by V. Beecher and O. Tebbutt prepared for Tony McLain Architect.
- Bushfire Risk Assessment prepared by R Coffey (4/09/19)

# 4 Flora

The purpose of the flora work was an investigation to determine the flora composition of the site, particularly vulnerable and endangered species. It also included an assessment of the flora as habitat. Furthermore, an assessment of potential impact of the development with a determination of native ground and shrub was conducted.

# 4.1 Threatened flora

BioNet records within 10km of the study site had 17 species currently listed as vulnerable or endangered under state and/or commonwealth legislation, out of a total of 1,009 native flora species. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 2** below. This is based on likelihood of occurrence.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Elaeocarpaceae	Tetratheca glandulosa		V,P		74
Ericaceae	Epacris purpurascens var. purpurascens		V,P		2
Euphorbiaceae	Chamaesyce psammogeton	Sand Spurge	E1,P		2
Fabaceae (Mimosoideae)	Acacia terminalis subsp. terminalis	Sunshine Wattle	E1,P	E	1
Lamiaceae	Prostanthera densa	Villous Mint-bush	V,P	V	1
Lamiaceae	^^Prostanthera marifolia	Seaforth Mintbush	E4A,P,3	CE	1
Malvaceae	Lasiopetalum joyceae		V,P	V	1
Myrtaceae	^^Callistemon linearifolius	Netted Bottle Brush	V,P,3		2
Myrtaceae	Eucalyptus camfieldii	Camfield's Stringybark	V,P	V	12

#### Table 2. Threatened flora recorded within a 10km radius since 1993. Source: NSW OEH Bionet 2018.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V,P	V	4
Myrtaceae	Kunzea rupestris		V,P	V	1
Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	E1,P	V	8
Orchidaceae	^Genoplesium baueri	Bauer's Midge Orchid	E1,P,2	E	1
Orchidaceae	^Microtis angusii	Angus's Onion Orchid	E1,P,2	E	80
Proteaceae	^^Grevillea caleyi	Caley's Grevillea	E4A,P,3	CE	372
Proteaceae	^^Persoonia hirsuta	Hairy Geebung	E1,P,3	E	23
Thymelaeaceae	Pimelea curviflora var. curviflora		V,P	V	20

**Note:** E = Endangered, V = Vulnerable, P = Protected.

# 4.2 Flora Findings from Site Investigations

#### 4.2.1 Threatened plant species findings

No threatened plant species were found during site assessments. The vegetation Community could constitute Sydney Turpentine Ironbark Forest an Endangered Ecological Community.

Table 3. Flora observed during the ecological assessment.

Scientific Name	Common Name	NSW Status	Comth. Status	Relative Abundance
Сапору				
Angophora costata	Smooth Barked Apple	N/A	N/A	##
Angophora floribunda	Rough Barked Apple	N/A	N/A	##
Allocasuarina littoralis	Black Sheoak	N/A	N/A	###

Scientific Name	Common Name	NSW Status	Comth. Status	Relative Abundance
Allocasuarina torulosa	Forest She Oak	N/A	N/A	#
Corymbia gummifera	Red Bloodwood	N/A	N/A	###
Eucalyptus botryoides	Southern Mahogany	N/A	N/A	#
Ecalyptus piperita	Sydney Peppermint	N/A	N/A	#
Eucalyptus robusta	Swamp Mahogany	N/A	N/A	##
Syncarpia glomulifera	Turpentine	N/A	N/A	###
Livistona australis	Cabbage Tree Palm	N/A	N/A	#
Banksia serrata	Old-Man Banksia	N/A	N/A	##
Ground and Shrub and Vine				
Themeda triandra	Kangaroo Grass	N/A	N/A	##
Calochlaena dubia	Soft Bracken Fern	N/A	N/A	##
Pteridum esculatium	Bracken Fern	N/A	N/A	##
Dianella caerulea	Blue Flax Lily	N/A	N/A	#
Eustrephus latifolius	Wombat Berry	N/A	N/A	#
Cayratia clematidea	Native Grape	N/A	N/A	#
Stephania japonica	Snake Vine	N/A	N/A	#
Geitonoplesium cymosum	Scrambling Lily	N/A	N/A	#
Hibbertia dentata	Hibbertia	N/A	N/A	#
Hibbertia sp.	Hibbertia	N/A	N/A	#

N/A: None of these are listed at a State or Federal level as endangered species.

Photos from the site have been included in the table below



Plate 1 Turf on roadside section of the property – scatter native species remaining around trees



Plate 2 Kangaroo Grass on southern side of the site.



Plate 3 Central area of the site turf and native canopy.



Plate 4. Upper section pre rocky outcrops – ferns increasing



Plate 5 and 6 Rear of the site – exposed boulders, ferns and Grass Trees (outside of proposed development zone).

# Native plants on site



Plate 7 Native Vines: Wombat Berry *Eustrephus latifolius* 

Plate 8 Native Vines: Water Vine





Plate 9

Plate 10



Plate 11 Banksia serrata



Plate 12 Hibbertia

#### 4.2.2 Disturbances to Flora

#### **Remnant Bushland zone**

The vegetation directly adjoining the reserve where the exposed sandstone is most evident is referred to as the Bushland Zone. This area will not be directly impacted. The bulk of the site has native canopy and could be regenerated to bushland – this area is referred to as the proposed development zone.

#### Notable weeds

Weeds of Environmental Significance observed including:

• Asparagus Fern - sparse

#### 4.2.3 Arborist report findings

#### **Tree Removal**

Seventy-seven trees within the proposed development footprint, were surveyed as part of the Arborists assessment. Trees were found to be in good condition, consistent with the species ages class and growing environment. Tree data can be found within the tree assessment schedule Appendix 1 of the Arborist report. See, Beecher and Tebbutt 2020.

Seventy four of the trees are locally native species and examples of the natural bushland on the site and adjoining escarpment. *Syncarpia glomulifera* (Turpentine) is the most abundant tree species on-site other species are:

- Angophora costata (Smooth Barked Apple),
- Angophora floribunda (Rough Barked Apple),
- Allocasuarina littoralis (Black Sheoak),
- *Corymbia gummifera* (Red Bloodwood),
- *Eucalyptus botryoides* (Southern Mahogany)
- Ecalyptus piperita (Sydney Peppermint)
- Eucalyptus robusta (Swamp Mahogany),
- Palms
- Livistona australis (Cabbage Palm)

The horse arena and drive as well as gabions and berms are all in areas of existing trees. Thirty (30) trees have been identified to be removed as of May 2020. Trees not in direct work areas are listed as potentially impacted by works.

Trees proposed for removal as per the Arborist Report include; 2, 5, 6, 32, 38, 39, 40, 41, 42, 43, 44, 53, 63, 64, 65, 66, 68, 69, 72, 73, 74, 75, 76, 77, 141, 142, 165, 167, 198, 208. The trees proposed for removal don't contain obvious hollows, they could provide food for cockatoos and other fauna – see impact section.

# 5 Fauna

# 5.1 Threatened fauna

A total of 392 native fauna species have been recorded within 10km of the study site according to BioNet records since 1993. Of these, 55 species are currently listed as vulnerable or endangered under state and/or commonwealth legislation. The vulnerable and endangered species to focus on-site searches for can be seen in Table 4 below, this is based on likelihood of occurrence.

NB: species whose habitat doesn't occur on site have been omitted from this list – those with marginal habitat have been retained on the list.

# Table 4. Threatened fauna observed in previous ecological surveys within a 10km radius since 1993. Source:NSW OEH Bionet 2018.

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Amphibia	Heleioporus australiacus	Giant Burrowing Frog	V,P	V	19
Amphibia	Pseudophryne australis	Red-crowned Toadlet	V,P		71
Amphibia	Litoria aurea	Green and Golden Bell Frog	E1,P	V	4
Reptilia	Caretta caretta	Loggerhead Turtle	E1,P	E	2
Reptilia	Chelonia mydas	Green Turtle	V,P	V	7
Reptilia	Varanus rosenbergi	Rosenberg's Goanna	V,P		83
Aves	Ptilinopus superbus	Superb Fruit-Dove	V,P		1
Aves	Diomedea exulans	Wandering Albatross	E1,P	E,J	1
Aves	Thalassarche cauta	Shy Albatross	V,P	V	4
Aves	Thalassarche melanophris	Black-browed Albatross	V,P	V	1
Aves	Ardenna carneipes	Flesh-footed Shearwater	V,P	J,K	1
Aves	Botaurus poiciloptilus	Australasian Bittern	E1,P	E	2
Aves	lxobrychus flavicollis	Black Bittern	V,P		15

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P	С	37
Aves	Hieraaetus morphnoides	Little Eagle	V,P		7
Aves	^^Lophoictinia isura	Square-tailed Kite	V,P,3		1
Aves	^^Pandion cristatus	Eastern Osprey	V,P,3		17
Aves	Burhinus grallarius	Bush Stone-curlew	E1,P		15
Aves	Haematopus fuliginosus	Sooty Oystercatcher	V,P		14
Aves	Rostratula australis	Australian Painted Snipe	E1,P	E	3
Aves	Calidris alba	Sanderling	V,P	C,J,K	1
Aves	Calidris canutus	Red Knot	Р	E,C,J,K	1
Aves	Calidris ferruginea	Curlew Sandpiper	E1,P	CE,C,J,K	2
Aves	Xenus cinereus	Terek Sandpiper	V,P	C,J,K	2
Aves	Gygis alba	White Tern	V,P		1
Aves	Sternula albifrons	Little Tern	E1,P	C,J,K	1
Aves	^^Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3		1
Aves	^Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2		74
Aves	Glossopsitta pusilla	Little Lorikeet	V,P		7
Aves	^^Lathamus discolor	Swift Parrot	E1,P,3	CE	9
Aves	^^Neophema pulchella	Turquoise Parrot	V,P,3		1
Aves	^^Ninox connivens	Barking Owl	V,P,3		19

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Aves	^^Ninox strenua	Powerful Owl	V,P,3		203
Aves	^^Tyto novaehollandiae	Masked Owl	V,P,3		5
Aves	^^Tyto tenebricosa	Sooty Owl	V,P,3		2
Aves	Anthochaera phrygia	Regent Honeyeater	E4A,P	CE	10
Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Aves	Daphoenositta chrysoptera	Varied Sittella	V,P		5
Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P		2
Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	V,P	E	15
Mammalia	lsoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1,P	E	20
Mammalia	Cercartetus nanus	Eastern Pygmy-possum	V,P		212
Mammalia	Petaurus norfolcensis	Squirrel Glider	V,P		5
Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	52
Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail- bat	V,P		1
Mammalia	Mormopterus norfolkensis	Eastern Freetail-bat	V,P		9
Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V	9
Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P		2
Mammalia	Miniopterus australis	Little Bentwing-bat	V,P		32

Class	Scientific Name	Common Name	NSW Status	Comth. Status	No. of records
Mammalia	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V,P		92
Mammalia	Myotis macropus	Southern Myotis	V,P		35
Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	V,P		7

**Note:** E = Endangered, V = Vulnerable, P = Protected. Species in bold have been identified as having appropriate habitat present on-site.

Species in bold have been identified as having appropriate habitat present on-site.

#### Likelihood of occurrence

The habitat suitability is a broad categorisation used by Kingfisher to indicate the potential for a species to occur within the study area. It is based on expert opinion and implies the relative value of a study area for a particular species.

During the survey, none of the above threatened species were observed on-site. However, foraging habitat is present on the study site for Grey-headed Flying-fox, Microbats (various species), Large Forest Owls, Swift Parrots, Regent Honey Eaters, Little Lorikeets and Glossy Black Cockatoos.

The areas is known habitat for the following Threatened Species:

- Powerful Owls,
- Microbats (Little Bent-wing),
- Grey-headed Flying-foxes,
- Glossy Black Cockatoos.

**Regionally Significant** Sugar Gliders have been seen within 400m of the site within Swamp Mahogany Trees in Warriewood Wetlands (Jaydne Walsh pers comm and photography 2018).

Test of Significance (5-Part Test) have been conducted to assess the impacts of proposed works on these species.

Two **endangered populations** have been recorded to occur within 10km of the site. Table 5 outlines these populations.

Squirrel Gliders on the Barrenjoey Peninsula and Koalas on the Barrenjoey Peninsula. Neither are within the study site or a corridor linking populations to those communities.

## 5.2 Fauna findings from site assessment

Table 6 provides a list of vertebrate fauna recorded during the site visit.

#### Table 6. Fauna recorded on the site.

Class	Scientific Name	Common Name	NSW Status	Comth. Status
Aves	Gymnorhina tibicen	Australian Magpie	N/A	N/A
Aves	Dacelo novaeguinea	Kookaburra	N/A	N/A
Aves	Alectura lathami	Brush Turkey	N/A	N/A
Reptilia	Lampropholis guichenoti	Common Skink	N/A	N/A

N/A: None of these are listed at a State or Federal level as endangered species.

#### 5.2.1 Fauna habitat

Major habitat on-site is the exposed rock (rear of site) and trees. No obvious hollows. While most of the area of grass under trees has a poor cover of leaf litter (~<30%) the rear of the site with the sandstone is has >60% leaf-litter cover.

#### Habitat and fauna



Rock – reptiles and invertebrates



Trees- foraging habitat and leaf-litter – invertebrate habitat.

#### **Flowering Eucalypts**

The site contains Canopy trees potentially providing foraging resources for the threatened Grey Headed Flying Fox and microbats, gliders and possibly Swift Parrots and Little Lorikeets as well as a high diversity of locally native (non-threatened species).

#### Rocks

The site holds sandstone and concrete rocks providing habitat for a number of invertebrates and reptiles.

#### **Upright Stags and Branches**

Dead branches are present onsite providing habitat for invertebrates and birds.

#### **Tree Hollows**

No obvious hollows were observed in trees within the proposed development zone. Small bark overhangs and hollows (none easily visible) could potentially provide habitat for microbat species.

# 5.3 Habitat Corridors

The site is being used by fauna as a habitat corridor as it is directly linked to the Escarpment Bushland reserves of Epworth Park, Warriewood Escarpment, Warriewood Wetlands and Irrawong Reserve.

# 6 Impacts

## 6.1 Direct Impacts

#### 6.1.1 Vegetation disturbance and loss

Tree removal as per the Arborist report is up to 30 trees within the development footprint, to be removed or impacted by the proposed activities, see figure 3b.

The species mix of the canopy is indicative of STIF – Endangered Ecological Community (STIF EEC) however the soil characteristics are not.

The flowering Eucalypts (and invertebrates attracted) are foraging resources for the threatened Grey Headed Flying Fox, threated species of microbats and nectivorous birds.



Figure 3b. Green circles indicate trees to be removed, as of the revised plan, July 2019. Source: Arborist report, May 2020.

## 6.2 Indirect Impacts

The proposed actions may result in a range of indirect impacts affecting species or communities.

#### 6.2.1 Weed growth and invasion

Weed species may arise within the direct works zone and surrounding remnant bushland through soil disturbance or by being brought in as seed on horses, work machinery, tools, equipment and worker clothes (e.g. boots). Soil disturbance combined with the elevated nutrients and increased light exposure may result in increased weed growth, aggravated by the high abundance of weeds present pre-works.

#### 6.2.2 Introduction of pathogens

The introduction of pathogens may occur into the site, and surrounding remnant bushland, via machinery, tools, equipment and worker clothing (e.g. boots). Diseases to watch out for include Phytophthora (also known as Root Rot – type of water mold) and Myrtle Rust (*Puccinia psidii* – type of fungus). See Appendix for methods to control selected pathogens.

#### 6.2.3 Noise

The proposed actions may result in noise which may result in minor disturbance to sensitive fauna in the local canopy and adjacent bushland nearby.

## 6.3 Assessment of Significance (5-part tests) Summary

See Appendix IV for full 5-Part Tests.

#### Large Forest Owls

The threatened species populations of Large Forest Owls Barking, Powerful, Eastern Grass and Sooty, (*Ninox connivens, Ninox strenua, Tyto longimembris, Tyto tenebricosa*) were identified as having potential foraging habitat within the site. The site offers habitat for arboreal prey species particularly Eucalyptus trees. This habitat may be disturbed during proposed works. Loss of these trees would have little effect on arboreal prey species which would have little effect on food availability for the Large Forest Owls.

#### Mircobats

Threatened Microbat species (Eastern Freetail-bat, Yellow-bellied Sheathtail Bat, Eastern False Pipistrelle, Eastern Bentwing-bat and Southern Myotis) were identified as having potential foraging habitat within the site. A microbat survey was conducted on-site using an Anabat SD2 Active Bat Detector. There were no microbat species recorded on site. However, researches have assumed their presence as the survey took place in a cooler period when microbat species are known to be absent at the site.

Proposed trees to be removed do not contain hollows, flaking bark or other roosting habitat for microbat species. These trees may contain marginal foraging habitat for species which feed on insects in or above the canopy. This habitat may be disturbed during proposed works.

#### **Grey-headed Flying-Fox**

The threatened Grey-headed Flying-Fox (*Pteropus poliocephalus*) was identified as having potential foraging habitat within the site. There are no endangered populations of Grey-headed Flying-foxes existing at near the site.

# 7 Bushfire

The boundaries to the North, East and South of the existing house will be managed as an Inner Protection Zone (IPZ). To the west, the IPZ will extend 25m from proposed alterations of the house. The Bushfire Risk Assessment prepared by R Coffey (4/09/19) for the property has identified all vegetation beyond the 25m to the western boundary will be managed but will not form part of any Asset Protection Zone (APZ). See figure 3c for the APZ boundaries.

No trees will be removed for the development to satisfy APZ requirements. Instead, the building will include gutter guards to prevent leaf litter build up. See Bushfire Risk Assessment prepared by R Coffey (4/09/19) for all Bushfire Protection Requirements.



Figure 3c. Asset Protection Zone boundaries for the site. As outlined in the *Bushfire Risk Assessment* prepared by R Coffey (4/09/19).

# 8 Recommendations

## 8.1 Mitigation Measures

The following mitigation measures have been suggested if the development is approved.

#### 8.1.1 Long-term Site Management

Development, approval and implementation of a Vegetation management Plan

#### 8.1.2 Delineation of work areas

During construction, impacts on the site and adjacent vegetation should be minimized by the delineation of works zones. Access to the site would be best restricted to small passageways avoiding native vegetation to prevent soil disturbance in general and in particular, damage to native vegetation. Access will be restricted to disturbed open areas and in accordance to Arborist report in a line with tree protection measures.

#### 8.1.3 Vegetation clearing control measures

Most of the vegetation planned for clearing (areas within the footprints of driveways and building envelopes) are trees, turf and weeds. In this case, no vegetation clearing control measures are necessary other than tree removal. Refer to Arborist report.

#### 8.1.4 Tree Protection

Tree protection will be consistent with the Arborist report. Main trees to be managed are trees within close proximity to building works. NB: see final arborist report for details of works and tree numbers.

#### 8.1.5 Weed management, bush regeneration and planting

Weed management, landscaping and bush regeneration will occur as per Landscaping Plan. (See Landscaping Plan)

#### 8.1.6 Weed Removal Techniques

Weed removal proposed for the site will consist of hand removal techniques, manual/mechanical removal using bush regenerator tools and winter thermal (flame) weeding. This approach will reduce the amount of herbicide used and reduce the amount of off-target damage through spot on application.

Woody perennial weeds less than 2 metres in height will require cut and paint or scrape and paint bush regenerator techniques based on the germinating/epicormic behaviour of the plant (especially plants that tend to coppice or sucker).

It is recommended that seed heads are removed prior to commencement of primary works. This would be best performed carefully by hand with secateurs with the aim of avoiding the spread flowers or seeds into planting zones.

See Appendix III for further details. For key weed photo guide see Appendix VIII.

#### 8.1.7 Native Seed Collection

Any native trees or shrubs being removed for the construction works should be checked for seeds during removal works. If seeds are present, they should be collected and used off-site, location to be determined with council.

#### 8.1.8 Landscaping

Landscaping will follow the Landscaping Plan.

#### 8.1.9 Nest boxes

Although it is not critical, installation of a single nest box designed for microbats should be added to the site to replace potential loss of roosting habitat.

Image from: nestboxes.com.au

#### 8.1.10 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix V should be followed. The site is considered to be an area which may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to water. It is recommended that Bushland Hygiene Protocols be followed closely.



Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)



Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)

#### 8.1.11 Vertebrate Pests

Vertebrate pests (cats, dogs, foxes) would not be considered a significant problem at the site and no actions are suggested for their control.

# 8.2 Appendix I – Threatened Species Habitat Preferences

Flora –	following are	considerations o	f species	likelihood o	of being or	n-site or imp	pacted by pr	oposed activities.
	0							•

Scientific Name	Common Name	Habitat Requirements	Site Suitability
Tetratheca glandulosa		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 ridgetops, 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.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Epacris purpurascens var. purpurascens		Found in a range of habitat types, most of which have a strong shale soil influence.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Prostanthera densa	Villous Mint-bush	Generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Lasiopetalum joyceae		Grows in heath on sandstone.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
^^Callistemon linearifolius	Netted Bottle Brush	Grows in dry sclerophyll forest on the coast and adjacent ranges.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Eucalyptus camfieldii	Camfield's Stringybark	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.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.

Scientific Name	Common Name	Habitat Requirements	Site Suitability
Eucalyptus nicholii	Narrow-leaved Black Peppermint	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Kunzea rupestris		Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
Syzygium paniculatum	Magenta Lilly Pilly	On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast species occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
^Genoplesium baueri	Bauer's Midge Orchid	Grows in dry sclerophyll forest and moss gardens over sandstone.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
<sup>^</sup> Microtis angusii	Angus's Onion Orchid	It is not easy to define the preferred natural habitat of this orchid as the Ingleside location is highly disturbed. The dominant species occurring on the site are introduced weeds Hyparrhenia hirta (Coolatai grass) and Acacia saligna. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys Forest - Terrey Hills - Ingleside and Belrose areas. These soils support a specific and distinct vegetation type, the Duffys Forest Vegetation Community which is listed as an endangered ecological community under the TSC Act and ranges from open forest to low open forest and rarely woodland.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.
^^Grevillea caleyi	Caley's Grevillea	All natural remnant sites occur within a habitat that is both characteristic and consistent between sites.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.

Scientific Name	Common Name	Habitat Requirements	Site Suitability
		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.	
^^Persoonia hirsuta	Hairy Geebung	Species found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	No potential habitat within the site boundaries or in the vicinity of the site. No further assessment required.

#### Fauna

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Burhinus grallarius	Bush Stone-curlew	Inhabits open forests and grassy woodlands. Fallen branches and logs are key habitat features that provides camouflage for the bird as well as areas for foraging. It is found in all states, except for Tasmania. Feeds at night on insects and small vertebrates including frogs, lizards, snakes and mice.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Rostratula australis	Australian Painted Snipe	Inhabits fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Species found in heath or open forest with a heathy understorey on sandy or friable soils. hey feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogenous (underground-fruiting) fungi.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Lathamus discolor	Swift Parrot	Migratory species occurring in south-eastern Australian from March to October. Occurs in areas of flowering Eucalyptus or abundant lerp invertebrates. Preferred tree species include Swamp Mahogany, Spotted Gums, Red Bloodwoods, Mugga Ironbarks and White Box.	There is low to moderate potential for the species to occur within the site. No further assessment is required.
Anthochaera phrygia	Regent Honeyeater	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. This species has been seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Heleioporus australiacus	Giant Burrowing Frog	Sites must have native vegetation. The species has not been found on cleared land. Occurs in hanging swamps on sandstone shelves and along perennial creeks. The species is not restricted to watercourses.	The site presents low quality and no potential habitat within the site GBF have been recorded in the escarpment and if the site was not disturbed it would be habitat at least for dispersal.
Pseudophryne australis	Red-crowned Toadlet	Occurs in open forests on Hawkesbury and Narrabeen Sandstones. Inhabits ephemeral drainage lines below sandstone ridges. Requires shelter in the form of rocks, dense vegetation and thick leaf litter.	Low potential for the species to occur within the site due to low quality of the site. RCT are within the Warriewood escarpment though. No further assessment or consideration is required.
Varanus rosenbergi	Rosenberg's Goanna	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,	Rosenberg's Goanna is in the local area and could traverse the site however the site is

Scientific Name	Common Name	Habitat Preferences	Site Suitability
		birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	not habitat as RG frequents the upper heath lands rather than forest areas.
Ptilinopus superbus	Superb Fruit-Dove	The species is found in rainforests, rainforest margins, mangroves, wooded stream-margins, and even isolated figs, lilly pillies and pittosporums. The Superb Fruit-Dove may migrate to New Guinea in winter, but little is known of its movements, or the reasons for its sometimes southerly flights as far as Tasmania. Feeds almost exclusively on fruit, mainly in large trees.	There is low potential for the species to occur within the site. No further assessment is required.
Ixobrychus flavicollis	Black Bittern	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. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds.	The site presents low quality and no potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Haliaeetus leucogaster	White-bellied Sea- Eagle	Occurs along the coastline and occasionally larger waterways.	Records of this species were recorded > 3 km away. Moderate potential for the species to occur within the site. No further assessment or consideration is required.
Hieraaetus morphnoides	Little Eagle	Occupies open eucalypt forest, woodland or open woodland. Sheoak 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. Lays two or three eggs during spring, and young fledge	Records of this species were recorded > 3 km away. Moderate potential for the species to occur within the site. No further assessment or consideration is required.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
		in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	
Haematopus fuliginosus	Sooty Oystercatcher	Inhabits rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Glossopsitta pusilla	Little Lorikeet	Prefers open Eucalypt forest and woodlands. Primarily feeds within the canopy of Eucalyptus, Angophora and Melaleuca trees. Prefers riparian areas but may visit isolated trees in open or cleared land.	The site has nectar producing trees and Little Lorikeets may at times be on-site. No recent records.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Occupies upper canopies of dry open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. Feeds on insects, nectar and honeydew.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Daphoenositta chrysoptera	Varied Sittella	Inhabits eucalypt forests and woodlands, especially those containing rough- barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. 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.	The site presents low quality and low potential for the species to occur within the site however the neighbouring bushland is suitable habitat.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Migratory bird primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. Feeds on invertebrates, mainly insects.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Dasyurus maculatus	Spotted-tailed Quoll	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal animal feeding on medium-sized (500g-5kg) mammals.	The site presents low quality habitat and low potential for the species to occur within the site however the escarpment still has suitable habitat and a quoll could move through the site.
Phascolarctos cinereus	Koala	Inhabit eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Cercartetus nanus	Eastern Pygmy- possum	Found in rainforests communities to sclerophyll (including Box-Ironbark) forests, woodland and heath. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, soft fruits are eaten when flowers are unavailable and insects.	The site presents low quality and low potential for Eastern Pygmy-possum within the site. They are nearby though in the upper heath areas of the escarpment. No further assessment or consideration is required.
Petaurus norfolcensis	Squirrel Glider	Inhabits mature or old growth Blackbutt-Bloodwood forests with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Requires abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap,	The site presents low quality for Squirrel Gliders to occur within the site however the bushland surrounding is habitat and they have been seen along Mona Vale road pers

Scientific Name	Common Name	Habitat Preferences	Site Suitability
		nectar, honeydew and manna, with invertebrates and pollen providing protein.	obvs July 2019. No further assessment or consideration is required.
Pteropus poliocephalus	Grey-headed Flying-fox	Occurs within tall sclerophyll forests and woodlands, heath, swamp subtropical and temperate rainforests, and urban areas. Occurs within 20km of a significant food source. May be found close to gullies and water within vegetation with a dense canopy.	Potential habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilise the vegetation canopy for invertebrate foraging resources.
Mormopterus norfolkensis	Eastern Freetail- bat	Prefers to roost in tree hollows buy may roost under flaking bark or in man-made structures. Occurs east of the Great Dividing Range throughout dry sclerophyll forest, woodlands, swamp forest and mangrove forests.	Potential habitat within the site and in the immediate vicinity. Moderate potential for the species to occur within the site. Further assessment or consideration is required.
Chalinolobus dwyeri	Large-eared Pied Bat	Roosts in caves, cliff crevices, mine shafts and in old nests of the Fairy Martin. Typically inhabits low to mid elevation well-timbered dry open forests and woodlands in close proximity to suitable nesting. Prefers areas containing gullies.	Habitat in the close vicinity
Miniopterus australis	Little Bentwing- bat	Roosts in tree hollows, caves, tunnels, mine shafts, stormwater drains, culverts, bridges and buildings. Forages for insects in the tree canopy in densely vegetated areas. Prefers moist eucalyptus forests, rainforests, vine thickets, wet and dry sclerophyll forests, Melaleuca swamps, dense coastal forests and banksia scrub. Prefers well-timbered areas.	Habitat in the close vicinity

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Miniopterus schreibersii oceanensis	Eastern Bentwing- bat	Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.	Potential habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources.
Myotis macropus	Southern Myotis	Roosts in groups of 10-15 in areas close to water. Will utilise caves, mine shafts, tree hollows, storm water drains, buildings, bridges and dense foliage. Forages over water bodies catching insects and small fish.	Potential habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources.
Scoteanax rueppellii	Greater Broad- nosed Bat	Roosts in tree hollows but may be found in buildings. Primarily found in gullies and river systems that drain the Great Dividing Range. Occurs in a range of habitats including woodlands to moist or dry eucalypt forest, rainforest with greatest preference for tall wet forests. Forages along creeks and river corridors.	Potential habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources.
Calyptorhynchus Iathami	Glossy Black- Cockatoo	Lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Glossy black-cockatoos occasionally eat seeds from eucalypts, angophoras, acacias and hakeas, as well as eating insect larvae.	The site has foraging habitat.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Lophoictinia isura	Square-tailed Kite	Inhabits dry woodlands and open forests, particularly along timbered watercourses. Specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Pandion cristatus	Eastern Osprey	Inhabits coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Callocephalon fimbriatum	Gang-gang Cockatoo	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	The site presents low quality and low potential habitat within the site or in the immediate vicinity.
Ninox connivens	Barking Owl	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. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Potential foraging habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to hunt small mammals from the outer canopy. Nearest known BO – Narrabeen Lagoon in Jamieson Park.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
		During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits.	There is moderate potential for the species to occur within the site. Further assessment is required.
Ninox strenua	Powerful Owl	The species requires large tracts of forest or woodland, however fragmented landscapes can contribute to their range. Breeds in forests and woodlands but may forage in open areas. Mainly preys upon medium sized arboreal mammals. Requires tree hollows for breeding.	Foraging habitat occurs within the site and in the surrounding areas. The species would be expected to utilize the remnant vegetation within the site as foraging habitat. PO hunt small mammals from the outer canopy.
			There is high potential for the species to occur within the site. No nesting trees were observed on site however the site would be part of the home range of the PO the breed in the Escarpment.
Tyto novaehollandiae	Masked Owl	The species prefers dry eucalypt forests and woodlands and hunts along the edges and forests and roadsides. Mainly preys upon arboreal and ground mammals, primarily rats. Requires tree hollows in moist gullies for breeding.	Potential for the species to occur within the site. No nearby records though.

Note: Species in **bold** have been assumed as having appropriate habitat present on-site.

# 8.3 Appendix II– Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
Hand Removal	Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height. Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.	Tools: Gloves, Rakes, Knife and Weed Bags
Crowning	Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning. A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility Soil disturbance is to be kept to a minimum when using this technique.	Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.
Cut and Paint Stems	Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent of vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent. Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump. Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.

Technique	Method	Equipment
Scrape and Painting	More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license. Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plants height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants. Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.	Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.
Cut with a Chainsaw and Paint	Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license. Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant. If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants. Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.

Technique	Method	Equipment
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.

#### Flame Weeding

Thermal (flame) weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted.

While flame weeding is not suited to most streetscapes due to the fire hazard nor can it be used on materials such as soft fall and similar playground equipment it is noted that 'flame' weeding in waterways allows weed management in areas where herbicides are not permitted.

Also for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, *Bidens pilosa*. Flame weeding is also effective in killing persistent weeds like Mother of Millions.

Best results are obtained when follow up weed control is undertaken 4-6 weeks after treatment. In addition, weed control should be conducted periodically after that for example to control weeds over a period of a year it is likely that between 3-5 applications will be necessary, depending on rainfall and the extent of the weed seed bank. This method is most effective on young annual weeds and least effective on older perennial weeds. In some cases, control of perennial weeds will be ineffective however this depends on the species present and its age.

# 8.4 Appendix III– Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- And, always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)

• Only accredited supplies of plants/mulch to be used.

**Kit should contain:** 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits.

# **Facts about Phytophthora**

*Phytophthora cinnamomi* (Phytophthora) is a microscopic, soil borne, water-mould that has been implicated in the death of remnant trees and other plants in Australian bushland. Phytophthora is not native to Australia. It is believed to have been introduced sometime after European settlement. Phytophthora is a national problem and is listed as a key threatening process under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999.

## Symptoms including Dieback

"Dieback" simply means dying or dead plants. There are many causes of dieback; Phytophthora is just one of them. Often dieback is the result of a combination of factors such as; changed drainage patterns and nutrient loads (e.g.: increased stormwater run-off) or changed soil conditions (e.g.: dumped fill or excavation of/near root zone). Plants that are stressed are more vulnerable to Phytophthora.

Initial symptoms of Phytophthora include; wilting, yellowing and retention of dried foliage, loss of canopy and dieback. Infected roots blacken and rot and are therefore unable to take-up water and nutrients. Severely infected plants will eventually die. Symptoms can be more obvious in summer when plants may be stressed by drought. If you suspect that Phytophthora is on your site, please contact the Bushcare team to collect a soil sample to be lab tested. This is usually done in the warmer months where conditions are optimum for the disease.

## Infection

There is no way of visually telling if Phytophthora is present in the soil as its structures and spores are microscopic (invisible to the naked eye). Phytophthora requires moist soil conditions and warm temperatures for infection, growth and reproduction. Spores travel through moist soil and attach to plant roots. Once Phytophthora has infected a host plant it can grow inside plant root tissue independent of external soil moisture conditions. After infection, Phytophthora grows through the root destroying the tissue which is then unable to absorb water and nutrients.

# 8.5 Appendix IV– Tests of Significance

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

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: Source: <u>https://legislation.nsw.gov.au/#/view/act/2016/63/part7/div1/sec7.3</u>



# 8.5.1 Large Forest Owls Populations Barking, Powerful, Eastern Grass and Sooty, (*Ninox connivens, Ninox strenua, Tyto longimembris, Tyto tenebricosa*).

(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,

The proposed work would remove over 30 trees and remove habitat for PO prey. The tree removals would not however, alone, be expected to adversely affect the life cycle of Large Forest Owls such that a local population would become extinct. Potential impacts from the removal of trees and thus prey species. Also the proposed increased use of the site could result in a decrease in habitat quality in the surrounding bushland.

- (b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: *Not EEC*
- (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
- (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,
- (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

Over 30 trees will either be removed or impacted – this would be a small area (>0.5ha) of the home range of the PO however it is a reduction.

(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

The removal of trees from the site will include some Turpentine trees (four trees) and thus the prey species that use these trees preferentially. This is not expected to fragment or isolate the general habitat of PO however it will remove much of a specific component of the habitat.

No core habitat will be removed or modified as a result of the proposed development. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed action. Sightings of Large Forest Owls – Powerful Owls have been recorded nearby the site – 2016 per obs near Irrawong Road.

(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,

Not essential. Habitat to be removed is not known breeding or roosting habitat.

(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),

No areas of outstanding biodiversity value yet listed for this area. On a local (unofficial scale) there will be an adverse effect on the biodiversity of the Escarpment Bushland.

(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.

Yes tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

#### Conclusion:

This proposal is not likely to significantly affect Populations of Large Forest Owls (*Ninox connivens, Ninox strenua, Tyto longimembris, Tyto tenebricosa*) and will not be likely to put the local population of PO these at risk of extinction.

#### 8.5.2 Microbats

Five species of microbat were assessed as having the potential to occur within the study area based on Bionet records. The following species have the potential to occur in the site or surrounding bushland:

- Eastern Freetail-bat (Mormopterus norfolkensis)
- Yellow-bellied Sheathtail-bat (Saccolaimus flaviventris)
- Eastern False Pipistrelle (Falsistrellus tasmaniensis)
- Eastern Bentwing-bat (Miniopterus schreibersii oceanensis)
- Southern Myotis (*Myotis macropus*)

All of the recorded species are considered to be highly mobile and would be likely to be accessing the site occasionally or opportunistically as foraging habitat across a landscape of fragmented habitat. Although these species have differing habitat requirements, they have been assessed together as the trees to be removed would be considered marginal habitat for all five species.

(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,

A microbat survey was conducted on-site using an Anabat SD2 Active Bat Detector. There were no microbat species recorded on site. However, researches have assumed their presence as the survey took place in a cooler period when microbat species are known to be absent at the site.

The trees that would be removed were not observed to be bearing hollows suitable for tree roosting microbat species including the Eastern Freetail-bat. This indicates a low potential for the life cycles of local populations to be put at risk from a breeding perspecitive however the site may be used primarily for foraging resources.

The proposed actions would be expected to have a lesser impact upon cave dwelling species including the Eastern Bentwing-bat and the Southern Myotis. Trees do not comprise breeding habitat for these species and would not impact their life cycles. The Eastern Bentwing Bat and the Southern Myotis have relatively higher recorded sightings within a 10km are surrounding the site (Bionet, 2018). This indicates that the site may be used frequently for foraging resources by these species and that the proposed actions would not impact the life-cycles of cave dwelling species. The proposed works will impact micro-bats with removal of habitat for foraging and possible roosting – especially in dead trees – see recommendations.

- (b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: *Not an EEC*
- (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



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

Over 30 trees will either be removed or impacted – this would be a small area (>0.5ha) of the home range of the PO however it is a reduction.

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

The removal of trees from the site will include some Turpentine trees (four trees) and thus the prey species that use these trees preferentially. This is not expected to fragment or isolate the general habitat of PO however it will remove much of a specific component of the habitat.

No core habitat will be removed or modified as a result of the proposed development. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed action.

Sightings of Large Forest Owls – Powerful Owls have been recorded nearby the site – 2016 per obs near Irrawong Road.

(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),

No areas of outstanding biodiversity value yet listed for this area. On a local (unofficial scale) there will be an adverse effect on the biodiversity of the Escarpment Bushland.

(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.

Yes tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

#### **Recommendations**

Micro-bat boxes will be installed on-site x 4. Boxes to be marine ply or equivalent and installed so that there is no nailing into the tree (see best practice – hanging of boxes and using coil-springs to keep in place). Boxes to be at least 4m above the ground.

#### 8.5.3 Grey-headed Flying-Fox (Pteropus poliocephalus)

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Can travel up to 50 km to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.



(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,

(b)

The proposed development is unlikely to have an adverse effect on the life cycle of this threatened species' viable population or bring it at risk of extinction. Grey-headed Flying-foxes eat nectar and pollen, and fruits from native trees/shrubs (e.g. Pittosporums) and vines (e.g. Wombat berry). A Flying Fox colony is within 500m in Warriewood Wetlands.

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

Not an EEC

- (iii) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
  No
- (iv) 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,
  No
- (d) in relation to the habitat of a threatened species or ecological community:

Over 30 trees will either be removed or impacted – this removes some food resources for GHFF. THE Turpentine's flowers at different times from other canopy trees hence removal of most of one species can constitute a decrease in food resources locally. GHFF fly long-distances but need close food resources during the time of rearing pups (young). Tree removals could reduce habitat quality in the local area.

(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

The removal of trees from the site will include some Turpentine trees (four trees) and thus the prey species that use these trees preferentially. This is not expected to fragment or isolate the general habitat of PO however it will remove much of a specific component of the habitat.

No core habitat will be removed or modified as a result of the proposed development. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed action.

(e) 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),

No areas of outstanding biodiversity value yet listed for this area. On a local (unofficial scale) there will be an adverse effect on the biodiversity of the Escarpment Bushland.

(f) 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.

Yes tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

# 8.6 Summary of Findings from the Matters of National Significance – EPBC Act

World Heritage Properties:	None	The 2 Threatened Communities listed are:	
National Heritage Places:	None	Coastal Swamp Oak Forest (Endangered	) and
Wetlands of International Importance:	None	Coastal Unland Swamps in the Sydney B	acin
Great Barrier Reef Marine Park:	None		asin
Commonwealth Marine Area:	None		
Listed Threatened Ecological Communities	2	Neither are on-site or would be impacted	by the
Listed Threatened Species:	34	proposed development.	
Listed Migratory Species:	18		
		Commonwealth Land:	None
		Commonwealth Heritage Places:	None
State and Territory Reserves:	None	Listed Marine Species:	23
Regional Forest Agreements:	None	Whales and Other Cetaceans:	None
Invasive Species:	47	Critical Habitats:	None
Nationally Important Wetlands:	None	Commonwealth Reserves Terrestrial:	None
<u>Key Ecological Features (Marine)</u>	None	Australian Marine Parks:	None

#### See attachment for full records

Listed threatened species have been considered and assessed where there is habitat on-site.

## 8.7 Appendix V. Native Plant Nurseries

Avalon Aquatics and native plants	Foleys Nursery
Ingleside: 9918 4486 or	Address: 16 Macpherson St, Warriewood NSW 2102
sales@dragonflyenv.com.au for enquiries	Phone: (02) 9997 8573
Indigo Native Nursery	Ingleside Plant Growers
Address: Lot 57 Wattle Rd, Ingleside NSW 2101	Address: 165A Mona Vale Rd, Ingleside NSW 2101
Phone: (02) 9970 8709	Phone: 0438 383 757
Powder Works Nursery	
Address: 20 Wilson Ave, Ingleside NSW 2101	
Phone: 0404 087 714	

Flora and Fauna Assessment for 113 Orchard Street, Warriewood | May 20