Flora and Fauna Assessment

20-22 Macpherson St, Warriewood NSW 2102

By Ecological Consultants Australia Pty Ltd

T/A Kingfisher Urban Ecology and Wetlands

October 2022 updated May 2023

About this document

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Statement of Authorship

This study and report were undertaken by Ecological Consultants Australia for the client. The author of the report is Geraldene Dalby-Ball whose qualifications are BSc majoring in Ecology and Botany with over 25 years' experience in this field and specialising in projects within Sydney urban areas.

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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Signed: Geraldene Dalby-Ball – Director of Ecological Consultants Australia Pty Ltd 

Executive Summary

Introduction

Ecological Consultants Australia (ECA) has been contracted by Green Kingswood Pty Ltd c/o BMN Properties P/L to provide a Flora and Fauna Assessment for the proposed development at 20-22 Macpherson St, Warriewood NSW 2102, identified as Lot 1 in DP 592091, within the Northern Beaches Council Local Government Area (LGA).
The proposed development is for the 53 lot subdivision of Lot 1 in DP 592091 for an integrated housing development.

Methods

- On-ground site inspection took place in November 2021 and March 2022 by Senior Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos, and samples of flora species were taken, on-site and neighbouring sites, to assess the ecological health and value of the site.
- BioNet searches were performed for flora, fauna, endangered populations, and communities to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- Review of the proposed development was evaluated for potential environmental impacts.

Results

- No threatened flora or fauna species were recorded on the site during the survey or previously recorded via BioNet.
- No significant habitat features, values or landscape corridors will be impacted by the proposed development.
- The proposal does not trigger entry into the BOS.
- The proposed development is restricted to the existing building footprint.
- Tree protection will be consistent with the Arborist report.
- The site contains vegetation mapped within PCT 1795 – Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, however the community is not in benchmark condition, native species planting and weed control are expected to improve the condition of the community.
- Test of significance (5-part tests) have been conducted for the Swift Parrot (*Lathamus discolor*) and Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions community. Appendix V contains 5-Part Test of Significance.
- While the 5-part test resulted in a 'not significant' impact for the community, recommendations have been made to assist the long-term sustainability of this community

- While the 5-part test resulted in a 'not significant' impact for the species assessed, recommendations to include habitat augmentation are restricted onsite, however can be implemented in future stages of this sites development particularly around the creek line.

Mitigation Measures

If the development is approved mitigation works will be required. Refer to VMP for specifications.

Before works:

- Tree Protection as per Arborist report.
- Removal of weeds to prevent spread of seed.
- Effective site management to minimise sediment runoff.
- Nest box installation in trees to be retained.

During works:

- Tree Protection as per Arborist report.
- Effective site management to minimise sediment runoff.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

- Tree and vegetation maintenance and on-going native vegetation and habitat renewal (planting).
- Native species landscaping.

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.

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Biodiversity Conservation Act 2016 (BC 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) trading as Kingfisher Urban Ecology & Wetlands has been contracted by Green Kingswood Pty Ltd c/o BMN Properties Pty Ltd 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* (EP&A Act 1979).

The 'test of significance' has been undertaken in accordance with the NSW Department of Planning, Industry, and Environment (DPIE) 'threatened species test of significance'. The test of significance is set out in s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act 2016).

1.2 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 vegetation structures. Some species are identifiable above ground only after 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.

1.3 Site information and general description

The "site" is the area of direct and likely indirect impacts and is defined as the whole of the property. The study area includes the site, as well as any additional surrounding land traversed during the site survey. The site is identified as Lot 1 DP 592091, in the Northern Beaches Council LGA. See Figures 1, 2, and 3.

The site has been previously cleared. Narrabeen Creek runs adjacent to the north eastern boundary of the property and directly feeds into Mullet Creek. See Figure 7. The site has few scattered Swamp Oak (*Casuarina glauca*) on the north eastern side of the site along the creek line. Currently exotic species dominate the catchment including *Ludwigia peruviana*. See Table 2.

Table 1.1. Site administrative information

Category	Details
Title reference (Lot/Section/Plan No)	1/-/592091

Category	Details
Area (ha)	2.05
Street address	20-22 Macpherson St, Warriewood NSW 2102
LGA	Northern Beaches Council
Land zoning	R3 – Medium Density Residential

Figure 1.1. Site map. Source: Mecone Mosaic 2022

Figure 1.2. Site map. Source: Mecone Mosaic 2022

Figure 1.3. Location map. Source: Mecone Mosaic 2022

Figure 1.4. Land zoning map. Source: Mecone Mosaic 2022.

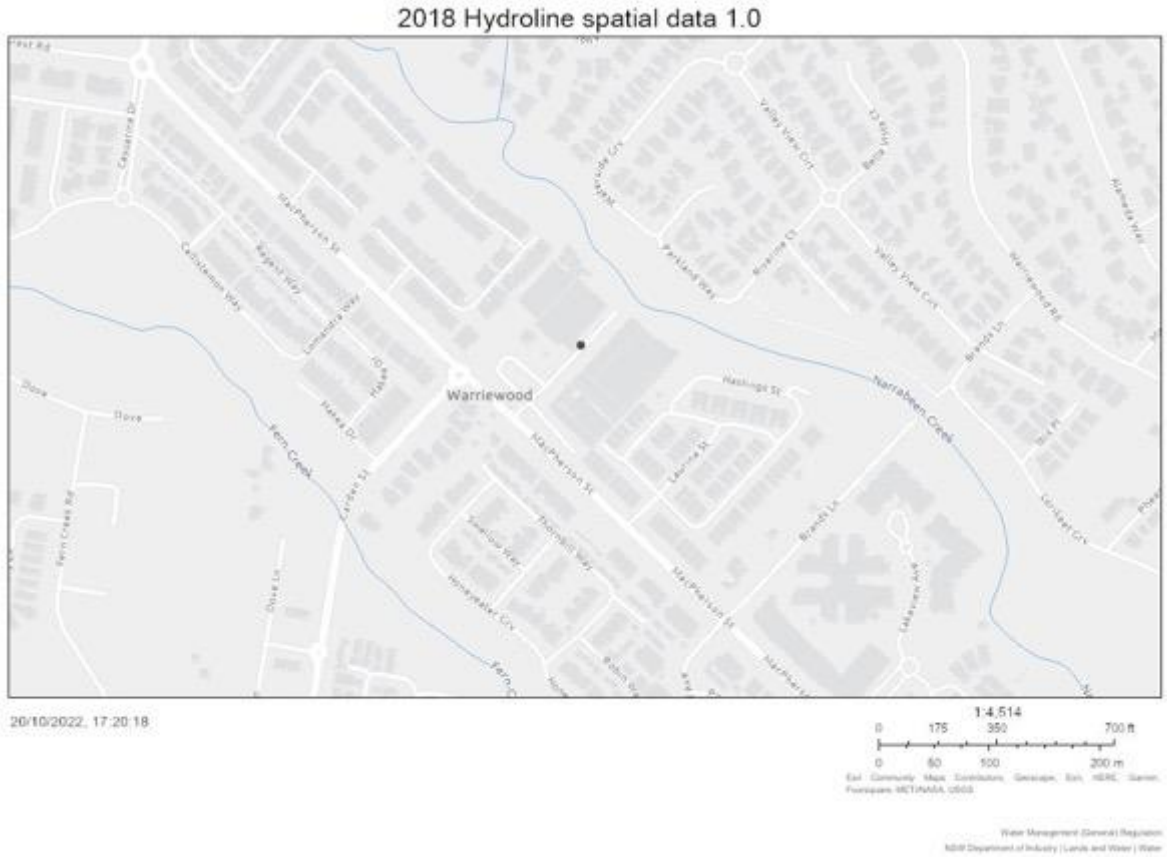


Figure 1.5. Waterways in the vicinity of the site (black dot). Source: Water Management (General) Regulation 2018 Hydro Line spatial data

1.4 Proposal

The proposed development is for the 53-lot subdivision of Lot 1 DP 592091 for an integrated housing development.

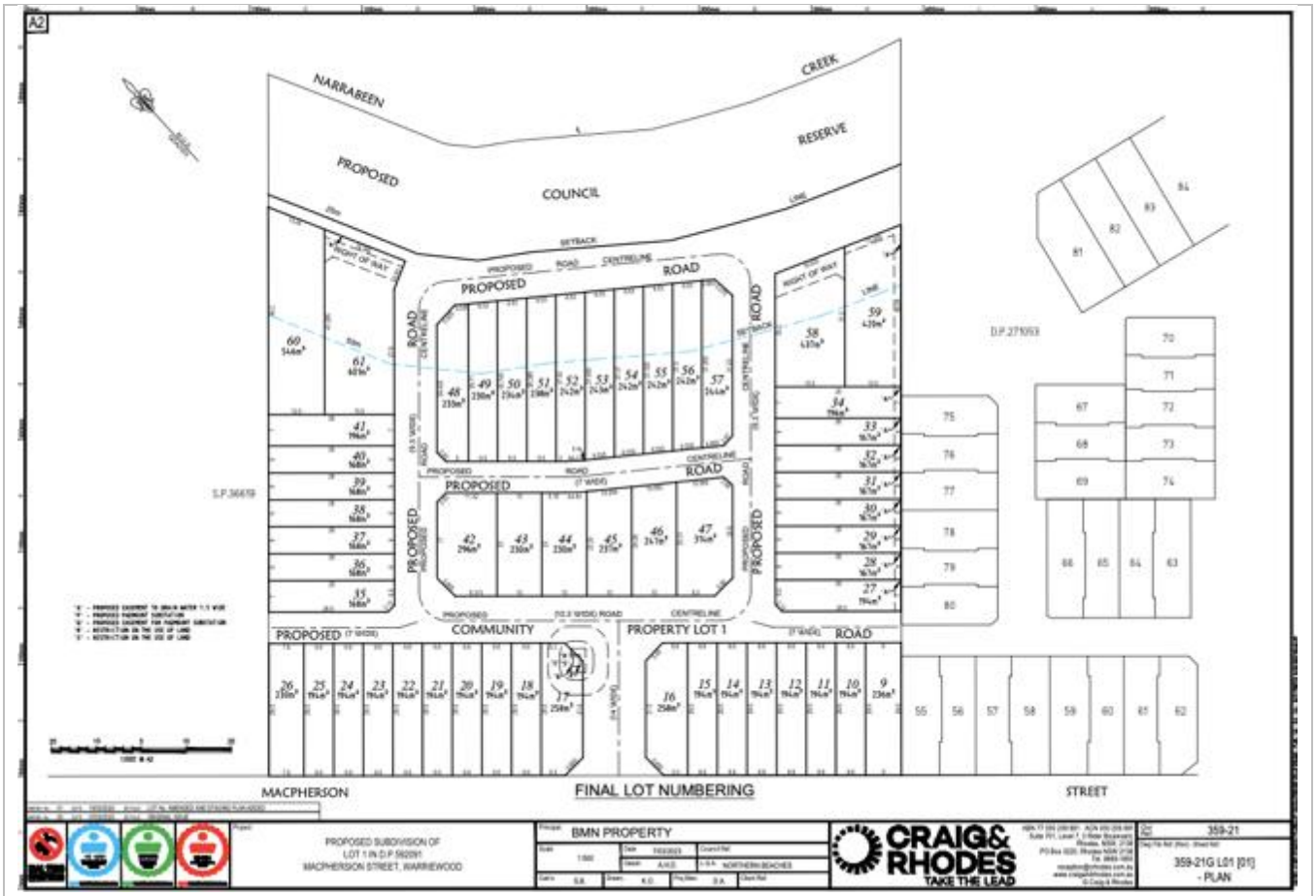


Figure 1.6. Proposal plan. Source: Craig and Rhodes 15/03/2023 version No. 01.

1.5 Source of information used in the assessment

The following sources of information were used for the assessment:

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^2 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).
- Biodiversity Values Map and Threshold Tool. New South Wales, Office of Environment and Heritage (OEH).
- Mecone Mosaic.
- NSW Threatened Species Information (DPIE).
- 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).
- The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.
- Water Management (General) Regulation 2018 hydro line spatial data (DPIE).

Plans and drawings specific to this development:

- Proposed Subdivision of Lot 1 in DP 592091 Macpherson Street, Warriewood. Craig and Rhodes 15/03/2023 version No.01.

1.6 Legislative context and statutory requirements

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

- *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act);

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is applicable if it was considered that an impact on a 'Matters of National Environmental Significance (NES)' were likely, thus providing a trigger for referral of the proposal to the Department of Environment and Heritage.

Matters of national environmental significance identified in the Act are:

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;
- the Commonwealth marine environment; and
- nuclear actions.

The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal does not impact on a 'matter of National Environmental Significance' and therefore is compliant with the EPBC Act.

- *Environmental Planning and Assessment Act, 1979* (EPA 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);

The BC Act replaces the Threatened Species Conservation Act and includes the test of significance for impacts on threatened species and communities. The test of significance has been conducted and the proposal was found to not have a significant impact on the currently ecology of the site. The proposed development is compliant with the BC Act.

- *National Parks and Wildlife Act, 1974* (NP&W Act);

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

- *Biosecurity Act, 2015;* and

The Biosecurity Act replaced the Noxious Weeds Act, and the objectives of this Act are to manage, and eradicate and Weeds that cause a high level of environmental, economic, or social harm. With the removal of and management of weeds the sites work with be compliant with the objectives of this Act. Notifiable weeds are present including *Ludwigia peruviana*.

- Northern Beaches Council DCP and LEP

The proposal satisfies provisions outlined in both the Pittwater Local Environmental Plan 2014 and Pittwater 21 Development Control Plan. Impacts on native vegetation and the environment are expected to be negligible. Mitigation measures are expected to maintain and improve upon the condition of the site.

1.7 Biodiversity Offsets Scheme threshold

The Biodiversity Offsets Scheme (BOS) is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) and thus evaluate the impacts of a proposal.

It is concluded that the development does not trigger the BOS area clearing threshold. The area clearing threshold is based on the minimum or actual lot size associated with the property (1 ha to less than 40 ha) and the thresholds for clearing that triggers BOS (0.5 ha or more). The proposed development is expected to replace the existing building footprint and will not remove more than 0.5 ha of native vegetation therefore the development does not trigger the BOS.

Area clearing threshold

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan [LEP]), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

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

Biodiversity Values Map threshold

The Biodiversity Values (BV) Map identifies the land of high biodiversity value, as defined by clause 7.3(3) of the Biodiversity Conservation Regulation 2017. The Biodiversity Offsets Scheme applies to the clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the map.

The site is not located on high biodiversity values land as identified on the BV Map. Therefore, the development does not trigger the BOS as per the Biodiversity Values Map threshold.

Figure 1.7. The site (red marker) located on the Biodiversity Values Map. Source: Biodiversity Values Map and Threshold Tool 2022.

2 Methods

2.1 Site inspection

On-ground site inspections took place in November 2021 and March 2022 by Senior Ecologist Geraldene Dalby-Ball.

2.2 Site photos

The following photos were taken during the November 2021 and March 2022 site inspections.

Plate 1 Rear of the site.

Plate 2 Planted areas immediately upstream of the site.

Plate 3 Creek side vegetation.

Plate 4 *L. peruviana* present on the site.

Plate 5 Creek line upstream of the site where weeds have been managed.

Plate 6 *L. peruviana* common in catchment.

Plate 7 Creek side vegetation downstream from the site – representative of vegetation along the water edge on the site.

Plate 8 Weed dominated with few Swamp Oak (*Casuarina glauca*).

3 Site Assessment

3.1 Desktop results – Plant Community Types (PCTs) and Vegetation Zones

Desktop reviews of the most up to date vegetation mapping, the Native Vegetation of the Sydney Metropolitan Area – Version 3.1 (OEH, 2016) VIS_ID 4489, identified one plant community type (PCT) within the site. The PCT is identified as PCT 1795 – *Swamp Mahogany / Cabbage Tree Palm - Cheese Tree - Swamp Oak tall open forest on poorly drained coastal alluvium in the Sydney basin*. Refer to Figure 3.1 Vegetation Composition. See Figure 5.

Threatened Ecological Community (TEC) Synonym - Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, is listed as an Endangered Ecological Community (EEC) under the NSW BC Act (2016).

Table 3.1 Vegetation community synonyms as per NSW and Commonwealth legislation

NSW PCT Code	TEC Name	BC Act 2016	EPBC Act 1999
1795	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community (EEC)	No Associated TEC

Figure 3.1 Current PCT (PCT 1795). Source: SEED 2022

3.2 Field survey method – PCTs and Vegetation Zones

On-ground site inspections took place in November 2021 and March 2022 by Senior Ecologist Geraldene Dalby-Ball. The entire site was assessed as were surrounding areas including bushland to the north. Geraldene is also very familiar (over 30 years' experience) with the flora and fauna of the locality.

3.3 Weeds

The following weeds of significant importance were identified within the site during the site inspection. Weeds must be controlled as required under the *Biosecurity Act 2015*. Refer to Table 3 Weeds.

Table 3.2 Weeds present in the area with the potential to spread

Scientific name	Common name	Legal requirements under NSW
Ludwigia peruviana	Peruvian primrose	This plant should not be sold in parts of NSW

3.4 Fauna sightings and habitat

Fauna sightings

A number of faunae were identified during the site assessment including:

- Noisy Minor (*Manorina melanocephala*);
- Blue Wren (Malurus cyaneus);
- Willie Wagtail (*Ripidura leucophrys);*
- Black-faced Cuckooshrike (C*oracina novaehollandiae*);
- Eastern Whipbird (*Psophodes olivaceus*); and
- Striped Marsh Frog (*Limnodynastes peronii*).

No reptiles or mammals were identified during the site assessment. No threatened fauna listed under the BC Act 2016 or EPBC Act 1999 were identified during the site assessment.

Fauna habitat

Potential habitat features were identified during the site assessment including:

- *Casuarina* and *Eucalyptus* species provide potential foraging habitat for the threatened birds.

3.5 Threatened flora

BioNet results were compared with the list from the BAM calculator to ensure all possible species were considered.

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 1,741 species. The vulnerable and endangered species to focus on-site searches for can be seen in Table 5 below. This is based on likelihood of occurrence.

Table 3.3 Threatened flora recorded within a 10km radius since 1993. NSW OEH BioNet 2022.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Myrtaceae	^^*Callistemon linearifolius*	Netted Bottle Brush	V,3		5
Grammitidaceae	^^*Grammitis stenophylla*	Narrow-leaf Finger Fern	E1,3		2
Proteaceae	^^*Grevillea caleyi*	Caley's Grevillea	E4A,3	CE	197
Proteaceae	^^*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	6
Orchidaceae	^*Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	2
Orchidaceae	^*Microtis angusii*	Angus's Onion Orchid	E1,P,2	E	74
Euphorbiaceae	*Chamaesyce psammogeton*	Sand Spurge	E1		13
Ericaceae	*Epacris purpurascens* var. *purpurascens*		V		3
Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V	59
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	4
Myrtaceae	*Kunzea rupestris*		V	V	1
Malvaceae	*Lasiopetalum joyceae*		V	V	2
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*		V	V	13
Lamiaceae	*Prostanthera densa*	Villous Mint-bush	V	V	1
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	E4A	CE	23
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	19
Elaeocarpaceae	*Tetratheca glandulosa*		V		47

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

3.6 Threatened fauna

A total of 476 fauna species have been recorded within 10km of the study site according to BioNet records since 1993. Of these, 44 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 6 below, this is based on likelihood of occurrence.

Note: Species whose habitat doesn't occur on site have been omitted from this list and those with marginal habitat have been retained on the list.

Table 3.4 Threatened fauna recorded within a 10km radius since 1993. NSW OEH BioNet 2022.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	43
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	3
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	V,P		106
Aves	*^^Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3	E	3
Aves	*^^Lathamus discolor*	Swift Parrot	E1,P,3	CE	23
Aves	*^^Lophoictinia isura*	Square-tailed Kite	V,P,3		4
Aves	*^^Ninox connivens*	Barking Owl	V,P,3		35
Aves	*^^Ninox strenua*	Powerful Owl	V,P,3		486
Aves	*^^Pandion cristatus*	Eastern Osprey	V,P,3		28
Aves	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		4
Aves	*^Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		99
Aves	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	39
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		1
Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	3
Aves	*Burhinus grallarius*	Bush Stone-curlew	E1,P		10
Aves	*Daphoenositta chrysoptera*	Varied Sittella	V,P		4
Aves	*Glossopsitta pusilla*	Little Lorikeet	V,P		13
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		7
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		44
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		8
Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		25
Aves	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Aves	*Petroica boodang*	Scarlet Robin	V,P		2
Aves	*Ptilinopus magnificus*	Wompoo Fruit-Dove	V,P		2
Aves	*Ptilinopus regina*	Rose-crowned Fruit-Dove	V,P		2
Aves	*Ptilinopus superbus*	Superb Fruit-Dove	V,P		3
Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	3

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Aves	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	2
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V,P		435
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	15
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	13
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		3
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	12
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		21
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	V,P		53
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		115
Mammalia	*Myotis macropus*	Southern Myotis	V,P		55
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V,P		6
Mammalia	*Phascolarctos cinereus*	Koala	E1,P	E	33
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	135
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		1
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		8
Mammalia	*Vespadelus troughtoni*	Eastern Cave Bat	V,P		1
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		65

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

3.7 Endangered populations

No endangered populations have been recorded to occur within 10 km of the site according to BioNet records since 1993.

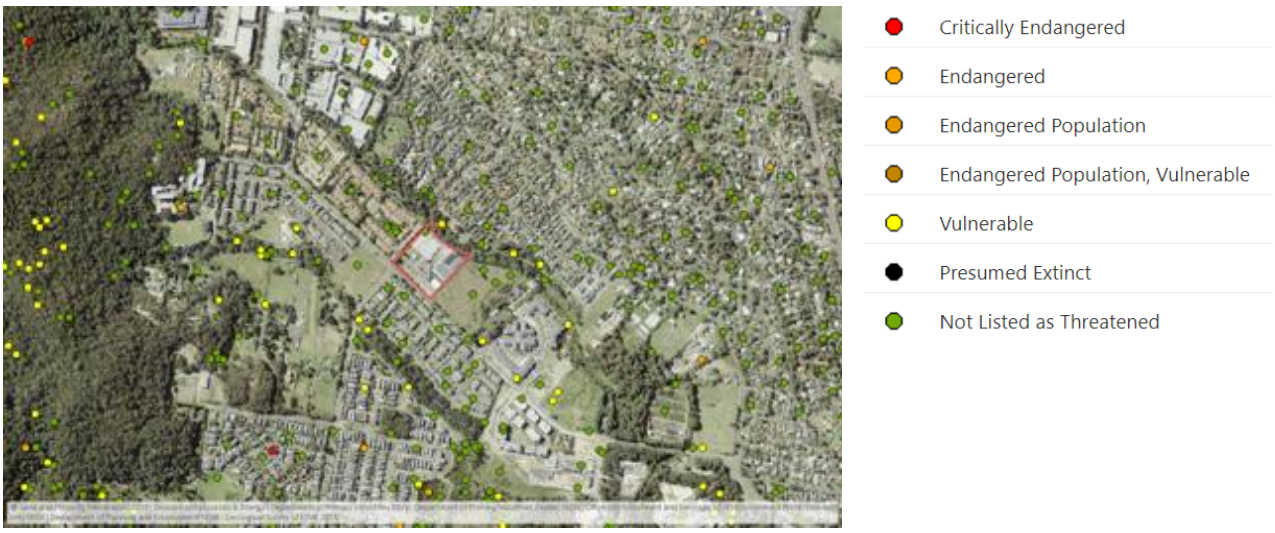


Figure 3.2 NSW BioNet Species Sightings within and around the proximity of the site. Source: SEED 2022.

4 Impacts

4.1 Direct impacts

4.1.1 Vegetation disturbance

No native vegetation will be removed. Planting would increase native species diversity; weeds should be removed.

4.2 Indirect impacts

The proposed actions have minor indirect impacts as the proposed development is restricted to the current building footprint.

4.2.1 Loss of breeding opportunities

Works onsite may result in temporary reduced breeding opportunities for locally occurring native species including amphibians, reptiles, birds, mammals, and invertebrate through the production of construction noise.

4.2.2 Weed growth and invasion

Weed species may arise within the direct works zone and surrounding landscaped areas through soil disturbance or by being brought in as seed on work machinery, tools, equipment, and worker clothes (e.g., boots). Excessive or biosecurity weeds must be managed to stop the spread into other areas and maximise the opportunities for soil re-use in other areas.

4.2.3 Introduction of pathogens

The introduction of pathogens may occur in the site 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 II for methods to control selected pathogens.

4.2.4 Noise

The proposed actions may result in noise which may cause minor disturbance to sensitive fauna in the local canopy.

4.2.5 Runoff

Soil cover is required to stop the transport of sediment from the work zones off-site and particularly to the creek.

5 Recommendations

5.1 Mitigation measures

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

5.1.1 Delineation of work areas

During the construction, impact to the site and the adjacent vegetation should be reduced by the delineation of work zone areas. The access to the site would be best restricted to the development footprint only. An exclusion zone should be established for the vegetation outside the work areas.

5.1.2 Tree protection

Tree protection will be consistent with the Arborist report.

5.1.3 Native species planting

Plantings are one of several best practice measures, to retain and support the long-term survival of the vegetation on site. It is recommended that seeds are collected from the site. Seedlings can then be propagated and planted once established. Plantings of tube stock across the site should be selected from locally native ground and shrub species and this is to be in accordance with Asset Protection Zone requirements. Refer to Appendix IV for species consistent with PCT 1795.

5.1.4 Care of bushland areas

Bush regeneration is to occur on the creek line edge and bushland that is retained within the community land. A Vegetation Management Plan (VMP) can be provided prior to subdivision certification. The VMP can include a section for subdivision and for post site development of individual lots.

5.1.5 Erosion and runoff

Where required, sediment controls will be put in place. These will include, but not be limited to sediment fences, jute matting and crushed sandstone. Sediment controls will be reviewed during site inspections and/or after significant rainfall (more than 10 mm in 24hrs resulting in site runoff).

5.1.6 Weed management

Weed species are present and must be appropriately managed to ensure they do not spread. There must be continuous maintenance of the vegetation onsite otherwise increased weed growth may result, exacerbated by the high abundance of weeds present pre-works. Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the duration of the project as well as on-going post-works.

Ludwigia peruviana, present on-site, is a High Threat Exotic (HTE) species and produces a high seed count with the potential to disperse seed on the site. This weed must be continuously managed throughout the development and into post-works.

See Appendix I for Key Weed Removal Methods.

5.1.7 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

5.1.8 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix II 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.

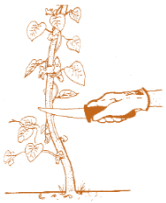
Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)

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

6 Appendices

6.1 Appendix I – Key Weed Removal Methods

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 plant 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, 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 PPE
Cut and Paint Stems 	Weed species deemed unsuitable for hand removal shall but cut. Those that have persistent 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 herbicide is limited. Herbicide is not to reach sediment or surrounding non-target plants.	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required PPE

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 scrapped 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 5cm a second scrape shall be made on the other side of the trunk. Apple undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of herbicide is limited. Herbicide is not to reach sediment or surrounding non-target 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 glass, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required PPE
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 herbicide is limited. Herbicide is not to reach sediment or surrounding non-target 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: chainsaw, earmuffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required PPE

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 brush cut. 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 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 PPE

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.

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.

Images provided by Dragonfly Environmental

Flame weeding should be undertaken outside of the fire seasons. Flame weeding allows for the mimicking of a burn in areas where a control burn could not be undertaken. Find native plants regenerating after flame weeding.

6.2 Appendix II – Bushland Hygiene Protocols for Phytophthora (Hornsby Council Recommendations)

- 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 the 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 methylated spirit 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% methylated spirit. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that come 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% methylated spirit.
- 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 % methylated spirit. 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 the 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 are to be used.

Kit contents: 1 bucket, 1 scrubbing brush, 1 spray bottle (methylated spirit 70% solution), 1 bottle of tap water, and 1 bottle of 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.

6.3 Appendix III – Threatened species likelihood of occurrence

Appendix III is based on BioNet records within 10 km of the study site. The following flora and fauna species are currently listed as vulnerable or endangered under state and/or Commonwealth legislation. The likelihood of occurrence for the flora and fauna species is listed below.

Table 6.1 **Threatened flora species likelihood of occurrence**

Scientific name	Common name	Habitat associations	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 flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Epacris purpurascens var. purpurascens		Found in a range of habitat types, most of which have a strong shale soil influence. These include ridgetop drainage depressions supporting wet heath within or adjoining shale cap communities e.g., Stringybark and Ironbark woodlands, various shale/sandstone transition forest associations including Turpentine Ironbark Margin Forest, Stringybark/ Scribbly Gum Woodland, and Scribbly Gum/ Grey Gum/ Red Bloodwood Woodland. The species also occurs in riparian zones draining into Sydney Sandstone Gully Forest, shale lenses within sandstone habitats and colluvial areas overlying or adjoining sandstone or tertiary alluvium.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Chamaesyce psammogeton	Sand Spurge	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (*Spinifex sericeus*) and Prickly Couch (*Zoysia macrantha*). Flowering recorded in spring and summer. Sand Spurge seeds float, so some dispersal between beaches may occur. Longevity of the species is approximately 5–30	No flora bearing the key identifying features of this species was identified during surveys. No

Scientific name	Common name	Habitat associations	Site suitability
		years with a primary juvenile period of less than 1 year. Plant growth occurs in spring and summer.	potential habitat within the site boundaries. No further assessment required.
^^*Grammitis stenophylla*	Narrow-leaf Finger Fern	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Prostanthera densa	Villous Mint-bush	*Prostanthera densa* generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea. Plants regenerate from rootstock after fire and flower within the first year or two.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Lasiopetalum joyceae		Grows in heath on sandstone. Flowers in spring. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: Shale/Sandstone Transition Forest, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Turpentine-Ironbark Forest in the Sydney Basin Bioregion.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No

Scientific name	Common name	Habitat associations	Site suitability
			further assessment required.
^^*Callistemon linearifolius*	Netted Bottle Brush	Grows in dry sclerophyll forest on the coast and adjacent ranges. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Flowers in spring to summer.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Eucalyptus camfieldii	Camfield's Stringybark	Restricted distribution at Norah Head, Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla, and a few other sites in Royal National Park. Recorded in 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.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
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. Occurs in association with many other eucalypts, including *E. andrewsii* and many of the stringybarks, such as *E. caliginosa*. Grows on shallow relatively infertile soils on shales and slates; Niangala to Glen Innes. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: White Box-Yellow Box-	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.

Scientific name	Common name	Habitat associations	Site suitability
		Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Upland Wetlands of the New England Tablelands and the Monaro Plateau.	
Kunzea rupestris		Restricted, with most locations in the Maroota, Sackville, Glenorie area and one outlier in Ku-ring-gai Chase National Park, all within the Central Coast botanical subdivision of NSW. Currently known to exist in 20 populations, 6 of which are reserved. Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland. Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so may disperse many metres per week. Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Rhodamnia rubescens	Scrub Turpentine	Found in littoral, warm temperate and subtropical rainforest, and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
Syzygium paniculatum	Magenta Lilly Pilly	Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest. Is thought to tolerate wet and dry conditions on sands.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.

Scientific name	Common name	Habitat associations	Site suitability
^*Genoplesium baueri*	Bauer's Midge Orchid	Grows in dry sclerophyll forest and moss gardens over sandstone.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
^*Microtis angusii*	Angus's Onion Orchid	Currently known from only one site at Ingleside, north of Sydney. 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.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
^^*Grevillea caleyi*	Caley's Grevillea	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater, and Warringah Local Government Areas. Recorded existing 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*.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.
^^*Persoonia hirsuta*	Hairy Geebung	Usually found in sandy soils in dry sclerophyll open forest, woodland, and heath on sandstone. Usually present as isolated individuals or very small	No flora bearing the key identifying features of this species was identified

Scientific name	Common name	Habitat associations	Site suitability
		populations. Habitat Preferences: It also favours disturbed heath, shrubby thickets, and sandstone scrubs.	during surveys. No potential habitat within the site boundaries. No further assessment required.
Pimelea curviflora var. curviflora		Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	No flora bearing the key identifying features of this species was identified during surveys. No potential habitat within the site boundaries. No further assessment required.

Table 6.2 **Threatened fauna species likelihood of occurrence**

Note: Marine species including Turtles (*Cheloniidae*), Dugongs (*Dugongidae*), Marine Birds *(Diomedeidae, Procellariidae)* and Whales *(Otariidae, Balaenidae, Balaenopteridae, Physeteridae)* have been omitted from this list.

Scientific name	Common name	Habitat associations	Site suitability
Haliaeetus leucogaster	White-bellied Sea-Eagle	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 seashore, 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	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		(including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.	
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 in early summer. Preys on birds, reptiles, and mammals, occasionally adding large insects and carrion.	Not suitable
^^*Lophoictinia isura*	Square-tailed Kite	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grass, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 square km. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Not suitable
^^*Pandion cristatus*	Eastern Osprey	Favours 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. Incubation of two to three eggs,	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		usually by the female, for about 40 days. Females remain with young until they fly, usually after about nine weeks in the nest.	
Botaurus poiciloptilus	Australasian Bittern	Freshwater wetlands and occasionally estuarine reedbeds. Prefers permanent shallow wetlands or the pools of creeks and rivers with tall and thick vegetation.	Not suitable
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.	Not suitable
Artamus cyanopterus cyanopterus	Dusky Woodswallow	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 groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Not suitable
Burhinus grallarius	Bush Stone-curlew	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber, the fringes of mangroves, golf courses, and farmland. It is thought to require large tracks of habitat to support breeding, in which there is a preference for relatively undisturbed to lightly disturbed habitat. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards, and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
Cercartetus nanus	Eastern Pygmy-possum	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. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.	Not suitable
^^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. May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.	Not suitable
^Calyptorhynchus lathami	Glossy Black-Cockatoo	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	
Ptilinopus magnificus	Wompoo Fruit-Dove	Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit. Thought to be an effective medium to long-distance vector for seed dispersal. Feeds alone, or in loose flocks at any height in the canopy. The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground. Breeds in spring and early summer; a single white egg is laid. Most often seen in mature forests, but also found in remnant and regenerating rainforest.	Not suitable
Ptilinopus regina	Rose-crowned Fruit-Dove	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.	Not suitable
Ptilinopus superbus	Superb Fruit-Dove	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn. Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species.	
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. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. A generalist predator with a preference for medium-sized (500g-5kg) mammals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects. Also eats carrion and takes domestic fowl.	Not suitable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	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 range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
Haematopus fuliginosus	Sooty Oystercatcher	Favours 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 nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	Not suitable
Litoria aurea	Green and Golden Bell Frog	Inhabits marshes, dams, and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes waterbodies 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. The species is active by day and usually breeds in summer when conditions are warm and wet.	Not suitable
Heleioporus australiacus	Giant Burrowing Frog	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. Individuals move into breeding site either immediately before or following heavy rain and occupy these sites for up to 10 days. Most individuals will not attempt to breed every year. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
Anthochaera phrygia	Regent Honeyeater	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She oak. Regent Honeyeaters inhabit woodlands that support 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. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria.	Not suitable
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Occupies mostly upper levels of drier 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. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage.	
Miniopterus australis	Little Bent-winged Bat	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.	Not suitable
Miniopterus orianae oceanensis	Large Bent-winged Bat	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Not suitable
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	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. Usually solitary but also recorded roosting communally, probably insectivorous.	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
Pseudophryne australis	Red-crowned Toadlet	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. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. 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.	Not suitable
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. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Generation length is estimated to be 5 years.	Not suitable
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Southern Brown Bandicoots 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. Nest during the day in a shallow depression in the ground covered by leaf litter, grass, or other plant material. Nests may be located under Grass trees *Xanthorrhoea* spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest. Mating occurs any time of	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		the year, usually following heavy rain. Two or three litters of 2-4 young may be produced annually. The gestation period of 11-12 days is the shortest known of any marsupial while young remarkably become independent around 60 days after being born.	
Petaurus norfolcensis	Squirrel Glider	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. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Not suitable
Petroica boodang	Scarlet Robin	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. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	Not suitable
Phascolarctos cinereus	Koala	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		mostly at night. Spend most of their time in trees but will descend and traverse open ground to move between trees.	
Glossopsitta pusilla	Little Lorikeet	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca, and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas, if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*.	Not suitable
^^*Lathamus discolor*	Swift Parrot	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White *Box E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*. Return to some foraging sites on a cyclic basis depending on food availability.	Habitat available in the surrounding area. Site has few nectar producing trees (*E. robusta*). Species could feed in the existing trees as part of surrounding home range area. Site is low quality habitat. No breeding habitat is located within the site. **5-part test conducted.**
Pteropus poliocephalus	Grey-headed Flying-fox	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	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	
Rostratula australis	Australian Painted Snipe	Prefers 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. The nest consists of a scrape in the ground, lined with grasses and leaves. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Not suitable
Xenus cinereus	Terek Sandpiper	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Generally roosts communally amongst mangroves or dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats.	Not suitable
^^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 found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas).	
^^*Ninox strenua*	Powerful Owl	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. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him.	Not suitable
^^*Tyto novaehollandiae*	Masked Owl	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Not suitable
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, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
		crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	
Chalinolobus dwyeri	Large-eared Pied Bat	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. Found in well-timbered areas containing gullies.	Not suitable
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Not suitable
Myotis macropus	Southern Myotis	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.	Not suitable
Scoteanax rueppellii	Greater Broad-nosed Bat	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	Not suitable

Scientific name	Common name	Habitat associations	Site suitability
Vespadelus troughtoni	Eastern Cave Bat	A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest.	Not suitable

6.4 Appendix IV – PCT 1795 Species List

PCT 1795 – Swamp Mahogany / Cabbage Tree Palm - Cheese Tree - Swamp Oak tall open forest on poorly drained coastal alluvium in the Sydney basin species list.

Scientific name	Common name
Trees	
Eucalyptus robusta	Swamp Mahogany
Glochidion ferdinandi	Cheese Tree
Casuarina glauca	Swamp Oak
Shrubs, palms, and palmlike	
Livistona australis	Cabbage Tree Palm
Melaleuca linariifolia	Flax-leaved Paperbark
Elaeocarpus reticulatus	Blueberry Ash
Pittosporum undulatum	Sweet Pittosporum
Melaleuca styphelioides	Prickly-leaved Tea Tree
Homalanthus populifolius	
Acacia longifolia	
Dodonaea triquetra	Large-leaf Hop-bush
Herbs, grasses, and groundcovers	
Entolasia marginata	Bordered Panic
Hypolepis muelleri	Harsh Ground Fern
Commelina cyanea	Native Wandering Jew
Gahnia clarkei	Tall Saw-sedge
Viola hederacea	Ivy-leaved Violet
Hydrocotyle peduncularis	
Pteridium esculentum	Bracken

Scientific name	Common name
Alternanthera denticulata	Lesser Joyweed
Calochlaena dubia	Rainbow Fern
Oplismenus aemulus	
Oplismenus imbecillis	
Phragmites australis	Common Reed
Blechnum camfieldii	
Centella asiatica	Indian Pennywort

6.5 Appendix V – Threatened species test of significance

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

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

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

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

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

(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

(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

(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,

(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),

(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.

Figure 6.1 Source: *Biodiversity Conservation Act 2016* s 7.3

Threatened species test of significance – Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats— *(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at the risk of extinction,*
Not a threatened species.
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity— *(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or* *(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,*
The proposed development is not likely to have an adverse effect on the extent of the ecological community or substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be place at risk of extinction as the vegetation community does not intersect the development area. The proposed development is restricted to the existing building footprint.
(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* *(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* *(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,*
No habitat is to be removed or modified as a result of the proposed development or activity. The proposal will not significantly impact or reduce the presence of appropriate habitat or the EEC. The EEC will not become fragmented or isolated as a result of the proposed development.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity values (either directly or indirectly),
Declared areas of outstanding biodiversity values have not yet been declared in this area.

Threatened species test of significance – Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions
(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.
The proposed development and actions are not likely to increase the impact of a key threatening process.
Conclusion The proposed development will not likely significantly alter the Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions community. The proposed development is restricted to the existing building footprint and the surrounding habitat is deemed as poor. The EEC will not be placed at risk of extinction.

Threatened species test of significance – Swift Parrot (*Lathamus discolor*)
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats— *(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at the risk of extinction,*
The proposed development will not impact on the breeding habitat of the Swift Parrot. The site displays marginal foraging habitat for the species in the form of *E. robusta* in creek area.
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity— *(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or* *(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,*
Not an endangered ecological community.
(c) in relation to the habitat of a threatened species or ecological community— *(iv) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and* *(v) 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*

Threatened species test of significance – Swift Parrot (*Lathamus discolor*)
(vi) 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,
The proposed development will not remove habitat for the species. The proposed development will not contribute to the fragmentation of species habitat. The species is highly mobile and the impact area to native vegetation is negligible. The proposed development does not plan to remove habitat of importance to the species. It is unlikely the site contributes significantly to the long-term survival of the species.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity values (either directly or indirectly),
No declared area of outstanding biodiversity values yet listed for the area.
(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.
Habitat removal is part of the key threatening process of habitat loss, both directly and indirectly through the loss of foraging habitat. The proposed development is not likely to increase the impact of a key threatening process.
Conclusion The proposed development is not likely to significantly effects populations of Swift Parrot (Lathamus discolor) and will not likely put the local population at the risk of extinction.

7 Expertise of Authors

With over 25 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Mia a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Mia was a key contributor to the recent set of Guidelines commissioned by Southeast Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

Geraldene Dalby-Ball

DIRECTOR

SPECIALISATIONS

- Urban Ecology – and habitat rehabilitation and re-creation.
- Urban waterway management – assessing, designing, and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration – assessment, design, and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor – environmental design, guidelines, and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

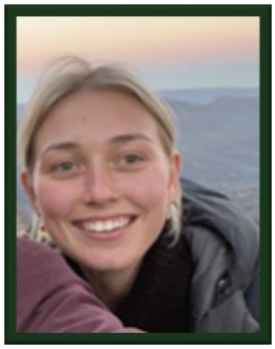
- **Director and Ecologist**, Ecological Consultants Australia. 2014-*present*
- **Director and Ecologist**, Dragonfly Environmental. 1998-*present*
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University.
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- Practicing member and vice president Ecological Consultants Association of NSW

Brooke Thompson

ECOLOGIST



Brooke is an ecologist with valuable on-ground experience working on bush regeneration projects throughout the Sydney region, including revegetation and weed management projects. Brooke is passionate about conserving and restoring natural areas for native species to thrive.

Brooke completed her undergraduate Bachelor of Science degree majoring in Conservation Biology. Brooke has knowledge of experimental design and analysis, research and reports, geographic information systems (GIS), environmental legislation, and flora identification.

Brooke has experience working with conservation organisations, including Sea Shepherd Australia, helping to raise awareness around the destruction of habitats in the world's oceans. She has participated in the organisation and delivery of fundraising events around Sydney.

Brooke has exceptional communication and customer service skills and an extended client relations history.

SPECIALISATIONS

- Urban and Landscape Ecology
- Fauna and Flora Assessments
- Vegetation Management
- Habitat Tree Assessment, Marking and Mapping

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. 2022

QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- WorkCover WHS General Induction of Construction Industry NSW White Card.