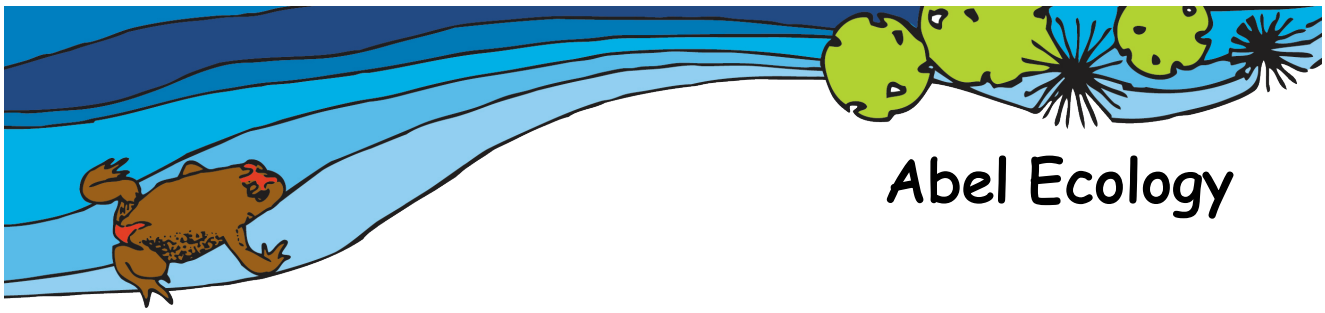


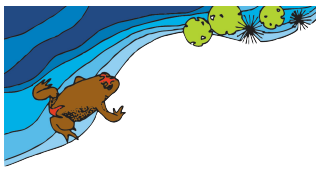
Prescribed Ecological Actions Report (PEAR)

for

346 – 352 Whale Beach Road, Palm Beach NSW 2108
Lots 327, 328, 329 and 330, DP 16362

Proposed new residential dwelling

Prepared for:	**The applicant c/- Harry Seidler & Associates Architects**
Report No:	**AE21-REP-2233-Draft A**
Prepared by:	**Abel Ecology**
Date:	**3 March 2021**



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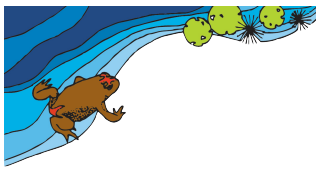
Document History

Report	Version	Prepared by	Technical Review by	Proofread by	Submission	
					Method	Date
Report 1931	Draft A	Dr Alison Hewitt	Dr Danny Wotherspoon	Steven Smith	Dropbox	18 Oct 18
Report 1931	Issue 1	Dr Alison Hewitt	Dr Danny Wotherspoon	Steven Smith	Dropbox	1 Feb 19
Report 1931	Issue 2	Dr Alison Hewitt	Dr Danny Wotherspoon	Steven Smith	Dropbox	25 Feb 19
Report 1931	Issue 3	Dr Alison Hewitt	Dr Danny Wotherspoon	Steven Smith	Dropbox	28 Feb 19
Report 2233	Draft A	Dr Alison Hewitt	Dr Danny Wotherspoon		Dropbox	23 Feb 21
Report 2233	Issue 1	Dr Alison Hewitt	Dr Danny Wotherspoon	Denise McNamara	Dropbox	3 Mar 21



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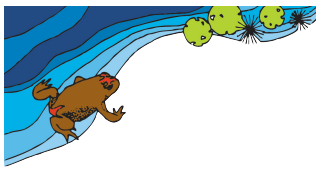

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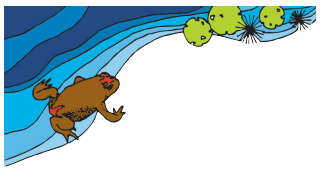

Table of Tables

List of Abbreviations

BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BCR	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
EEC	Endangered Ecological Community
ESD	Ecologically Sustainable Development
LEP	Local Environmental Plan
LGA	Local Government Area

Note regarding maps in this report

The diagrams/site maps used in this report have been supplied by and are used with the permission of Tzannes Architects.

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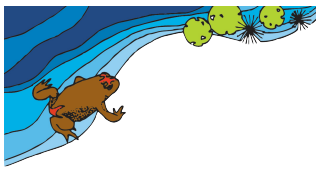


Executive summary

The proposal is to demolish an existing building, remove planted landscapes and construct a new house, swimming pool and gymnasium across Lots 327, 328, 329 and 330 Whale Beach Road, Palm Beach, NSW. Clearing of native vegetation is required to create a defendable space for bushfire and an asset protection zone.

A biodiversity survey was carried out at the site to assess the likely impacts of the proposal on species and ecological communities present on the site and whether the proposal requires a Biodiversity Development Assessment Report (BDAR) because it is a likely trigger to entry into the Biodiversity Offsets Scheme identified in s. 7.4 of the *Biodiversity Conservation Act 2016*.

This report also describes whether there is likely to be any significant effect on any endangered ecological community, endangered population, threatened species or their habitats, as per the listings in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) (Commonwealth legislation).

The original plant community on site was most likely 'Coastal Enriched Sandstone Dry Forest' with a very small area of 'Coastal Enriched Sandstone Moist Forest' at the southern boundary of the site. Both of these communities occur in the wider area and neither are listed threatened ecological communities. While some native species of each of these communities remain on site, the vegetation has been degraded by loss of larger trees, disturbance accrued by construction and occupation, replacement with exotic gardens and weed invasion.

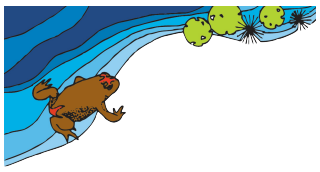
No threatened flora has previously been recorded from the site and none were detected on site in our surveys. None of the threatened terrestrial fauna species known from the wider locality have any specific requirements that could currently be provided by the site for breeding or other life cycle needs.

The threatened species Grey-headed Flying-fox was detected visiting the site. There is also evidence for two threatened microbat species visiting the site, the Little Bentwing-bat and the Eastern Bentwing-bat (Table 10). It is also likely that the Powerful Owl forages on site (Section 6.1). These species are highly mobile and forage / hunt over wide areas of land. None of them appear to be roosting or nesting on site. The scale of the proposal will modify a small area of potential foraging / hunting area with substantial areas of native vegetation in the surrounding area and will not place any of these species at significant risk of extinction (see 5 part test reports in Appendix 1).

The design of the proposed house appears to enable protection and preservation of the main rock escarpment and rock outcrops on site that are providing habitat to native reptiles.

The following three considerations have been assessed as triggers for entry into the Biodiversity Assessment Method.

1. Threshold 1: The proposal does not exceed the clearing threshold area as described in clause 7.2 of the BC Regulation 2017.



2. Threshold 2: The proposal does not undertake clearing of native vegetation or any prescribed activities (clause 6.1 of the BC Regulation 2017) on land shaded in the Biodiversity Values Land Map

3. Threshold 3: The proposal is not likely to significantly affect any threatened species or Endangered or Critically Endangered Species or ecological community (BC Act 7.7(2)).

None of these thresholds for entry into the Biodiversity offset Scheme are triggered by the proposal. Therefore, there is no impediment to this proposal in the scope of this report.

A report prepared using the Biodiversity Assessment Method is not recommended.

The provisions of the EPBC Act 1999 do not apply to this proposal and it does not require referral to the Commonwealth.

Recommendation:
A Biodiversity Development Assessment Report (BDAR) is not required.

Figure 1. Locality map for 346 – 352 Whale Beach Road.

Site location

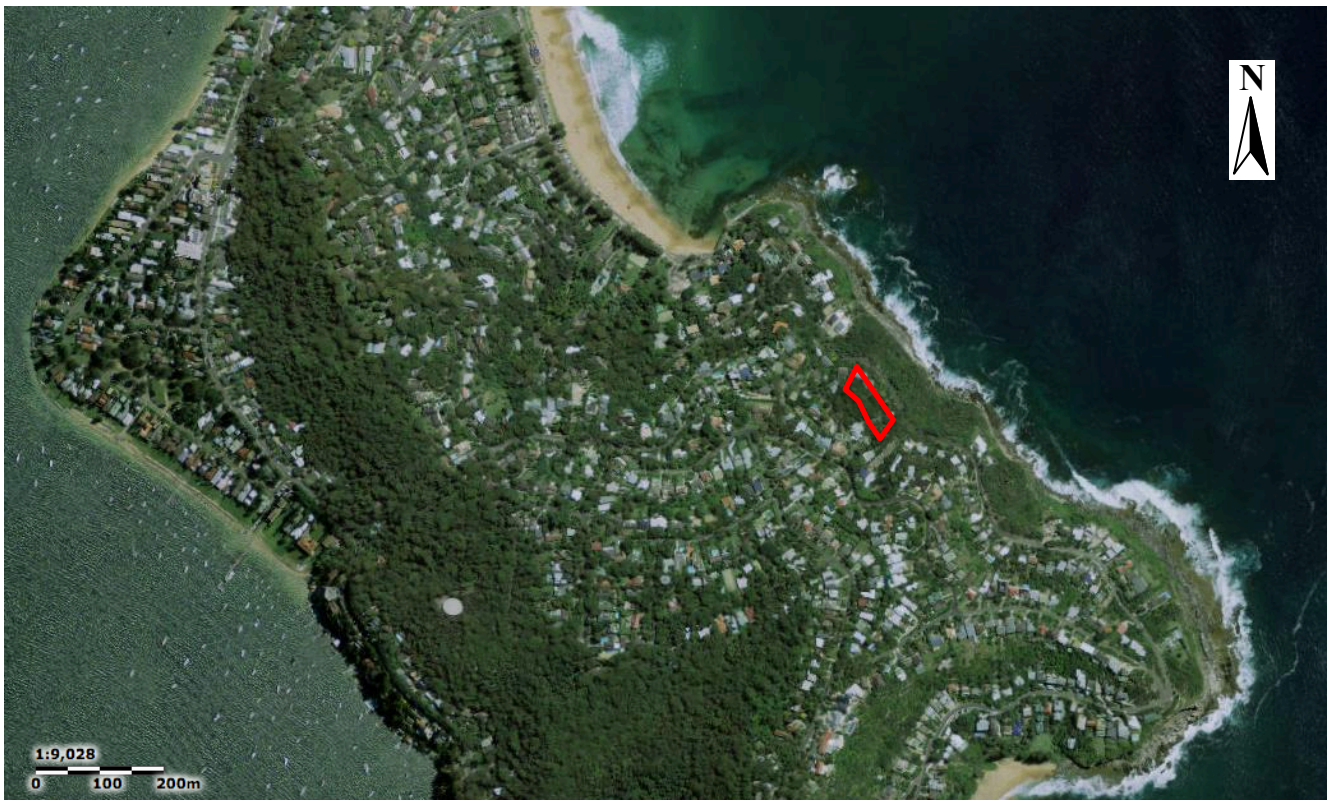


Figure 2. Aerial photo of the site and local area.

Key

Site location

-	FECA	UCA	GFA
Level 0	152.25m²	56.87m²	209.12m²
Level 1	231.41m²	55.28m²	286.69m²
Level 2	360.81m²	54.02m²	414.83m²
Roof	10.38m²	-	10.38m²
Total	754.85m²	166.17m²	921.02m²

Figure 3. Site Plan. Proposed new residence across Lots 328, 329 and 330, numbers 346-350 Whale Beach Road, Palm Beach. Orange line indicates approximate rock faces.

Source. Seidler and Associates Architects.

Figure 4. Biodiversity values map of the site and area.

Site location

https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Figure 5. Site LEP zone map.

Site location

Land Zoning

E4 - Environmental Living : (pub. 2014-05-30) E4

E2 - Environmental Conservation : (pub. 2014-05-30) E2

RE1 - Public Recreation : (pub. 2014-05-30) RE1

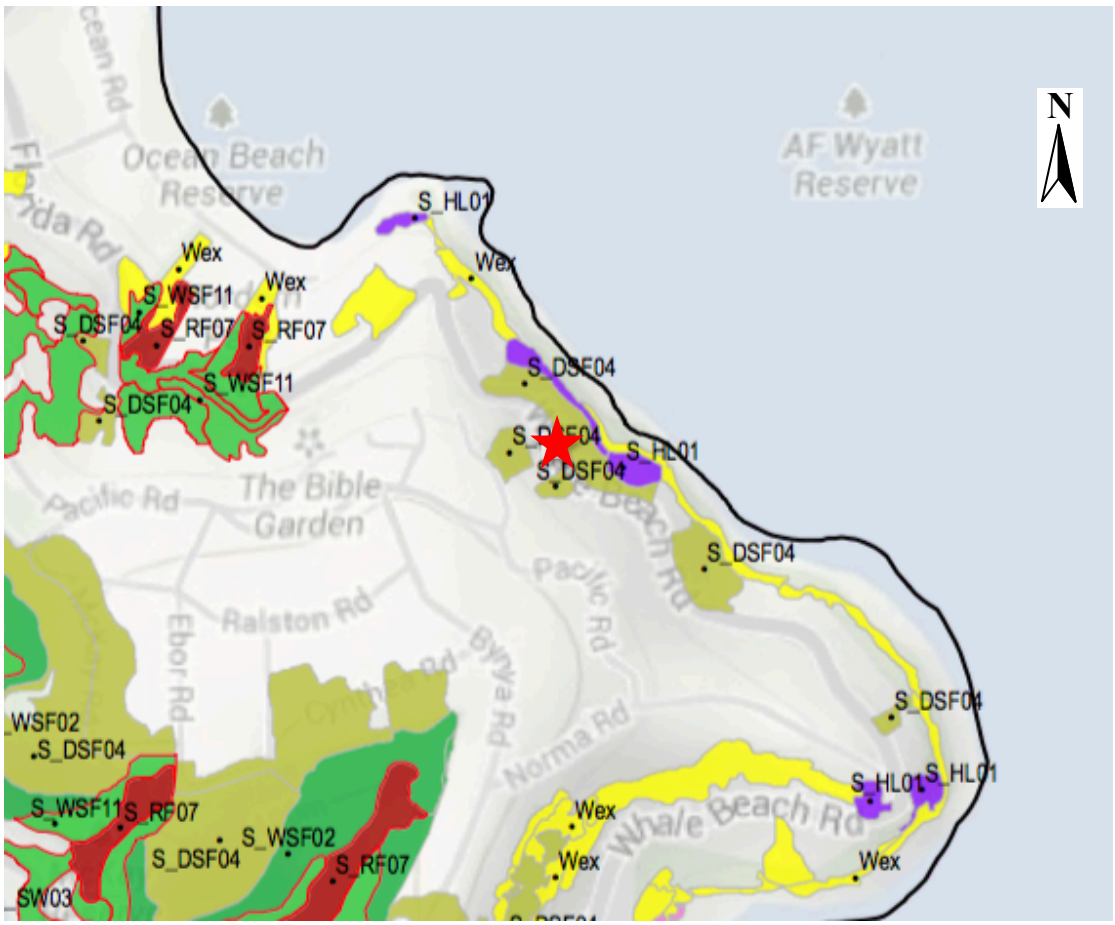


Figure 6. Vegetation Map of the area.

Key

Location of site

S_WSF02 Coastal Enriched Sandstone Moist Forest (NSW PCT No 1841)

S_HL01 Coastal Headland Clay Heath (NSW PCT No 1821)

S_DSF04 Coastal Enriched Sandstone Dry Forest (NSW PCT No 1776)

S_RF07 Coastal Escarpment Littoral Rainforest (NSW PCT No 1833) * #

WEX Weeds and Exotics (NSW PCT No 0)

Source. OEH (2013) The Native vegetation of the Sydney Metropolitan Area Volume 1, Version 2.

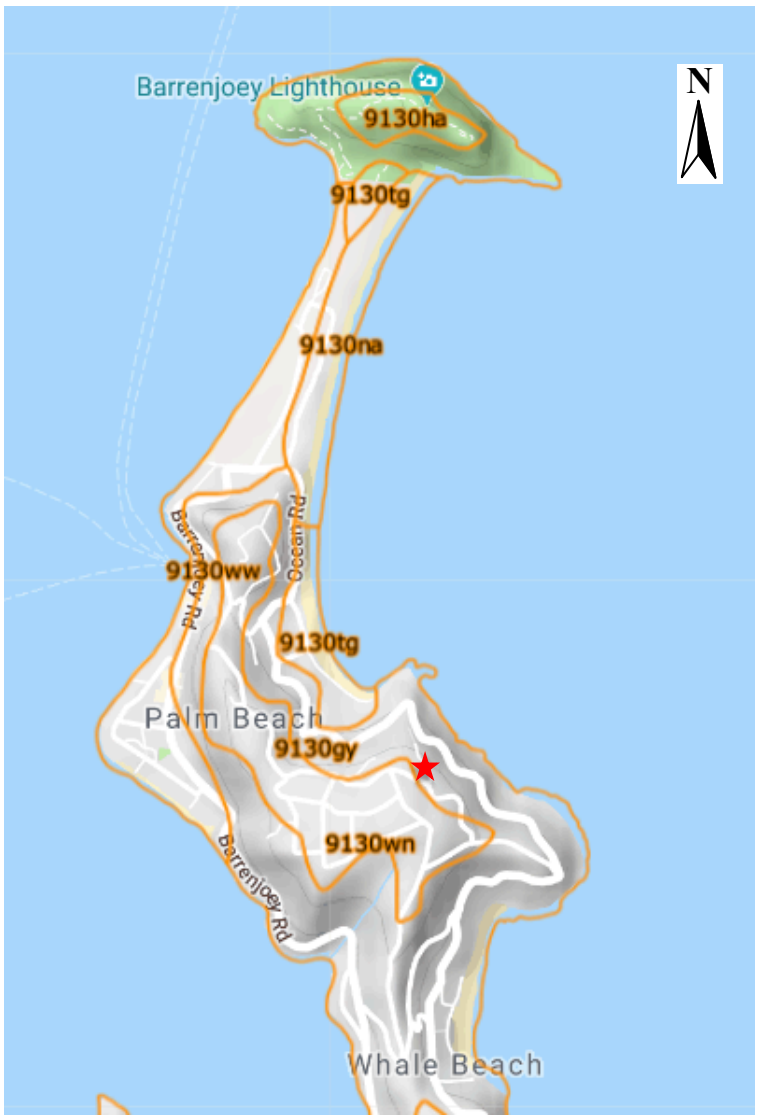


Figure 7. Soil Landscape map pertaining to the site and area.

Key

★ Site location

9130gy = Gymea
9130wn = Watagan
9130ha = Hawkesbury
9130tg = Tuggerah
9130na = Narrabeen
9130ww = Woy Woy

Source. https://www.environment.nsw.gov.au/eSpade2Webapp

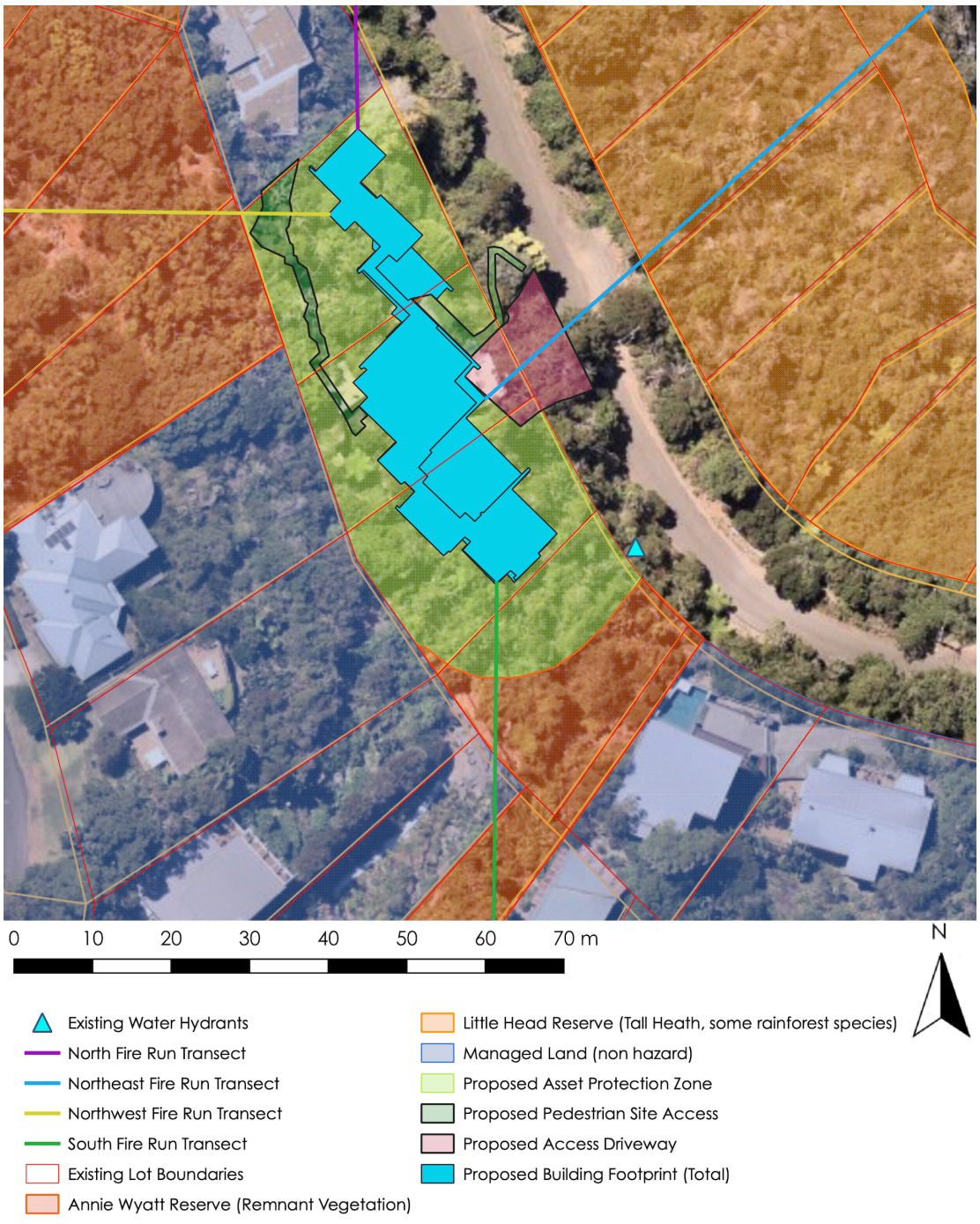


Figure 8. Asset Protection Zone Map

Figure 9. Location of fauna trap and camera stations set up on site.

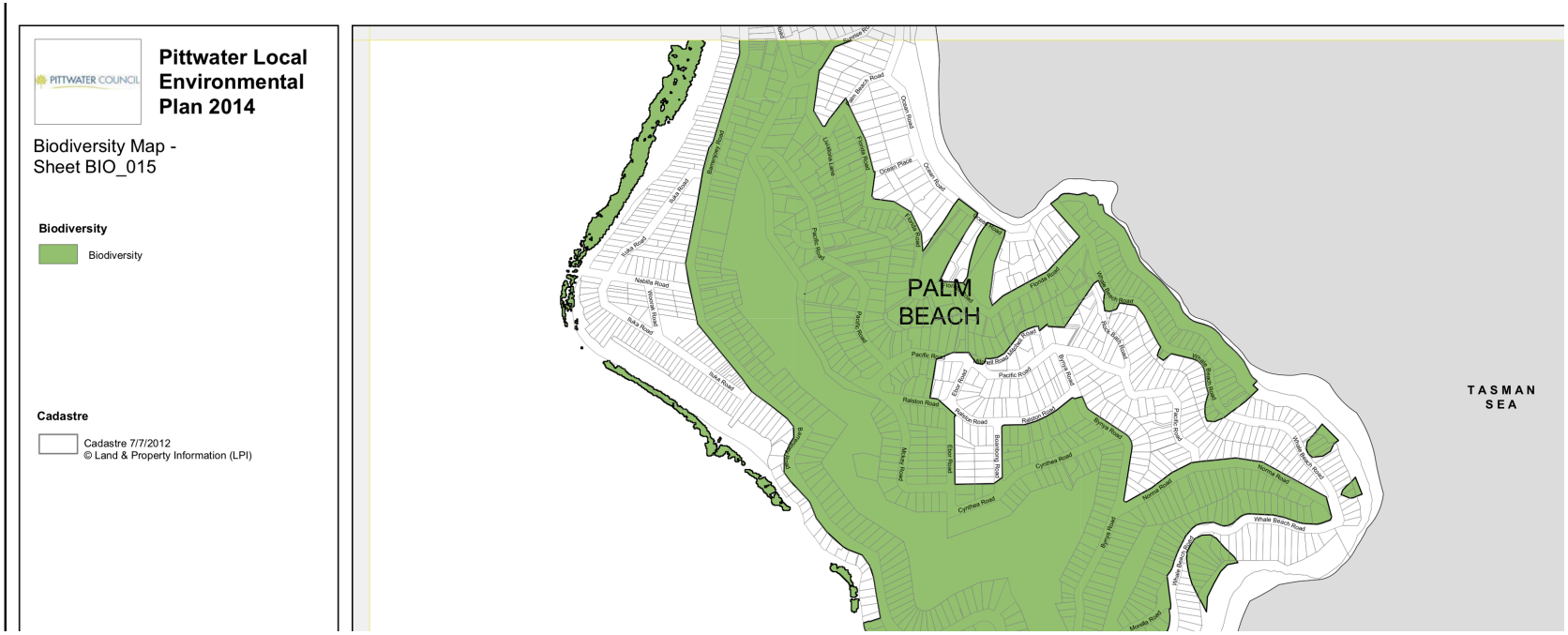


Figure 10. LEP Biodiversity Map

1. Introduction

1.1 Legislative context

This Prescribed Ecological Actions Report (PEAR) meets the requirements of the *Biodiversity Conservation Act 2016* to enable a Council to issue a consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The consent authority (Pittwater Council) must consider the following three Biodiversity Offset Scheme Development Thresholds.

Threshold Trigger 1: Exceeding the clearing threshold on an area of native vegetation.
Threshold Trigger 2: Development or a prescribed activity is carried out on land included in the Biodiversity Values Land Map.
Threshold Trigger 3: A "significant effect" on threatened species or ecological communities.

A biodiversity survey of the proposed development site at 346 – 352 Whale Beach Road, Palm Beach ('the site' – Figure 1) was undertaken on 11th – 13th and 18th – 20th September 2018. This Prescribed Ecological Actions Report (PEAR) investigates whether the impacts of the proposal to knock down an existing dwelling on Lot 328 and build a new home, swimming pool and gym across Lots 327, 328, 329 and 330 will trigger any of the three thresholds to entry into the Biodiversity Offsets Scheme, thereby requiring a Biodiversity Development Assessment Report.

This assessment addresses both 'endangered' and 'vulnerable', as required by the *Biodiversity Conservation Act 2016* (BCA 2016). Throughout this report 'threatened' refers to those species and communities listed as 'endangered' or 'vulnerable' in Schedules 1 & 2 of the BC Act 2016.

If any of the three thresholds are triggered, then a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor for the Authority to issue a consent or an approval and a calculation of offsetting required.

1.2 The proposal

The proposal (Figure 3) is to demolish an existing house on Lot 328 and 329, No. 350 Whale Beach Road, Palm Beach and build a new dwelling over Lots 328, 329 and 330, with ancillary works over Lot 327 consisting of:

a) Building on Lots 328, 329 and 330
b) driveway
c) swimming pool
d) outdoor living and landscape areas, including over Lot 327
e) link up to sewage system
f) clearing native vegetation, including over Lot 327
g) bushfire asset protection zone, including over Lot 327
h) utilities within the lots.

Table 1. Details of lot size and size of proposed native vegetation clearing.

Component of site	Area m^2	Proportion of the site %
Whole site Lot 327 = 614 m^2 Lots 328, 329, 330 = 1,665 m^2	2279	100%
Extent of proposed native vegetation clearing	~1811	~ 79%

Total APZ = 2,279m^2.
Note. Calculated extent of clearing comprises the new works construction footprint (~586 m^2) plus the Asset Protection Zone (~1580 m^2) (Figure 8).
There will be no clearing in the area of the LEP Biodiversity map (Figure 10).

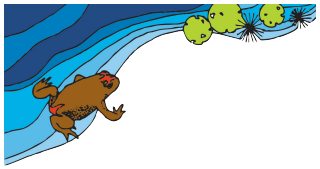
1.3 Sources of information used in this assessment

Literature reviewed in order to assess possible issues relating to this site include:
Air photos (SIX maps and NearMap)
Survey map (supplied by Seidler & Associates Architects)
Vegetation map (OEH 2013 Sydney Metro Veg Mapping)
Schedules to the BC Act 2016
Schedules to the EPBC Act 1999
OEH Atlas of NSW Wildlife

Other biodiversity survey reports in the local area include:

Abel Ecology (2016). LEC Expert Witness for 20 Chiltern Road, Ingleside, Abel Ecology, Springwood.

Abel Ecology (2016). Affidavit of Adrian Daniel Wotherspoon 26 February 2015, 2015 for Pittwater Council v Daniel Ryan in the Land and Environment Court of New South Wales proceedings 40949/2015, King & Wood Mallesons, Sydney, NSW.



Abel Ecology (2015). Flora and Fauna Report, 9-11 Beaconsfield Road, Newport, Lots 29 & 30 DP 1093125, Abel Ecology, Springwood.

Abel Ecology (2013). Vegetation management plan for 6-8 and part of 10 Macpherson Street, Warriewood, Proposed new retirement village, Abel Ecology, Springwood.

Wotherspoon, A. D. (2006). Flora and Fauna Report for 62 and 85 Hillside Road, Newport, Lot 1, DP 408800 and Lot 2 DP 1036400, Proposed 2 into 8 Lot subdivision, Abel Ecology, Faulconbridge.

Abel Ecology (2006). Flora and Fauna Report for 62 Ingleside Road, Ingleside, Lot 21, DP 11785, Proposed Residential dwelling, Abel Ecology, Faulconbridge.

Abel Ecology (2005). Flora and Fauna Report and Ecological Sustainability Plan for 13 Lane Cove Road, Ingleside, Lot 26 in DP 12115, Proposed dwelling and effluent disposal, Abel Ecology, Faulconbridge.

Wotherspoon, A. D. (2003). Flora and Fauna Report for 63 Therry Street, Avalon, Lot 20, DP 209493, Proposed subdivision and construction of a dwelling, Blue Mountain Wilderness Services Pty. Ltd., Faulconbridge.

Wotherspoon, A. D. (2003). Flora and Fauna Report with Bushfire Assessment for 15-17 Central Road, Avalon, Lot 24, DP 9151 and Lot 7 DP 415579, Proposed SEPP5 Development, Blue Mountain Wilderness Services Pty. Ltd., Faulconbridge.

2. Biodiversity offsets scheme thresholds 1 and 2

2.1 Threshold One: Biodiversity Conservation Regulation 2017 Development area assessment thresholds

Clearing of native vegetation is declared by clause 7.2(1) to exceed the biodiversity offsets scheme threshold if the area proposed to be cleared, is the area set out in Column 2 of the Table to that clause (Table 2 below) opposite the minimum lot size applicable to the land to be cleared in Column 1 of that Table.

Clearing of native vegetation will trigger entry into the offsets scheme if clearing is greater than the assessment threshold. To determine the correct threshold from Table 2 below, the appropriate minimum lot size of land must be selected. The minimum lot size of land can be found on the NSW planning portal https://www.planningportal.nsw.gov.au/find-a-property/property/.

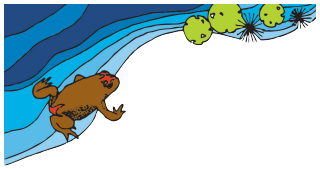


Table 2: Areas section 7.2(4) Biodiversity Conservation Regulation 2017.

	Land to be considered	**Assessment threshold**
	Minimum lot size of land	**Area of clearing**
A	Less than 1 hectare	0.25 hectare or more
B	Less than 40 hectares but not less than 1 hectare	0.5 hectare or more
C	Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
D	1,000 hectares or more	2 hectares or more

The four lots of land are zoned E4 (Figure 5) with a minimum lot size for each lot in the zone of 700 m^2 or 0.07 ha (NSW Planning Portal Minimum Lot Sizes), therefore row A is appropriate for this proposal. The size of the smallest Lot (Lot 329) is approximately 550 m^2 (i.e. less than the minimum lot size). The proposal consists of four lots which together have a total area of 2,269.6 m^2 or 0.2269.6 ha. The area of clearing even if all four lots were levelled is therefore less than the threshold of 0.25 hectares.

Conclusion
The proposed clearing does not exceed the threshold and entry into the BC Act offset scheme is not required as a result of clearing.

2.2 Threshold Two: Clearing or prescribed activities as listed in the Biodiversity Conservation Regulation 2017 on land included on the Biodiversity Values Map

No part of the site is included on the Biodiversity Values Map (Figure 4). Thus, threshold two is not breached.

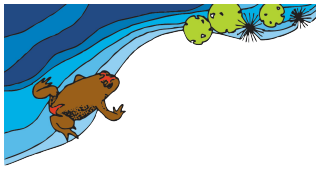
If one or more of particular Prescribed Activities are included directly or indirectly as part of the proposal or proposed activity the Biodiversity Offsets Scheme will apply.

The "prescribed activities" criteria are as follows:

> *(a) the impacts of development on the following habitat of threatened species or ecological communities:*
> *(i) karst, caves, crevices, cliffs and other geological features of significance,*
> *(ii) rocks,*
> *(iii) human made structures,*
> *(iv) non-native vegetation,*

Response
There are no threatened ecological communities on the site.

The site was noted to have sandstone rock outcrops and crevices which may provide habitat for threatened species of fauna that occur in the locality.



The two possible threatened species that could use rock crevices as shelter are:

1. *Cercartetus nanus* Eastern Pygmy-possum
2. *Petaurus norfolcensis* Squirrel Glider

Neither species was detected on site and have not been recorded north of Avalon since 1990.

These two species prefer tree hollows for shelter, so it is most unlikely that they will be using the rock faces on the site.

The proposal does not affect the existing rock outcrops, so there is no anticipated impact under this criterion.

The existing dwelling is a *human made structure* that is proposed to be demolished. There was no indication during field survey that any microbats or other fauna were using the dwelling for a roost. Similarly, there was no indication that threatened fauna were using the non-native vegetation.

No significant impacts from the proposal will occur on karsts, caves, crevices, cliffs or other geological features of significance, or rocks, human made structures or non-native vegetation that were present on site and could be potential habitat for threatened species or ecological communities.

> *(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,*

The three possible threatened mammal species that could use the east escarpment for a terrestrial movement corridor are:

1. *Phascolarctos cinereus* Koala
2. *Cercartetus nanus* Eastern Pygmy-possum
3. *Petaurus norfolcensis* Squirrel Glider

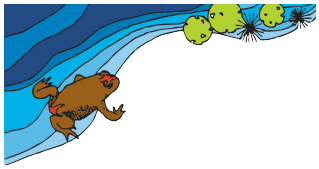
None of those species were detected on site and have not been recorded north of Avalon since 1990.

Other mobile or flying species are unlikely to be affected by the proposal.

The proposal is unlikely to have a significant impact on connectivity of habitat for any threatened species.

> *(c) the impacts of development on movement of threatened species that maintains their lifecycle,*

None of the threated terrestrial fauna species in the locality are migratory or have any specific requirements that could be provided by the site for breeding or other life cycle needs.



The proposal is unlikely to have a significant impact on the movement of threatened species as required for their lifecycle.

> *(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),*

None of those features occur on the site. The proposal will be constructed to best practice Water Sensitive Urban Design so is not likely to compromise any water quality down slope of the site.

No significant impact from the proposal is anticipated on water quality, water bodies and hydrological processes that sustain threatened species or threatened ecological communities.

> *(e) the impacts of wind turbine strikes on protected animals,*

Wind turbines are not part of the proposal.

> *(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.*

No terrestrial threatened species have been recorded north of Avalon since 1990 so it is most unlikely that the proposal will increase road kill. The proposal will not significantly increase vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

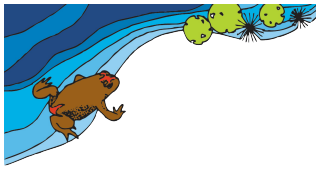
None of the potential species will be at any greater risk than at present with the existing dwelling.

> *(2) The additional biodiversity impacts prescribed by this clause* (above)*:*
> *(a) are prescribed for the purposes of assessment and biodiversity assessment reports under the Act, but are not additional biodiversity impacts for the purposes of calculating the number and class of biodiversity credits that are required under a biodiversity assessment report to be retired to offset the residual impact on biodiversity values of proposed development, proposed clearing of native vegetation or proposed biodiversity certification of land, and*
> *(b) may be taken into account in the determination of the biodiversity credits required to be retired (or other conservation measures required to be taken) under a planning approval or vegetation clearing approval or under a biodiversity certification of land.*

None of the prescribed biodiversity impacts described above (a, b, c, d, e, or f) are included in the proposal. Any impacts are not significant within the scope of the triggers in this consideration.

Conclusion

The threshold two trigger for entry into the Biodiversity offsets scheme is not activated by the proposal. A Biodiversity Development Assessment Report is not required.



3. Landscape features of the site and the locality

3.1 Site description

For the purposes of this report, the site (Figure 1) is defined by the property boundaries of lots 327 - 330.

It is 0.2269.6 ha. in size and the elevation is approximately 84 m above sea level.

https://www.planningportal.nsw.gov.au/find-a-property/

The site is on the eastern aspect of a ridge above the ocean with a steep slope of approximately (40 - 60°) down to Whale Beach Road before a further drop through reserve land to a rocky ocean shore.

There are no water bodies or creeks.

Stormwater management is by overland flow to the street.

The adjacent properties (Figure 1) are a mix of Council reserve to the east, a council reserve to the west of a part of the site and residential dwellings to the north, west and south.

The vegetation (Figure 6) is described in detail in Section 5 below and fauna habitat is detailed in Section 5 below.

3.2 Soils

The soil landscapes on site are mapped as Gymea adjoining Watagan (Figure 7).

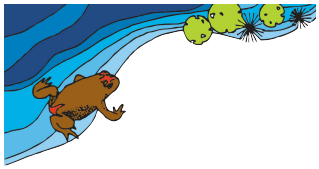
Gymea soil landscapes are typified by slopes of 10 - 25%, rock outcrops and shallow to moderately deep red to yellow podsols of Hawkesbury sandstone sediment.

Watagan soil landscapes are typified by slopes of more than 25%, occasional sandstone boulders and benches and moderately deep red to yellow podsols of Narrabeen sediment.

Both landscapes are typified by imperfectly drained, non-cohesive soils posing rockfall and sheet erosion hazards with high run-off.

3.3 History of the site

The site is an old residential subdivision with existing improvements comprising a dwelling, landscaping and ancillary structures.



3.4 Landscape features

3.4.1 Site landscape features

The following landscape features are present on the site (Table 3).

Table 3. Site landscape features.

Vegetation	There is remnant local native tree canopy and understorey vegetation. A variety of exotic landscape planting and various weed species are present on the site.
Non-native vegetation	The landscape has potential for foraging habitat for threatened species of bats and birds.
Human structures	Buildings to be demolished have very little potential as bat roosts.
Wetlands/dams/watercourse	None
Karst, caves, crevices and other geological features of significance	Sandstone rock faces and outcrops.
Roads	Vehicle traffic and road mortality – A native Ring tailed Possum was noted to have been killed by a vehicle on Whale Beach Road opposite the property 19th Sept.

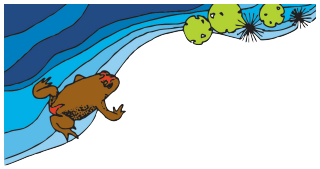
4. Field survey methods

4.1 BioNet Atlas of NSW Wildlife website search

Records from the BioNet Atlas of NSW Wildlife website were accessed using the following search criteria:

Licensed Report of all Valid Records of Threatened (listed on *BC Act 2016*) or Commonwealth listed Entities for a 10 x 10 km square centred on the site (selected area [North: -33.56 West: 151.29 East: 151.39 South: -33.66]). Records since 01 Jan 1990 until 20 Sept 2017 returned a total of 356 records of 42 threatened flora and fauna species.

Data used is from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage.

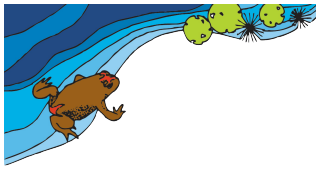


These species (Table 4) were considered in designing field survey targets and methods. Unsuitable candidates were eliminated on the basis of habitat requirements (Appendix 4 and Appendix 5).

Table 4: BioNet threatened flora & fauna species records for a 5 km radius of the site since 1 Jan 1990.

Scientific Name	Common Name	NSW status	Comm. status
Callocephalon fimbriatum	Gang-gang Cockatoo	V	
Glossopsitta pusilla	Little Lorikeet	V	
Ninox connivens	Barking Owl	V	
Ninox strenua	Powerful Owl	V	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Mormopterus norfolkensis	Eastern Freetail-bat	V	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
Callistemon linearifolius	Netted Bottle Brush	V	

Species for which suitable habitat occurs on the site within the range of the species but which did not appear in the Atlas record were added to Appendix 4 and Appendix 5.



4.2 Field work effort

Over seval days of fieldwork a total of 32.75 hours were spent undertaking survey work on the site and surrounding habitat areas.

Table 5. Survey dates and weather conditions.

Date	Time	Temperature (°C)	Task	Hours (hrs x no. people)
11 Sep 18	14:30 - 19:00	19 - 22	Some veg survey; Baits, Hairtube traps, Anabat recorder and camera set up.	4.5 x 2 = 9
12 Sep 18	08:00 - 15:30	20 - 26	Vegetation survey, Anabat recorded set up.	7.5 x 2 = 15
13 Sep 18	0800 - 0830	17	Reptile survey, collect Anabat and Reconyx cameras.	0.5 x 1 = 0.5
18 Sep 18	10:30 – 14:30	19 - 24	Reptile survey, install Anabat and Reconyx cameras, funnel trap, pipe trap.	4 x 1 = 4
19 Sep 18	17:30-18:45	15-18	Reptile survey, Anabat and Reconyx cameras, funnel trap, pipe trap, hair tubes, spotlighting.	1.25 x 1 = 1.25
20 Sep 18	08:00-09:30	17-19	Collect Anabat and Reconyx cameras, funnel trap, pipe trap, hair tubes.	1.5 x 1 = 1.5
28 Jan21	15:15 – 16:39	20	Review site conditions	1.5 x 1 = 1.5
			Total	32.75

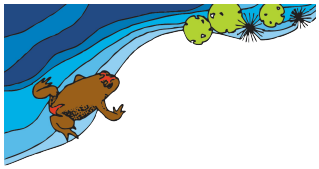
Survey effort was concentrated within the site boundaries, although adjacent surrounding vegetation was noted.

4.3 Flora survey method, vegetation community and habitat classification

A flora survey was conducted to compile vegetation descriptions and species lists for the site.

The vegetation community on site was derived from the site flora list and vegetation mapping of the area.

Vegetation quality is assessed as described below (Section 4.4). The plant community/communities on site were classified according to the NSW VIS.



4.4 Simplified vegetation integrity assessment

On-site vegetation may be described according to a simplified vegetation integrity classification for each vegetation zone / habitat type. The simplified vegetation integrity assessment is based upon a modified version of the vegetation integrity assessment described in the NSW Biodiversity Assessment Method (BAM) 2017. This simplified assessment is based upon a qualitative assessment; no quantitative assessment was undertaken and no vegetation integrity score is calculated. The assessment requires the assessor to compare the observed vegetation with the vegetation type presumed to be present prior to 1750 (high quality native vegetation). Vegetation with good or moderate integrity usually provide higher quality habitat for a diverse range of indigenous species.

Four main qualitative classes of vegetation integrity are recognised. There is variation within each class, and in addition the class boundaries are somewhat fluid where one grades into the other.

Good integrity vegetation
Characteristics: Relatively high indigenous species diversity, diversity of flora species growth form (mix of trees, shrubs and groundcovers etc), diversity of tree size, canopy layer regeneration observed, fallen logs present on the ground, dead vegetative litter (leaves, twigs etc) cover present, weed invasion absent or minimal

Moderate integrity vegetation
Characteristics: Remnants and regenerating areas that have experienced disturbance but appear to retain the capability of recovery. Weed invasion may be moderate.

Poor integrity vegetation
Characteristics: The vegetation is highly disturbed. It typically consists of scattered trees/shrubs or clumps of trees and shrubs. Tree size diversity significantly reduced. The groundcover layer is comprised of a mix of indigenous species and exotic species. Fallen logs rare to absent, ground vegetative litter lacking.

Cleared class
Characteristics: Indigenous canopy species are absent and the indigenous understorey (shrubs/climbers/scramblers/groundcovers) are approximately less than 50%.

Note: some vegetation types naturally lack some of the characteristics. For example, trees are rare to absent in saltmarshes, sedge swamps, alpine herbfields and arid shrublands. However, providing the other characteristics are consistent with a natural undisturbed area of the same vegetation type then these vegetation types are classified as having "good integrity".

4.5 Fauna survey method

The methods of survey undertaken to detect the various faunal groups or their habitat are outlined below. Locations for specific survey methods are shown in Figure 8. Targeted surveys were made for threatened species based on records of sightings from the BioNet Atlas website, and the Ecologist's knowledge.

From this survey nine hair samples and one owl pellet, not easily identifiable in the field were sent to Barbara Triggs for analysis.

Roads and road verges were searched for road-kill fauna. Surveys for mammals, reptiles and frogs are generally run concurrently.

Dates, weather and temperatures of all fieldwork were recorded and are tabulated in Table 5 above.

4.5.1 Diurnal fauna searches

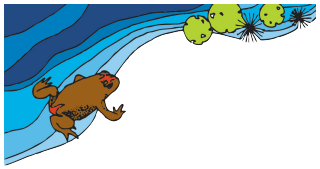
Searching, opportunistic observations and call recording provides an indication of types of species using a site. These methods are used to identify and record live animals, or record indirect evidence of animal presence on the site. On occasions, specific surveys may be conducted for a targeted group or species, such as searching the margins of a dam for frogs. Generally though, birds, reptiles, frogs and mammals, or evidence of them, may all be present in the same habitat at the time of survey, therefore searching for these faunal groups is generally run concurrently. This involved:

a) Searching shelter sites, basking sites, opportunistic observation, and assessment of shelter site diversity suitability for reptiles.
b) Opportunistic observations and identification of calls of species, and search for indirect evidence such as nests, feathers, scratchings and feeding signs for birds.
c) Searching for indirect evidence, such as diggings, droppings, runways and burrows, and opportunistic observations for mammals.

While rigorous surveys are likely to find more species, high species richness for birds can be recorded in a relatively short amount of time. Bird surveys are used as a simple indicator of other parameters, such as biodiversity and the functioning of the ecosystem.

4.5.2 Trapping

Hair-tube trapping targets small and medium-sized mammals. Six trap stations were placed on the site (Figure 8). Three hair tubes were placed at each trap station, one with oat bait at ground level, one with oat bait, tree mounted, and one with fish bait alternating at ground level and tree mounted. Oat bait was a mixture of rolled oats, honey, truffle oil, fish oil and sesame oil. These were left out for nine nights.



4.5.3 Reconyx Wildlife camera

Two cameras were positioned on site, one in the approximate centre of Lot 329 and another in the approximate centre of Lot 327 (Figure 8). These were left out overnight 11th and 12th Sept and 18th and 19th Sept totalling four nights of camera survey.

4.5.4 Nocturnal fauna searches

Nocturnal search was undertaken by one person for a total of 1.25 hours on 19th of September.

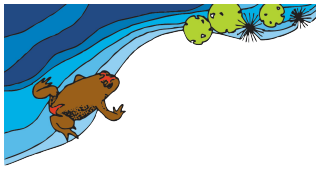
Nocturnal searches may encompass all the surveying methods used during the day, but generally consist of either locating a live animal or recording its call. Nocturnal species, such as arboreal mammals, large forest owls and flying-foxes are specifically targeted. Survey methods for microbats are outlined below in 3.4.7.

4.5.5 Microbat ultrasonic call recording

The method for identifying free-flying bats by their species-specific echolocation calls is one that has become standard in the last two decades (Richards 2001). Insectivorous bats were surveyed on this site by Anabat recordings directly to cf storage zcaim, over five nights (Duffy et al. 2000). Any other bat survey methods, such as tape recorded calls, and brief survey time, is certain to miss bat species scheduled by the BC Act 2016. Scheduled species are recorded on average within 1.5 hours (94 ±64 minutes) of recording but up to four hours is required to record all threatened species present (Richards 2001). Of the eight threatened species in the Sydney Bioregion, Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* has the largest home range and takes up to four hours to reliably appear at any point in its range. For a small site, any bats that appear in the first half hour are likely to be roosting nearby, with probability of recording 57% in the first half hour and 68% in the first whole hour (Richards 2001). Storage to zcam provides high quality call recordings with very little noise, enabling high reliability in call identification, as opposed to storage to magnetic tape. Anabat recordings were analysed by Dr Daniel McDonald.

Table 6. Anabat recording dates and weather conditions.

Date	Times	Temperatures (°C)	Weather
11 Sept 2018	18:30 – 08:00	12 – 19	Clear, light breeze
12 Sept 2018	15.30 – 07:00	13 - 12	Clear, light breeze
18 Sept 2018	14:30 – 07:00	12 - 19	Clear, light breeze
19 Sept 2018	18:30 – 08:00	12 - 17	Clear, light breeze



4.6 Species likely to occur

Species to be listed as 'likely to occur' or 'expected' (see Appendix 3), are common species generally found in the region, which are likely to occur on site if suitable habitat is present.

Native flora may include species local to the area (occurring in local remnants). Structure and species composition will depend upon locally occurring communities.

Expected species are common and, by definition, are not threatened species.

4.7 Limitations of the survey

This survey was conducted in early Spring. The weather conditions were mild and clear with a light coastal breeze.

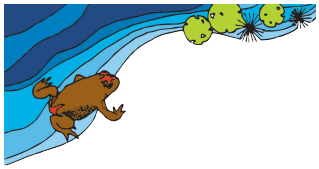
Species that may use the site were not detected during the survey for the following reasons:

a) The species was present during the survey but was not detected due to dormancy, inactivity or cryptic habits.
b) The species use the site at other times of the year, but was not present during the survey due to being nomadic or migratory.

4.8 Staff associated with the field work

Table 7. Staff associated with field work and analysis of field work.

Field work	Analysis of field work
Dr Danny Wotherspoon	Barbara Triggs
Dr Daniel McDonald	Dr Daniel McDonald
Dr Alison Hewitt	Mark Sherring



5. Survey Results: Vegetation and habitat description

5.1 Site vegetation

Site vegetation comprises rambling gardens to the house and areas in and around numerous rock outcrops on site with exotic plants such as *Cupressus*, *Strelitzia*, *Hibiscus* and *Cycads.* Many small *Cactus* varieties, *Clivea*, *Agave*, potted orchids and varied exotic shrubs are also being grown interspersed across the gardens and rock areas on site.

Native *Glochidion ferdinandi, Elaeocarpus reticulatus* and *Pittosporum undulatum* are the most common small trees occurring on site in low abundance. There are also two small *Ficus rubiginosa*, and *Livistona australis* with native ferns (*Todea barbara*, *Pteridium esculentum* and *Cyathea cooperi*) and vines (*Genoplesium cymosum*, *Pandorea pandorana* and *Smilax glyciphylla*) more common at the southern boundary area where a watercourse gully provides a wetter and more sheltered microclimate.

There is one *Eucalyptus saligna* (planted) on Lot 327 northern area of the site, one large *Eucalyptus scias* in front of the existing house, several *Syncarpia glomulifera* (native Turpentine) and scattered *Xanthorrhoea media* across the site. Several established *Casuarina cunninghamiana* trees have also been planted closer to the road / steps on site.

Weedy species in highest abundance on site include **Asparagus aethiopicus* (Asparagus fern), **Nephrolepis cordifolia* (Fishbone fern) and **Hedychium gardnerianum* (Ginger lily).

A total of 150 plant species were recorded on site during field surveys, with approximately one third (56) of these native. All plant species recorded on site are presented in Appendix 2.

In determining the most likely original native vegetation community present on site, all native plant species recorded pertaining to nearby mapped vegetation units (Figure 6) are given in Table 8 below.

Table 8. Vegetation community type species indicators.

S_DSF04 Coastal Enriched Sandstone Dry Forest	**S_DSF06 Coastal Sandstone Foreshores Forest**	**S_WSF02 Coastal Enriched Sandstone Moist Forest**
Acacia suaveolens	*Acacia longifolia*	*Ceratopetalum gummiferum*
Acacia ulicifolia	*Banksia integrifolia*	*Dianella caerulea*
Banksia serrata	*Commelina cyanea*	*Dodonaea triquetra*
Caesia parviflora	*Dianella caerulea*	*Elaeocarpus reticulatus*
Cassytha pubescens	*Dodonaea triquetra*	*Glochidion ferdinandi*
Ceratopetalum gummiferum	*Elaeocarpus reticulatus*	*Livistona australis*
Dianella caerulea	*Ficus rubiginosa*	*Lomandra longifolia*
Dodonaea triquetra	*Glochidion ferdinandi*	*Notelaea longifolia*

S_DSF04 Coastal Enriched Sandstone Dry Forest	**S_DSF06 Coastal Sandstone Foreshores Forest**	**S_WSF02 Coastal Enriched Sandstone Moist Forest**
Elaeocarpus reticulatus	*Lomandra longifolia*	*Pandorea pandorana*
Glochidion ferdinandi	*Notelaea longifolia*	*Pittosporum undulatum*
Imperata cylindrical var. major	*Omalanthus nutans*	*Platylobium formosum*
Lomandra longifolia	*Oplismenus aemulus*	*Pteridium esculentum*
Notelaea longifolia	*Pandorea pandorana*	*Smilax glyciphylla*
Pandorea pandorana	*Pittosporum undulatum*	*Syncarpia glomulifera*
Pittosporum undulatum	*Platylobium formosum*	*Todea barbara*
Platylobium formosum	*Pteridium esculentum*	
Smilax glyciphylla	*Smilax glyciphylla*	
Syncarpia glomulifera		
Themeda australis		
Total = 19	**Total = 17**	**Total = 15**

In considering each of these three possible vegetation communities it is noted that Coastal Enriched Sandstone Dry Forest and Coastal Enriched Sandstone Wet Forest fail to achieve the minimum number of positive diagnostic species for 95% confidence in assigning a vegetation community:

- The minimum number of species required to diagnose S_DSF04 Coastal Enriched Sandstone Dry Forest with 95% confidence is 21 of a minimum 38 or more native species.

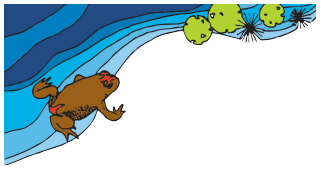
- The minimum number of species required to diagnose S_DSF06 Coastal Sandstone Foreshore Forest with 95% confidence is 14 of a minimum 28 or more native species.

- The minimum number of species required to diagnose S_WSF02 Coastal Enriched Sandstone Moist Forest with 95% confidence is 17 of a minimum 33 or more native species.

We conclude that the low numbers of native species recorded to enable assignment of a vegetation community with high confidence is reflective of the disturbed nature of the site.

It should also be noted that these vegetation community diagnoses are ordinarily made based on sampling data obtained from a 400 m^2 quadrat, randomly placed on site, while we employed a census of the whole site. This was because of the steep rock outcrops across large areas of the site and the disturbed areas across the entirety of the site, which made it difficult to randomly select representative points.

In attempting to assign an original native vegetation community to the site we note that:



1. There are nineteen positive diagnostic species on site for Coastal Enriched Sandstone Dry Forest. Species include some of the trees on site that are listed as positive diagnostic indicators for this community, namely *Syncarpia glomulifera, Glochidion ferdinandi* and *Elaeocarpus reticulatus.* The site also has the aligning soils for this community, in terms of clay enrichment to the sandstone (Figure 7). Mapping by Sydney Metro (2013) also supports the assignment of this vegetation community (Figure 6. Vegetation Map of the area).
2. There are a lesser number (seventeen) positive diagnostic species on site for Coastal Sandstone Foreshores Forest including *Ficus rubiginosa*, *Elaeocarpus reticulatus* and *Glochidion ferdinandi*. However, the site perhaps lacks the more protected location and the more minor shale enrichment to sandstone soils that support this vegetation community.
3. There are fourteen positive diagnostic species on site for Coastal Enriched Sandstone Moist Forest. It is noted that these all tend to occur in the southern area of the site (Lot 330), which is also consistent in that it borders a slightly more sheltered sandstone gully enriched by clay. This area of the site may therefore be closer to an intergrade to Coastal Enriched Sandstone Moist Forest.

We therefore conclude that the original vegetation on site was, for the most part, closest in assemblage to Coastal Enriched Sandstone Dry Forest with a very small area of Coastal Enriched Sandstone Moist Forest at the southern boundary of the site.

Neither of these vegetation communities are threatened ecological communities and both are represented within nearby reserve areas in the Pittwater LGA.

In some areas of the site there are old tree stumps and coarse litter.

Hollow bearing trees are absent across the site.

The site was noted to have sandstone escarpment, outcrops and crevices which can provide habitat for fauna.

Important habitat features that have significance for fauna occupation of the site are discussed below (Table 9). These include both site disturbance and natural features.

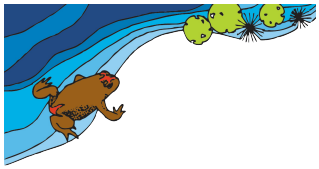


Table 9. Significant features and observations for this zone.

Significant features	Observations
Frequency of large trees (approx. > 80 cm DBH)	Absent
Tree regeneration and Tree stem-size diversity	Tree regeneration appears absent
Logs, woody debris and litter cover	Logs, woody debris and leaf litter – moderate
Rock outcrops, crevices	Large areas of escarpment along the entire western edge of the site.
Food resources	Eucalyptus, Ficus, Glochidion and Acacia provide food resources of fruits, blossoms and seeds.

5.2 Biodiversity Significance

The southern portion of Lot 327 (346 Whale Beach Road) is indicated as containing an area of Biodiversity Significance as indicated on Council's Biodiversity Map forming part of the PDCP 2014. This is most likely the very small area of Coastal Enriched Sandstone Moist Forest at the southern boundary of the site.

6. Survey Results: Fauna

6.1 Fauna results

A total of 23 species were detected, including 13 mammals, six birds and four reptiles.

Species listed as 'likely to occur' in the area are presented in Appendix 4. Note that the majority of the 'Expected Species' would occur on the site due to the presence of habitat. All the species listed as 'likely to occur' are common throughout the locality and the region. It is unlikely that protected species will be affected at a local, regional or state-wide scale by the proposal.

The habitats for threatened species that occur in the area are tabulated in Appendix 5.

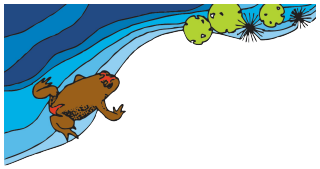
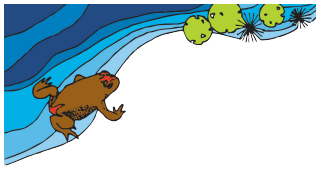


Table 10. List of fauna detected on the site.

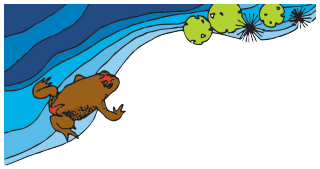
Reptiles			
Broad Tailed Gecko	*1. Phyllurus platurus*		
Scaly-foot Lizard	*1. Pygopus lepidopodus*		
Red-throated Skink	*1. Acritoscincus platynota*		
Fence Skink	*1. Cryptoblepharus virgatus*		O
Coppertail Skink	*1. Ctenotus taeniolatus*		
Three-toed yellow-bellied Skink	*1. Saiphos equalis*		O
Eastern Water-skink	*1. Eulamprus quoyii*		
Dark-flecked Garden Sunskink	*1. Lampropholis delicata*		O
Pale-flecked Garden Sunskink	*1. Lampropholis guichenoti*		
Weasel Skink	*1. Saproscincus mustelinus*		
Eastern Blue-tongued Skink	*1. Tiliqua scincoides*		
Jacky Lizard	*1. Amphibolurus muricatus*		
Bearded Dragon	*1. Pogona barbata*		
Eastern water dragon	*1. Intellagama (Physignathus) lesueurii*		O
Red Bellied Black Snake	*1. Pseudechis porphyriacus*		
N=	4		

Birds			
Australian Wood Duck	*1. Chenonetta jubata*		
Pacific Black Duck	*1. Anas superciliosa*		
White-faced Heron	*1. Egretta novaehollandiae*		
Australian White Ibis	*1. Threskiornis molucca*		
Collared Sparrowhawk	*1. Accipiter cirrocephalus*		
Brown Goshawk	*1. Accipiter fasciatus*		
Grey Goshawk	*1. Accipiter fasciatus*		O
Nankeen Kestrel	*1. Falco cenchroides*		
Purple Swamphen	*1. Porphyrio porphyrio*		
Dusky Moorhen	*1. Gallinula tenebrosa*		
Eurasian Coot	*1. Fulica atra*		
Masked Lapwing	*1. Vanellus miles*		
Rock Dove*	*1. Columba livia*		
Spotted Turtle-dove*	*1. Streptopelia chinensis*		
Crested Pigeon	*1. Ocyphaps lophotes*		
Glossy Black-cockatoo	*1. Calyptorhynchus lathami*		
Yellow-tailed Black-cockatoo	*1. Calyptorhynchus funereus*		
Galah	*1. Eolophus roseicapilla*		

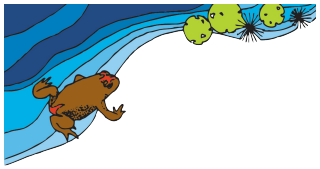


Birds			
Long-billed Corella	*1. Cacatua tenuirostris*		
Sulphur-crested Cockatoo	*1. Cacatua galerita*		
Gang-gang Cockatoo	*1. Callocephalon fimbriatum*		
Scaly-breasted Lorikeet	*1. Trichoglossus chlorolepidotus*		
Rainbow Lorikeet	*1. Trichoglossus haematodus*		O, W
Musk Lorikeet	*1. Glossopsitta concinna*		
Australian King-parrot	*1. Alisterus scapularis*		
Crimson Rosella	*1. Platycercus elegans*		
Eastern Rosella	*1. Platycercus eximius*		
Asian Koel	*1. Eudynamys scolopaceus*		
Channel-billed Cuckoo	*1. Scythrops novaehollandiae*		
Southern Boobook	*1. Ninox novaeseelandiae*		
Tawny Frogmouth	*1. Podargus strigoides*		
Laughing Kookaburra	*1. Dacelo novaeguineae*		
Sacred Kingfisher	*1. Todiramphus sanctus*		
Dollarbird	*1. Eurystomus orientalis*		
Satin Bowerbird	*1. Ptilonorhynchus violaceus*		
Superb Fairy-wren	*1. Malurus cyaneus*		
Variegated Fairy-wren	*1. Malurus lamberti*		
Spotted Pardalote	*1. Pardalotus punctatus*		
White-browed Scrubwren	*1. Sericornis frontalis*		
Brown Gerygone	*1. Gerygone mouki*		
White-throated Gerygone	*1. Gerygone albogularis*		
White-throated Treecreeper	*1. Cormobates leucophaea*		
Brown Thornbill	*1. Acanthiza pusilla*		
Yellow Thornbill	*1. Acanthiza nana*		
Striated Thornbill	*1. Acanthiza lineata*		
Buff-rumped Thornbill	*1. Acanthiza reguloides*		
Red Wattlebird	*1. Anthochaera carunculata*		
Little Wattlebird	*1. Anthochaera chrysoptera*		
Noisy Friarbird	*1. Philemon corniculatus*		
Bell Miner	*1. Manorina melanophrys*		
Noisy Miner	*1. Manorina melanocephala*		
Lewin's Honeyeater	*1. Meliphaga lewinii*		
Yellow-faced Honeyeater	*1. Lichenostomus chrysops*		
White-plumed Honeyeater	*1. Lichenostomus penicillatus*		
White-naped Honeyeater	*1. Melithreptus lunatus*		
New Holland Honeyeater	*1. Phylidonyris novaehollandiae*		

Birds			
Eastern Spinebill	*1. Acanthorhynchus tenuirostris*		
Eastern Yellow Robin	*1. Eopsaltria australis*		
Eastern Whipbird	*1. Psophodes olivaceus*		
Golden Whistler	*1. Pachycephala pectoralis*		
Rufous Whistler	*1. Pachycephala rufiventris*		
Grey Shrike-thrush	*1. Colluricincla harmonica*		
Magpie-lark	*1. Grallina cyanoleuca*		O
Rufous Fantail	*1. Rhipidura rufifrons*		
Grey Fantail	*1. Rhipidura fuliginosa*		
Willie Wagtail	*1. Rhipidura leucophrys*		
Olive-backed Oriole	*1. Oriolus sagittatus*		
Black-faced Cuckoo-shrike	*1. Coracina novaehollandiae*		
Grey Butcherbird	*1. Cracticus torquatus*		
Australian Magpie	*1. Cracticus tibicen*		
Pied Currawong	*1. Strepera graculina*		
Australian Raven	*1. Corvus coronoides*		
House Sparrow	*1. Passer domesticus*		
Red-browed Finch	*1. Neochmia temporalis*		
Welcome Swallow	*1. Hirundo neoxena*		
Silvereye	*1. Zosterops lateralis*		
Common Blackbird*	*1. Turdus merula*		
Common Starling*	*1. Sturnus vulgaris*		
Common Myna*	*1. Sturnus tristis*		
White-bellied Sea Eagle	*Haliaeetus leucogaster*		O
Silver Gull	*Chroicocephalus novaehollandiae*		O
Powerful Owl	*Ninox strenua*	Sch. 2, Vul.	P - Po
N =	6		



Mammals			
Brown Antechinus	*1. Antechinus stuartii*		
Long-nosed Bandicoot	*1. Perameles nasuta*		RC
Common Wombat	*1. Vombatus ursinus*		
Sugar Glider	*1. Petaurus breviceps*		
Common Ringtail Possum	*1. Pseudocheirus peregrinus*		O, RC 10:52 pm H - C
Common Brushtail Possum	*1. Trichosurus vulpecula*		S, RC
Eastern Grey Kangaroo	*1. Macropus giganteus*		
Swamp Wallaby	*1. Wallabia bicolor*		
Grey-headed Flying-fox	*1. Pteropus poliocephalus*		W
Yellow-bellied Sheathtail-bat	*1. Saccolaimus flaviventris*		
White-striped Freetail-bat	*1. Austronomus australis*		
Eastern Freetail-bat	*1. Mormopterus norfolkensis*		
White-striped Mastiff-bat	*1. Tadarida australis*		A - C
Large-eared Pied Bat	*1. Chalinolobus dwyeri*		
Gould's Wattled Bat	*1. Chalinolobus gouldii*		A - C
Chocolate Wattled Bat	*1. Chalinolobus morio*		A – P
Eastern False Pipistrelle	*1. Falsistrellus tasmaniensis*		
Golden-tipped Bat	*1. Kerivoula papuensis*		
Little Bentwing-bat	*1. Miniopterus australis*	Sch. 2, Vul.	A - P
Eastern Bentwing-bat	*1. Miniopterus schreibersii oceanensis*	Sch. 2, Vul.	A - Po
Southern Myotis	*1. Myotis macropus*		
Lesser Long-eared Bat	*1. Nyctophilus geoffroyi*		
Gould's Long-eared Bat	*1. Nyctophilus gouldi*		
Eastern Horseshoe bat	*1. Rhinolophus megaphyllus*		A - C
Greater Broad-nosed Bat	*1. Scoteanax rueppellii*		
Eastern Broad-nosed Bat	*1. Scotorepens orion*		
Large Forest Bat	*1. Vespadelus darlingtoni*		
Eastern Forest Bat	*1. Vespadelus pumilus*		
Southern Forest Bat	*1. Vespadelus regulus*		A - Po
Large Forest Eptesicus	*1. Vespadelus darlingtoni*		A - Po
Little Forest Eptesicus	*1. Vespadelus vulturnus*		
Little Forest Bat	*1. Vespadelus vulturnus*		A - Po
Bush Rat	*1. Rattus fuscipes*		
House Mouse*	*1. Mus musculus*		
Black Rat*	*1. Rattus rattus*		RC 12:25 am
Dog*	*1. Canis lupus familiaris*		
Fox*	*1. Vulpes vulpes*		
Cat*	*1. Felis catus*		



Rabbit*	*1. Oryctolagus cuniculus*		
Mammals			
Brown Hare*	*1. Lepus capensis*		
Horse*	*1. Equus caballus*		
N=	13		

Chalinolobus gouldii - confident
Chalinolobus morio - probable
Miniopterus australis - probable
Minitopterus schreibersii oceanensis / Vespedelus darlingtonii - possible
Rhinolophus megaphyllus - confident
Tadarida australis - confident
Vespadelus regulus - possible
Vespedelus darlingtonii - possible
Vespedelus vulturnus - probable

Key

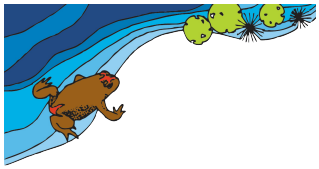
*	=	Introduced fauna
A – P	=	Anabat – Probable
A – C	=	Anabat – Confident
A – Po	=	Anabat – Possible
H – P	=	Hair Tube – Probable
H – C	=	Hair Tube – Confident
H – Po	=	Hair Tube – Possible
P – Po	=	Pellet - Possible
O	=	Observed
R	=	Road kill
RC	=	Reconyx wildlife camera
S	=	Scats
W	=	Calls heard

6.2 Fauna Summary

The number of species from each faunal group, listed as 'likely to occur' can be seen in Appendix 3.

Mammals

Mammal species detected on the site totalled 13.
Reconyx wildlife cameras captured Long-nosed Bandicoot, *Black rat, Ringtail and Brushtail possum.
Anabat detectors call analysis identified nine species of bat, including two Vulnerable species: Little Bentwing Bat and Eastern Bentwing Bat.
A Ringtail Possum was also identified in hair tube trap analysis, scats, spotlighting and roadkill.



Reptiles

Reptile species detected on the site totalled four, being three species of locally occurring skink and the more conspicuous Eastern Water Dragon.

Frogs

No frog species were detected on the site.

Birds

Bird species detected on the site totalled six.

The sea birds amongst these (White-bellied Sea Eagle and Silver Gull) were noted off shore on the wing to nearby headland visible from the site.

An owl pellet was collected on site. This was sent away for analysis. The content results were hair, dentaries and other bones of **Rattus rattus*. This does not enable identification of the owl however given the many nearby records of Powerful Owl (*Ninox strenua*) and the confirmed presence on site of its preferred prey (Brushtail and Ringtail possums) it is a possible likely candidate. As a precautionary approach Powerful Owl is included in the five-part test assessment.

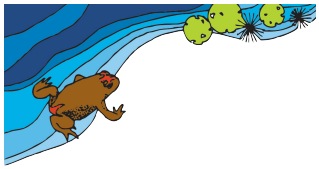
6.3 Microbats

Seven common bat species and two listed Vulnerable bat species were detected. Where calls were easily identifiable to species, they were classed as Confident. Where the calls were most likely to represent a particular species, they were classed as Probable. Where calls were likely to belong to a species but the quality or length of the call precluded a confident identification, they were classed as Possible. Where the calls could have belonged to two or more species, they were classified into a species group. Any calls of very poor quality, which could not be reliably placed into any species or species group category, were classified as Unknown. Many of the calls were of good quality and the poor ones most likely represented bats flying just within the bat detector's outer detection limits.

The most common microbat species detected on the site was the Gould's Wattled Bat. Calls from this species represented more than approximately 95% of the analysed microbat calls.

Foraging Habitat

This site provides potentially suitable foraging habitat for eight of the nine possible threatened species. *Myotis macropus* (syn. *Myotis adversus*) has no suitable foraging habitat in the form of open water bodies on or adjacent to the site. *Myotis macropus* is not known to forage over the ocean. Presumably the water surface is too rough. *Kerivoula papuensis* is only likely to forage in areas within a few kilometres of rainforest or rainforest gullies. It was not detected during the site survey.



However, a precautionary approach has been taken and this species is included in the five-part test assessment. Some of the vegetation in the locality has a structure similar to rainforest.

Roosting Habitat

This site has no tree hollows that provide suitable roosting habitat for *Falsistrellus tasmaniensis, Mormopterus norfolkensis, Scoteanax rueppellii, Myotis macropus, Miniopterus australis* and *Saccolaimus flaviventris*. This site has no caves, culverts, or bridges, but does have buildings and other suitable (often human-made) structures that provide potentially suitable roosting habitat for *Chalinolobus dwyeri, Miniopterus schreibersii oceanensis, Myotis macropus. Kerivoula papuensis* normally roosts in hanging bird nests or trees in rainforest gullies so is very unlikely to roost in the surveyed site.

Rock outcrops are common on the site. There are fissures and small opening between the rocks that are possibly suitable for occasional use by one or a few cave-dwelling bats. However, there was no evidence any of the rock outcrops provided roosting habitat for any larger group of microbats.

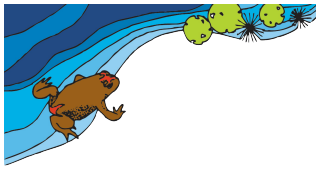
7. Discussion of results

The site comprises steep rocky hillside along Whale Beach Road, Palm Beach.

The original plant community present on site was most likely Coastal Enriched Sandstone Dry Forest with a very small area of Coastal Enriched Sandstone Moist Forest at the southern boundary of the site. While some native species of these communities remain on site, the vegetation has been degraded by loss of larger trees, disturbance by construction and occupation, replacement with exotic gardens and weed invasion.

The site is in poor - moderate condition with weed invasion evident, larger dead trees and stumps. Despite a high disturbance regime on the site, smaller native trees like *Eucalyptus scias, Glochidion ferdinandi*, *Ficus rubiginosa* and *Elaeocarpus reticulatus* would provide blossom and fruit for native birds. Native bats would occasionally forage on site. The rock outcrops on site provide habitat for native lizards and skinks.

There is evidence of threatened species of bats, Grey-headed Flying-fox and possibly Powerful Owl visiting the site. None of the threatened terrestrial fauna species in the locality have any specific requirements that could be provided by the site for breeding or other life cycle needs. Mobile or flying species are unlikely to be affected by the proposal. The proposal is unlikely to have a significant impact on threatened species.



8. Impact on biodiversity: Threshold 3

8.1 Threshold 3: Five-part test summary

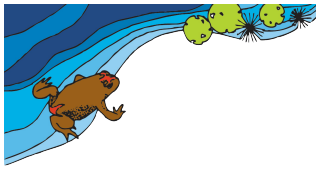
Habitat requirements for locally occurring threatened faunal species, and the presence or absence of such habitat on the site, is tabulated in Appendix 4. Threatened plant species, listed in the BC Act and the EPBC Act, are shown in Appendix 5.

Under Section 7.3 of the *Biodiversity Conservation Act* several factors (listed in Appendix 1) need to be considered in deciding whether there is likely to be a Significant effect on threatened species, populations or ecological communities, or their habitats. If there is likely to be a significant effect on threatened species, the proposal must be accompanied by a Biodiversity Development Assessment Report (BDAR).

While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the five-part tests.

Table 11. Summary of the five-part tests shown in full in Appendix 1.

Species/Communities	Recorded on site	State listing BC Act '16	C-wealth listing EPBC Act '99	Result
Diurnal raptors				
Little Eagle *Hieraaetus morphnoides*	No	Sch 2, Vul.	-	No significant effect
Square-tailed Kite *Lophoictinia isura*		Sch 2, Vul.	-	
Forest birds				
Gang-gang Cockatoo *Callocephalon fimbriatum*	No	Sch 2, Vul.	-	No significant effect
Little Lorikeet *Glossopsitta pusilla*		Sch 2, Vul.	-	
Large Forest Owls				
Barking Owl *Ninox connivens*	Possibly	Sch 2, Vul.	-	No significant effect
Powerful Owl *Ninox strenua*		Sch 2, Vul.	-	
Masked Owl *Tyto novaehollandiae*		Sch 2, Vul.	-	
Sooty Owl *Tyto tenebricosa*		Sch 2, Vul.	-	
Mammals				
Grey-headed Flying-fox *Pteropus poliocephalus*	Yes	Sch. 2, Vul.	Vulnerable	No significant effect



Species/Communities	Recorded on site	State listing BC Act '16	C-wealth listing EPBC Act '99	Result
Insectivorous bats				
Eastern Freetail-bat *Mormopterus norfolkensis*	Yes	Sch. 2, Vul.	-	No significant effect
Large-eared Pied Bat *Chalinolobus dwyeri*		Sch. 2, Vul.	Vulnerable	
Eastern False Pipistrelle *Falsistrellus tasmaniensis*		Sch. 2, Vul.	-	
Little Bentwing-bat *Miniopterus australis*		Sch. 2, Vul.	-	
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*		Sch. 2, Vul.	-	
Greater Broad-nosed Bat *Scoteanax rueppellii*		Sch. 2, Vul.	-	
Golden –tipped Bat ……*Kerivoula papuensis*		Sch. 2, Vul.	-	
Plants				
Callistemon linearifolius	No	Sch. 2, Vul.		No significant effect
Prostanthera densa		Sch. 2, Vul.	Vulnerable	

There is no significant effect so a Biodiversity Development Assessment Report is not required.

9. Planning Instruments

The site is zoned E4 - Environmental Living.

Objectives of this zone are:
• To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.
• To ensure that residential development does not have an adverse effect on those values.
• To provide for residential development of a low density and scale integrated with the landform and landscape.
• To encourage development that retains and enhances riparian and foreshore vegetation and wildlife corridors.

Additional planning instruments which would apply at this site include:
Pittwater council Local Environmental Plan 2014;
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017;
Planning for Bushfire Protection 2006.

9.1 *Environment Protection and Biodiversity Conservation Act 1999*

9.1.1 Protected matters

The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site. The outputs are shown in Appendix 6 and summarised below (Table 12).

Table 12. Results from Protected Matters Search.

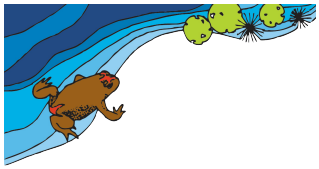
World Heritage Properties	Nil
National Heritage Places	Nil
Wetlands of International Importance	Nil
Commonwealth Marine Areas	Nil
Commonwealth Land	Nil
Critical Habitats/ Areas of Outstanding Biodiversity Value	Nil
Australian Marine Parks	Nil
Commonwealth Terrestrial Reserves	Nil
Listed Threatened Ecological Communities	Three
Listed Migratory Species	Fifty six
Listed Threatened Species	Sixty three

The three Listed Threatened Ecological Communities recorded in the area are:
1. Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland;
2. Coastal Upland Swamps in the Sydney Basin Bioregion; and
3. *Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion.

These ecological communities are protected under Commonwealth legislation by the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act 1999) and are listed as Endangered. The provisions of the EPBC Act apply to this proposal. The outcome is not significant, however, and does not require referral to the Commonwealth.

There were no Critically Endangered or Endangered species or communities recorded on site.

There was one Vulnerable species recorded on the site. This was the Grey-headed Flying-fox.



9.1.2 Criteria for Vulnerable Species

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

a) lead to a long-term decrease in the size of an important population of a species, or
b) reduce the area of occupancy of an important population, or
c) fragment an existing important population into two or more populations, or
d) adversely affect habitat critical to the survival of a species, or
e) disrupt the breeding cycle of an important population, or
f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat,* or
h) interfere substantially with the recovery of the species.

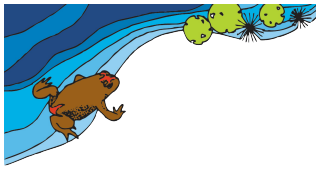
No significant impact on Grey-headed Flying-fox.

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

a) key source populations either for breeding or dispersal,
b) populations that are necessary for maintaining genetic diversity, and/or
c) populations that are near the limit of the species range.

Not deemed an Important Population in this area.

(*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.)



10. Conclusion and Recommendations

The original plant community on site was most likely 'Coastal Enriched Sandstone Dry Forest' with a very small area of 'Coastal Enriched Sandstone Moist Forest' at the southern boundary of the site. Both of these communities occur in the wider area and neither are listed threatened ecological communities. While some native species of each of these communities remain on site, the vegetation has been degraded by loss of larger trees, disturbance accrued by construction and occupation, replacement with exotic gardens and weed invasion.

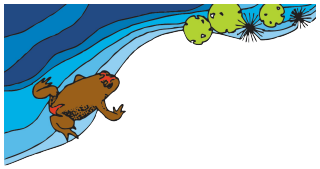
No threatened flora has previously been recorded from the site and none were detected on site in our surveys. None of the threatened terrestrial fauna species known from the wider locality have any specific requirements that could currently be provided by the site for breeding or other life cycle needs.

The threatened species Grey-headed Flying-fox was detected visiting the site. There is also evidence for two threatened microbat species visiting the site, the Little Bentwing-bat and the Eastern Bentwing-bat (Table 10). It is also likely that Powerful Owl forages on site (Section 6.1). These species are highly mobile and forage/ hunt over wide areas of land. None of them appear to be roosting or nesting on site. The scale of the proposal will modify a small area of potential foraging/ hunting area with substantial areas of native vegetation in the surrounding area and will not place any of these species at significant risk of extinction (see 5 part test reports in Appendix 1).

The design of the proposed house appears to enable protection and preservation of the main rock escarpment and rock outcrops on site that are providing habitat to native reptiles.

None of the three thresholds for a Biodiversity Development Assessment Report are triggered as follows:
1. Area of clearing
2. Biodiversity Land Map and Prescribed biodiversity impacts
3. Five Part Tests.

Therefore a Biodiversity Development Assessment Report (BDAR) is not required.



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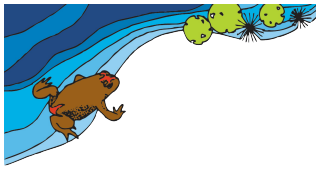

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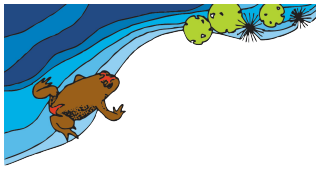

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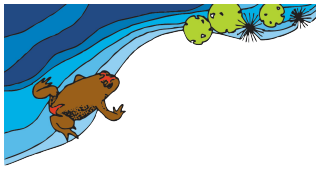


Appendix 1. Five-part tests

While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the **five-part** tests.

The Assessment of Significance (Office of Environment and Heritage (OEH)) states that "*Proposed measures that mitigate, improve or compensate for the action, development or activity should not be considered in determining the degree of the effect on threatened species, populations or ecological communities, unless the measure has been used successfully for that species in a similar situation.*"

Species addressed are as follows:

Scientific Name	Common Name	NSW status	Comm. status
Callocephalon fimbriatum	Gang-gang Cockatoo	V	
Glossopsitta pusilla	Little Lorikeet	V	
Ninox connivens	Barking Owl	V	
Lophoictinia isura	Square-tailed Kite	V	
Hieraaetus morphnoides	Little Eagle	V	
Ninox strenua	Powerful Owl	V	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Mormopterus norfolkensis	Eastern Freetail-bat	V	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Chalinobus dwyeri	Large-eared Pied Bat	V	V
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	
Miniopterus australis	Little Bentwing Bat	V	
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
Callistemon linearifolius	Netted Bottle Brush	V	
Prostanthera densa	Villous Mint-bush	V	V

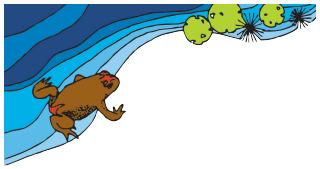
Where applicable threatened populations are considered as threatened species in the following five part tests.

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

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

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

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



(c) it is carried out in a declared area of outstanding biodiversity value.
(2) To avoid doubt, subsection (1) (b) does not apply to development that is an activity subject to environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*.

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

(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.

Forest Birds

Key
CE = Critically Endangered
E = Endangered
V = Vulnerable

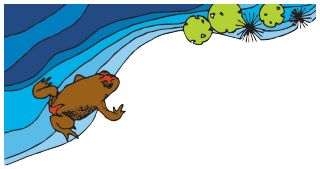
Scientific name	Common name	NSW status	Comm. status
Glossopsitta pusilla	Little Lorikeet	V	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	

Little Lorikeet *Glossopsitta pusilla*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20111

- 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.
- Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.
- Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards
- Gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries.
- 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*.
- Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.

Gang-gang Cockatoo *Callocephalon fimbriatum*

- https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10975
- 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 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.



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
No. There are very few forage trees on site making the habitat on site marginal for these species. Any Little Lorikeets or Gang-gang Cockatoos in the area will use a wide area for foraging including natural vegetation east and west of the site. The extent of habitat modification is minor considering the disturbed nature of the proposal area. The proposal is unlikely to effect the life cycle of the Little Lorikeet or Gang-gang Cockatoo such that a viable local population will 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
Not applicable. This test is for a group of threatened species.

(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 applicable. This test is for a group of threatened species.

(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
The site is 0.2269.6 ha in size. Approximately half of the site will be modified to construct the facility. Currently there is less than 15% canopy cover on the site in terms of forest trees. It is anticipated that this will be reduced further to less than 10%.

(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

No. Similar habitat occurs west of the property and east across Whale Beach Road in the form of a reserve. Little Lorikeet and Gang-gang Cockatoo are mobile and can easily travel over a house.

(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,

Negligible.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey)	The locality is a suburban matrix with areas of natural vegetation remaining on/around typically cleared or disturbed land on residential properties.
Area and quality of habitat on site in relation to the area and quality of habitat in the locality	Similar habitat is available on nearby and adjacent properties that have not been cleared. The feeding resource is moderate.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Site habitat provides additional connectivity to the council reserves east and west of the site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.

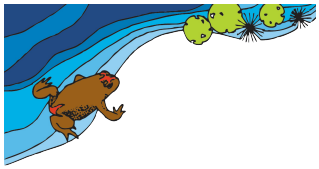
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No. No areas of outstanding biodiversity value have been specifically declared for these species.

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

Yes. The proposed development will require the "Clearing of native vegetation" which is a key threatening process relevant to these species. Key threatening processes are listed under the TSC Act, 1995 and the Commonwealth's EPBC Act, 1999. The nature and extent of such clearing is minimal for these species.

Conclusion

The proposed activity is unlikely to have a significant effect on Little Lorikeet or Gang-gang Cockatoo. Therefore a Biodiversity Development Assessment Report is not recommended.



Grey-headed Flying-fox

Scientific name	Common name	NSW status	Comm. status
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V

Key
V = Vulnerable
P = Protected

Habitat and ecology
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10697

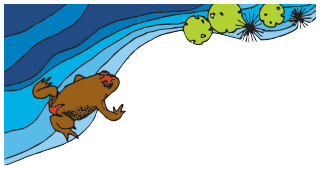
- Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.
- Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.
- Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.
- Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.
- Site fidelity to camps is high; some camps have been used for over a century.
- Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km.
- Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.
- Also forage in cultivated gardens and fruit crops.

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

No. While the proposal will modify an area of foraging habitat for the Grey-headed Flying-fox, the extent of habitat modification is minor considering the disturbed nature of the proposal area. Grey-headed Flying-fox will use a wide area for foraging and the habitat on site is marginal for the species. Thus while the species may fly over or



occasionally forage on the site, the site does not provide significant habitat. The proposal is unlikely to effect the life cycle of the species such that a viable local population will 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
Not applicable. This test is for a group of threatened species.

(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 applicable. This test is for a group of threatened species.

(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

The site is 0.2269.6 ha in size. Up to approximately half of the site will be modified to construct the facility. Currently there is less than 15% canopy cover on the site in terms of forest trees. It is anticipated that this will be reduced further to less than 10%.

(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

No. Similar habitat occurs west of the property and east across Whale Beach Road in the form of council reserves. Grey-headed Flying-fox are mobile and can easily travel over a house.

(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,
Negligible.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey)	The locality is a suburban matrix with areas of natural vegetation remaining on/around typically cleared or disturbed land on residential properties.

Criterion	Comment
Area and quality of habitat on site in relation to the area and quality of habitat in the locality	Similar habitat is available on nearby and adjacent properties that have not been cleared. The feeding resource is moderate.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Site habitat provides additional connectivity to the council reserves east and west of the site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.

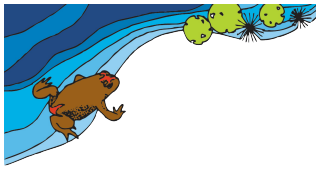
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly), No. No area of outstanding biodiversity value has been specifically declared for this species.

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

Yes. The proposed development will require the "Clearing of native vegetation" which is a key threatening process relevant to these species. Key threatening processes are listed under the TSC Act, 1995 and the Commonwealth's EPBC Act, 1999. The nature and extent of such clearing is minimal for these species.

Conclusion

The proposed activity is unlikely to have a significant effect on Grey-headed Flying-fox. Therefore a Biodiversity Development Assessment Report is not recommended.



Nocturnal Raptors

Key
CE = Critically Endangered
E = Endangered
V = Vulnerable

Scientific name	Common name	NSW status	Comm. status
Ninox strenua	Powerful Owl	V	-
Ninox connivens	Barking Owl	V	

Powerful Owl *Ninox strenua*
https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10562

- 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.
- The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl.
- Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha.
- 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.
- Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days.

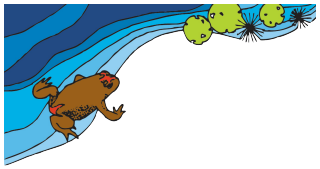
Barking Owl *Ninox connivens*

- https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10561
- Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile 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.
- Preferentially hunts small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Can catch bats and moths on the wing, but typically hunts by sallying from a tall perch.
- 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 over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas).
- Nesting occurs during mid-winter and spring, being variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. Young are dependent for several months.
- Territorial pairs respond strongly to recordings of Barking Owl calls from up to 6 km away, though humans rarely hear this response farther than 1.5 km. Because disturbance reduces the pair's foraging time, and can pull the female off her eggs even on cold nights, recordings should not be broadcast unnecessarily nor during the nesting season.

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.



No. Powerful Owls and Barking Owls use a wide area for hunting including natural vegetation east and west of the site. The extent of habitat modification is minor considering the disturbed nature of the proposal area. The site does not provide significant habitat for these species while its preferred prey species Ringtail and Brushtail possums were detected on site and would be common in the rea. The proposal is unlikely to effect the life cycle of these species such that a viable local population will 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
Not applicable. This test is for a group of threatened species.

(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 applicable. This test is for a group of threatened species.

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

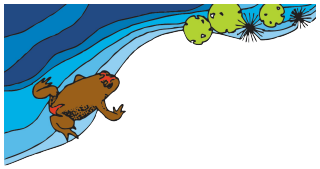
(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
The site is 0.2269.6 ha in size. Up to approximately half of the site will be modified to construct the facility. Currently there is less than 15% canopy cover on the site in terms of forest trees. It is anticipated that this will be reduced further to less than 10%.

(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

No. Similar habitat occurs west of the property and east across Whale Beach Road in the form of council reserves. Powerful owl and Barking Owl are highly mobile species and can easily travel across the area.

(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,
Negligible.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey).	The locality is a suburban matrix with areas of natural vegetation remaining on/around typically cleared or disturbed land on residential properties.



Criterion	Comment
Area and quality of habitat on site in relation to the area and quality of habitat in the locality.	Similar habitat is available on nearby and adjacent properties that have not been cleared. The feeding resource is moderate.
Role of habitat to be affected in sustaining habitat connectivity in the locality.	Site habitat provides additional connectivity to the council reserves east and west of the site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No. No area of outstanding biodiversity value has been specifically declared for this species.

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

Yes. The proposed development will require the "Clearing of native vegetation" which is a key threatening process relevant to these species. Key threatening processes are listed under the TSC Act, 1995 and the Commonwealth's EPBC Act, 1999. The nature and extent of such clearing is minimal for these species.

Conclusion

The proposed activity is unlikely to have a significant effect on Powerful Owl and Barking Owl. Therefore a Biodiversity Development Assessment Report is not recommended.

Diurnal Raptor

Scientific name	Common name	NSW status	Comm. status
Hieraatus morphnoides	Little Eagle	V,P	
Lophoictinia isura	Square-tailed Kite	V	

Key
V = Vulnerable
P = Protected

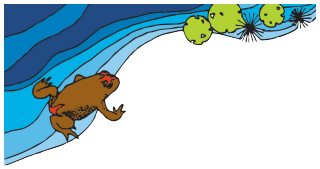
Little Eagle *Hieraatus morphnoides*
Habitat and ecology
https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20131

- 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.

Square-tailed Kite *Lophoictinia isura*
Habitat and ecology
https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10495

- 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 grasses, 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 100km2.
- Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.

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

No. Little Eagles and Square-tailed Kites use a wide area for hunting including natural vegetation east and west of the site. The extent of habitat modification is minor considering the disturbed nature of the proposal area. The site does not provide significant habitat for these species. The proposal is unlikely to effect the life cycle of these species such that a viable local population will 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
Not applicable. This test is for a group of threatened species.

(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 applicable. This test is for a group of threatened species.

(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

The site is 0.2269.6 ha in size. Up to approximately half of the site will be modified to construct the facility. Currently there is less than 15% canopy cover on the site in terms of forest trees. It is anticipated that this will be reduced further to less than 10%.

(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

No. Similar habitat occurs west of the property and east across Whale Beach Road in the form of council reserves. Little Eagle and Square-tailed Kite are mobile and can easily travel over a house.

(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,
Negligible.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey).	The locality is a suburban matrix with areas of natural vegetation remaining on/around typically cleared or disturbed land on residential properties.
Area and quality of habitat on site in relation to the area and quality of habitat in the locality.	Similar habitat is available on nearby and adjacent properties that have not been cleared. The feeding resource is moderate.
Role of habitat to be affected in sustaining habitat connectivity in the locality.	Site habitat provides additional connectivity to the council reserves east and west of the site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No. No area of outstanding biodiversity value has been specifically declared for this species.

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

Yes. The proposed development will require the "Clearing of native vegetation" which is a key threatening process relevant to these species. Key threatening processes are listed under the TSC Act, 1995 and the Commonwealth's EPBC Act, 1999. The nature and extent of such clearing is minimal for these species.

Conclusion

The proposed activity is unlikely to have a significant effect on Little Eagle and Square-tailed Kite. Therefore a Biodiversity Development Assessment Report is not recommended.

Insectivorous bats

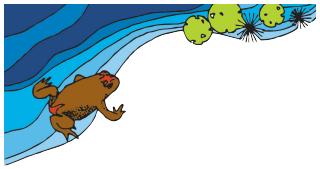
Scientific name	Common name	NSW status	Comm. status
Mormopterus norfolkensis	Eastern Freetail-bat	V,P	-
Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	-
Miniopterus australis	Little Bentwing-bat	V,P	-
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V,P	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P	Near Threatened
Kerivoula papuensis	Golden-tipped Bat	V,P	-

Key
V = Vulnerable
P = Protected

Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10741
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 a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

Eastern Freetail-bat *Mormopterus norfolkensis*
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10544
Eastern Freetail-bat occurs 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.

Large-eared Pied Bat *Chalinolobus dwyeri*
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10157
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.



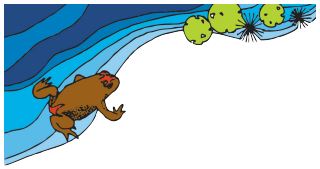
The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.

Eastern False Pipistrelle *Falsistrellus tasmaniensis*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10331
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. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.

Little Bentwing-bat *Miniopterus australis*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10533
Little Bentwing-bat prefers 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. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (Miniopterus schreibersii) and appears to depend on the large colony to provide the high temperatures needed to rear its young. 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.

Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10534
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.

Greater Broad-nosed Bat *Scoteanax rueppellii*
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10748
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.



Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

Golden-tipped Bat *Kerivoula papuensis*
https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10444
Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests. Bats will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes. Will use multiple roosts and change roosts regularly. Roost individually or in small colonies which can contain up to approximately 20 bats of both males and females or just a single sex. Maternity roosts may occur away from water sources with one maternity roost found 450m upslope of the nearest water course in a broken bough. Specialist feeder on small web-building spiders. There is one breeding cycle per year.

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

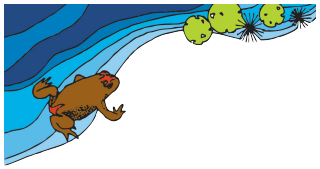
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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

No. While the proposal will modify an area of foraging habitat for these species, the site does not provide significant habitat for any of these species and the extent of habitat modification is minor considering the disturbed nature of the proposal area. Any local viable population of threatened microbats will use a wide area for foraging including the natural vegetation reserves east and west of the site. Bats will continue to forage within and around the house. The proposal is unlikely to effect the life cycles of these species such that a viable local population will 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
Not applicable. This test is for a group of threatened species.



(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 applicable. This test is for a group of threatened species.

(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

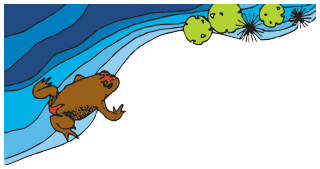
The site is 0.2269.6 ha in size. Up to approximately half of the site will be modified to construct the facility. Currently there is less than 15% canopy cover on the site in terms of forest trees. It is anticipated that this will be reduced further to less than 10%.

(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

No. Similar habitat occurs west of the property and east across Whale Beach Road in the form of council reserves. Insectivorous bats are mobile and can easily travel between these areas.

(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,
Negligible.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey).	The locality is a suburban matrix with areas of natural vegetation remaining on/around typically cleared or disturbed land on residential properties.
Area and quality of habitat on site in relation to the area and quality of habitat in the locality.	Similar habitat is available on nearby and adjacent properties such as the council reserves east and west of the site.
Role of habitat to be affected in sustaining habitat connectivity in the locality.	Site habitat provides additional connectivity to fragmented council reserves east and west of the site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.



(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No. No area of outstanding biodiversity value has been specifically declared for this species.

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

Yes. The proposed development will require the "Clearing of native vegetation" which is a key threatening process relevant to these species. Key threatening processes are listed under the TSC Act, 1995 and the Commonwealth's EPBC Act, 1999. The nature and extent of such clearing is minimal for these species.

Conclusion

The proposed activity is unlikely to have a significant effect on Eastern Freetail-bat, Large-eared Pied Bat, Eastern False Pipistrelle, Little Bentwing-bat, Eastern Bentwing-bat, Greater Broad-nosed Bat or Golden-tipped Bat. Therefore a Biodiversity Development Assessment Report is not recommended.

Threatened Plants

Botanical name	NSW status	Comm. status
Callistemon linearifolius	V	-
Prostanthera densa	V	V

No threatened or endangered plants were recorded in site surveys 11th Oct 2017.

Key

V = Vulnerable

P = Protected

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

No. No threatened plants were recorded on site. Much of the vegetation on the site is disturbed and it provides poor habitat for the majority of threatened species recorded in the locality. The proposal is unlikely to have an adverse effect on the life cycle of any of these species such that a viable local population will 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

Not applicable. This test is for a group of threatened species.

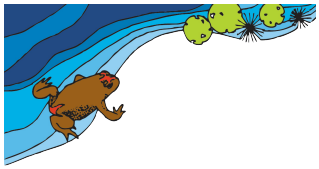
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable. This test is for a group of threatened species.

(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

The site is 0.2269.6 ha in size. Up to approximately half of the site will be modified to construct the facility.



Weedy and natural vegetation, and rock outcrops will be disturbed by the proposal. The site generally provides poor quality habitat for these species.

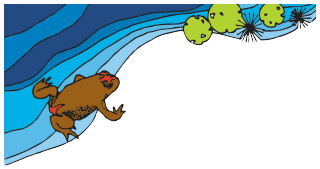
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
No. No threatened plants were recorded on site or in the council reserves east and west of the site. The proposal will not significantly increase isolation or fragmentation on the site.

(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,
Nil.

Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey).	The locality is a suburban matrix with areas of often-degraded natural vegetation remaining on/around typically cleared or disturbed land on residential properties.
Area and quality of habitat on site in relation to the area and quality of habitat in the locality.	Similar habitat is available on nearby and adjacent properties that have not been cleared.
Role of habitat to be affected in sustaining habitat connectivity in the locality.	There are no records of threatened plants in the council reserves east and west of the site. Therefore dispersal opportunities are not disrupted by construction of a house on site.
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however some local indigenous species remain. Ecological integrity on the site will remain in the locality as natural vegetation will be retained on the site and in the council reserves east and west of the site.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
No. No areas of outstanding biodiversity value have been specifically declared for these species.

(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.
Not applicable. *Callistemon limearifolius* and *Prostanthera densa* were not found to be present on the site, nor recorded in council reserves immediately east or west of the site.



Conclusion

The proposed activity is unlikely to have a significant effect on *Callistemon limearifolius* and *Prostanthera densa* which were not found to be present on the site. Therefore a Biodiversity Development Assessment Report is not recommended.

Appendix 2. Flora species list

FLORA LIST for Lots 327, 328, 329 and 330 DP16362 Whale Beach Road, Palm Beach

PSILOTOPSIDA

PSILOTACEAE
Psilotum nudum

FILICOPSIDA

CYATHEACEAE
Cyathea cooperi

DENNSTAEDTIACEAE
Pteridium esculentum

DRYOPTERIDACEAE
 # Cyrtomium falcatum

GLEICHENIACEAE
Gleichenia microcarpa

Sticherus flabellatus

LOMARIOPSIDACEAE
** Nephrolepis cordifolia*

OSMUNDACEAE
Todea barbara

POLYPODIACEAE
 # Platycerium sp.

CONIFEROPSIDA

ARAUCARIACEAE
 # Auracaria heterophylla

ARECACEAE
 # Phoenix canariensis
 # Syagrus romanzoffiana

CUPRESSACEAE
 # Cupressocyparis leylandii
 # Cupressus sp. *(C. lusitanica)*
 # Juniperus communis

CYCADACEAE
 # Cycas revoluta

ZAMIACEAE
 # Zamia furfuracea

MAGNOLIOPSIDA

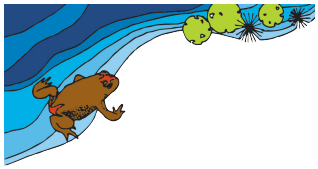
DICOTYLEDONS

AIZOACEAE
** Lampranthus tegens*

APIACEAE

Centella asiatica

APOCYNACEAE
** Plumeria sp.*
** Trachelospermum jasminoides*



ARALIACEAE
* *Hedera helix*
* *Hydrocotyle bonariense*
# *Schefflera arboricola*

ASTERACEAE
* *Ageratina adenophora*
* *Chrysanthemoides monilifera* subsp. *monilifera*
* *Conyza bonariensis*
Cotula australis
* *Soliva anthemifolia*
* *Senecio serpens*
* *Sonchus oleraceus*

BIGNONIACEAE
Pandorea jasminoides
Pandorea pandorana

BORAGINACEAE
* *Echium fastuosum*

CACTACEAE
Rhipsalis sp.

CAPRIFOLIACEAE
* *Lonicera japonica*

CASUARINACEAE
Casuarina cunninghamiana

CELASTRACEAE
Euonymus sp.

CONVOLVULACEAE
* *Ipomoea cairica*

CRASSULACEAE
Aeonium sp.
* *Bryophyllum pinnatum*
* *Crassula ovata*
# *Graptopetalum* sp.
# *Kalanchoe luciae*

CUNONIACEAE
Ceratopetalum gummiferum

DILLENIACEAE
Hibbertia scandens

ELAEOCARPACEAE
Elaeocarpus reticulatus

EUPHORBIACEAE
Euphorbia milii
Homalanthus populifolius

FABACEAE
CAESALPINIODEAE
* *Senna pendula*

FABACEAE
FABOIDEAE
Bauhinia sp.
Platylobium formosum
Pultenaea ferruginea

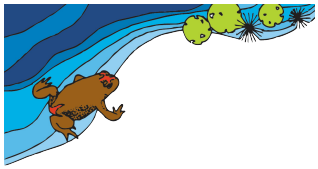
FABACEAE
MIMOSOIDEAE
* *Acacia baileyana*
Acacia binervia
Acacia parvipinnula
Acacia longifolia subsp. *sophorae*
Acacia suaveolens
Acacia ulicifolia

GERANIACEAE
* *Geranium molle*

HYDRANGEACEAE
* *Hydrangea macrophylla*

LAMIACEAE
Lavandula stoechis
Rosmarinus officinalis
Westringia fruticosa

LAURACEAE
Cassytha pubescens



* *Cinnamomum camphora*

LOBELIACEAE
Lobelia anceps

MALVACEAE
* *Hibiscus rosa-sinensis*
* *Hibiscus syriacus*

MENISPERMACEAE
Stephania japonica

MORACEAE
Ficus lyrata
Ficus rubiginosa

MYRTACEAE
Callistemon citrinus
Callistemon viminalis
Eucalyptus saligna
Eucalyptus scias
Leptospermum polygalifolium
Agonis flexuosa
Syncarpia glomulifera

NYCTAGINACEAE
Bougainvillea spectabilis

OCHNACEAE
* *Ochna serrulata*

OLEACEAE
Jasminium polyanthum
* *Ligustrum sinense*
Notelaea longifolia f. *longifolia*
* *Olea europea* subsp. *cuspidata*

OXALIDACEAE
* *Oxalis corniculata* complex

PASSIFLORACEAE
**Passiflora edulis*

PHYLANTHACEAE
Glochidion ferdinandi

PITTOSPORACEAE
Pittosporum undulatum

PLANTAGINACEAE
* *Plantago lanceolata*

POLYGALACEAE
* *Polygala myrtifolia*

PROTEACEAE
Banksia integrifolia
Bankisa serrata
Grevillea (Bronze Rambler)
Grevillea (lanigera)
Grevillea sericea cv.

ROSACEAE
* *Cotoneaster (franchetii)*
* *Rhaphiolepis indica*

RUTACEAE
Calodendrum capense
Citrus x limon
Eriostemon australasius
Murraya paniculata

SAPINDACEAE
Cupaniopsis anacardioides
Dodonaea triquetra

SCROPHULARIACEAE
Veronica plebeia

SOLANACEAE
* *Physalis peruviana*

THYMELEACEAE
Pimelea linifolia subsp. *linifolia*

VERBENACEAE
**Lantana camara*

MONOCOTYLEDONS

AMARYLLIDACEAE
* *Clivia miniata*
* *Crinum pedunculatum*

ANTHERICACEAE
Caesia parviflora
* *Chlorophytum comosum*

ARACEAE
Monstera deliciosa

ARECACEAE
Archontophoenix cunninghamiana
Livistona australis
* *Syagrus romanzoffiana*

ASPARAGACEAE
* *Agave americana*
**Agave attenuata*
* *Asparagus aethiopicus*
# *Aspadistra elatior*
# *Sansevierea sp.*

ASPHODELACEAE
* *Aloe vera*
# *Haworthia* sp.

BROMELIACEAE
Aechmea chantinii
* *Bromeliad* sp.

COMMELINACEAE
Commelina cyanea
* *Tradescantia pallida*

CYPERACEAE
* *Cyperus eragrostis*
Gahnia melanocarpa

IRIDACEAE
* *Dietes sp.*
* *Freesia* sp.

LILIACEAE
* *Agapanthus praecox* var. *orientalis*
* *Lilium formosanum*

LOMANDRACEAE
Lomandra longifolia

ORCHIDACEAE
Dendrobium speciosum
Epidendrum radicans

PHORMIACEAE
Dianella caerulea var. *producta*

POACEAE
* *Briza maxima*
Imperata cylindrica
Oplismenus aemulus
* *Paspalum dilatatum* HTE
* *Paspalum urvillei*
* *Setaria parviflora*
Themeda australis

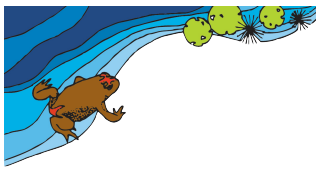
SMILACACEAE
Genoplesium cymosum
Smilax glyciphylla

STRELITZIACEAE
Strelitzia nicolai
Strelitzia reginae

XANTHORRHOEACEAE
Xanthorrhoea media

ZINGIBERACEAE
* *Hedychium gardnerianum*

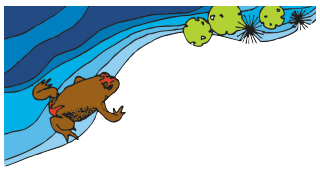
Key
* Exotic weedy species
# Planted



Appendix 3. Expected fauna species in the Sydney Basin

Mammals

Common name	Scientific name
White-striped Freetail-bat	*Tadarida australis*
Gould's Wattled Bat	*Chalinolobus gouldii*
Chocolate Wattled Bat	*Chalinolobus morio*
Lesser Long-eared Bat	*Nyctophilus geoffroyi*
Gould's Long-eared Bat	*Nyctophilus gouldi*
Bush Rat	*Rattus fuscipes*
Swamp Rat	*Rattus lutreolus*
Long-nosed Bandicoot	*Perameles nasuta*
Brown Antechinus	*Antechinus stuartii*
Dusky Antechinus	*Antechinus swainsonii*
Yellow-footed Antechinus	*Antechinus flavipes*
Common Wombat	*Vombatus ursinus*
Common Ringtail Possum	*Pseudocheirus peregrinus*
Sugar Glider	*Petaurus breviceps*
Feathertail Glider	*Acrobates pygmaeus*
Eastern Grey Kangaroo	*Macropus giganteus*
Large Forest Bat	*Vespadelus darlingtoni*
Little Forest Bat	*Vespadelus vulturnus*
Common Wallaroo	*Macropus robustus*
Red-necked Wallaby	*Macropus rufogriseus*
Swamp Wallaby	*Wallabia bicolor*
Common Brushtail Possum	*Trichosurus vulpecula*
Greater Glider	*Petauroides volans*
Short-beaked Echidna	*Tachyglossus aculeatus*
Fox	*Vulpes vulpes*
Black Rat	*Rattus rattus*
Rabbit	*Oryctolagus cuniculus*

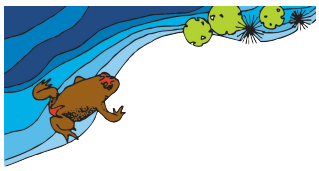


Frogs

Common Name	Scientific Name
Green Tree Frog	*Litoria caerulea*
Blue Mountains Tree Frog	*Litoria citropa*
Bleating Tree Frog	*Litoria dentata*
Eastern Dwarf Tree Frog	*Litoria fallax*
Jervis Bay Tree Frog	*Litoria jervisiensis*
Broad-palmed Frog	*Litoria latopalmata*
Peron's Tree Frog	*Litoria peronii*
Leaf-green Tree Frog	*Litoria phyllochroa*
Tyler's Tree Frog	*Litoria tyleri*
Verreaux's Frog	*Litoria verreauxii*
Common Eastern Froglet	*Crinia signifera*
Eastern Banjo Frog	*Limnodynastes dumerilii*
Ornate Burrowing Frog	*Limnodynastes ornatus*
Brown-striped Frog	*Limnodynastes peronii*
Spotted Grass Frog	*Limnodynastes tasmaniensis*
Haswell's Froglet	*Paracrinia haswelli*
Smooth Toadlet	*Uperoleia laevigata*
Tyler's Toadlet	*Uperoleia tyleri*

Reptiles

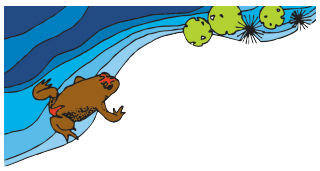
Common Name	Scientific Name
Diamond Python	*Morelia spilota spilota*
Common Death Adder	*Acanthophis antarcticus*
Yellow-faced Whip Snake	*Demansia psammophis*
Common Tree Snake	*Dendrelaphis punctulatus*
Golden-crowned Snake	*Cacophis squamulosus*
Eastern Small-eyed Snake	*Cryptophis nigrescens*
Red-naped Snake	*Furina diadema*
Black-bellied Swamp Snake	*Hemiaspis signata*
Tiger Snake	*Notechis scutatus*
Red-bellied Black Snake	*Pseudechis porphyriacus*
Eastern Brown Snake	*Pseudonaja textilis*
Dwyer's Snake	*Parasuta dwyeri*
Bandy Bandy	*Vermicella annulata*
Blackish Blind Snake	*Ramphotyphlops nigrescens*
Wood Gecko	*Diplodactylus vittatus*
Lesueur's Velvet Gecko	*Oedura lesueurii*
Broad-tailed Gecko	*Phyllurus platurus*
Thick-tailed Gecko	*Underwoodisaurus milii*
Burton's Snake-lizard	*Lialis burtonis*



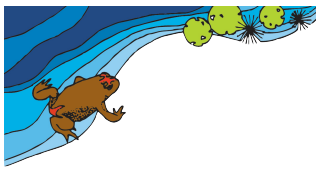
Common Name	Scientific Name
Common Scaly-foot	*Pygopus lepidopodus*
Jacky Lizard	*Amphibolurus muricatus*
Bearded Dragon	*Pogona barbata*
Punctate Worm-skink	*Anomalopus swansoni*
Eastern Blue-tongue	*Tiliqua scincoides*
Southern Rainbow-skink	*Carlia tetradactyla*
Cream-striped Shinning-skink	*Cryptoblepharus virgatus*
Robust Ctenotus	*Ctenotus robustus*
Copper-tailed Skink	*Ctenotus taeniolatus*
Mainland She-oak Skink	*Cyclodomorphus michaeli*
Pink-tongued Skink	*Cyclodomorphus gerrardii*
Cunningham's Skink	*Egernia cunninghami*
Black Rock Skink	*Egernia saxatilis*
White's Skink	*Liopholis whitii*
Eastern Water-skink	*Eulamprus quoyii*
Barred-sided Skink	*Eulamprus tenuis*
Dark-flecked Garden Sunskink	*Lampropholis delicata*
Pale-flecked Garden Sunskink	*Lampropholis guichenoti*
Weasel Skink	*Saproscincus mustelinus*
Red-throated Skink	*Acritoscincus platynota*
Three-toed Skink	*Saiphos equalis*
Lace Monitor	*Varanus varius*
Eastern Snake-necked Turtle	*Chelodina longicollis*

Birds

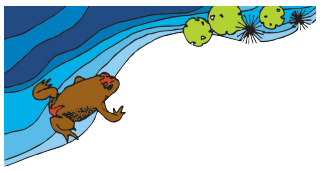
Common Name	Scientific Name
Brown Quail	*Coturnix ypsilophora*
Black Swan	*Cygnus atratus*
Australian Wood Duck	*Chenonetta jubata*
Mallard	*Anas platyrhynchos*
Pacific Black Duck	*Anas superciliosa*
Grey Teal	*Anas gracilis*
Chestnut Teal	*Anas castanea*
Australasian Grebe	*Tachybaptus novaehollandiae*
Great Crested Grebe	*Podiceps cristatus*
Hoary-headed Grebe	*Poliocephalus poliocephalus*
Little Pied Cormorant	*Microcarbo melanoleucos*
Little Black Cormorant	*Phalacrocorax sulcirostris*
Great Cormorant	*Phalacrocorax carbo*
Australian Pelican	*Pelecanus conspicillatus*
White-faced Heron	*Egretta novaehollandiae*
Little Egret	*Egretta garzetta*



Common Name	Scientific Name
White-necked Heron	*Ardea pacifica*
Great Egret	*Ardea alba*
Cattle Egret	*Ardea ibis*
Intermediate Egret	*Ardea intermedia*
Australian White Ibis	*Threskiornis molucca*
Straw-necked Ibis	*Threskiornis spinicollis*
Royal Spoonbill	*Platalea regia*
Black-shouldered Kite	*Elanus axillaris*
Whistling Kite	*Haliastur sphenurus*
Wedge-tailed Eagle	*Aquila audax*
White-bellied Sea-eagle	*Haliaeetus leucogaster*
Swamp Harrier	*Circus approximans*
Brown Goshawk	*Accipiter fasciatus*
Collared Sparrowhawk	*Accipiter cirrocephalus*
Brown Falcon	*Falco berigora*
Australian Hobby	*Falco longipennis*
Nankeen Kestrel	*Falco cenchroides*
Buff-banded Rail	*Gallirallus philippensis*
Purple Swamphen	*Porphyrio porphyrio*
Dusky Moorhen	*Gallinula tenebrosa*
Eurasian Coot	*Fulica atra*
Latham's Snipe	*Gallinago hardwickii*
Black-winged Stilt	*Himantopus himantopus*
Black-fronted Dotterel	*Elseyornis melanops*
Masked Lapwing	*Vanellus miles*
Silver Gull	*Chroicocephalus novaehollandiae*
Rock Dove	*Columba livia*
White-headed Pigeon	*Columba leucomela*
Spotted Turtle-dove	*Streptopelia chinensis*
Brown Cuckoo-dove	*Macropygia amboinensis*
Emerald Dove	*Chalcophaps indica*
Common Bronzewing	*Phaps chalcoptera*
Crested Pigeon	*Ocyphaps lophotes*
Bar-shouldered Dove	*Geopelia humeralis*
Wonga Pigeon	*Leucosarcia picata*
Topknot Pigeon	*Lopholaimus antarcticus*
Yellow-tailed Black-cockatoo	*Calyptorhynchus funereus*
Galah	*Eolophus roseicapilla*
Long-billed Corella	*Cacatua tenuirostris*
Little Corella	*Cacatua sanguinea*
Sulphur-crested Cockatoo	*Cacatua galerita*
Rainbow Lorikeet	*Trichoglossus haematodus*
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*

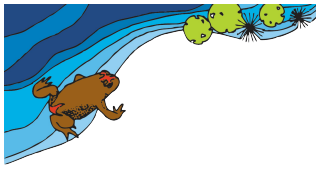


Common Name	Scientific Name
Musk Lorikeet	*Glossopsitta concinna*
Australian King-parrot	*Alisterus scapularis*
Crimson Rosella	*Platycercus elegans*
Eastern Rosella	*Platycercus eximius*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Horsfield's Bronze-cuckoo	*Chalcites basalis*
Channel-billed Cuckoo	*Scythrops novaehollandiae*
Asian Koel	*Eudynamys scolopaceus*
Southern Boobook	*Ninox novaeseelandiae*
Barn Owl	*Tyto alba*
Tawny Frogmouth	*Podargus strigoides*
White-throated Nightjar	*Eurostopodus mystacalis*
Australian Owlet-nightjar	*Aegotheles cristatus*
White-throated Needletail	*Hirundapus caudacutus*
Laughing Kookaburra	*Dacelo novaeguineae*
Sacred Kingfisher	*Todiramphus sanctus*
Rainbow Bee-eater	*Merops ornatus*
Dollarbird	*Eurystomus orientalis*
Superb Lyrebird	*Menura novaehollandiae*
Satin Bowerbird	*Ptilonorhynchus violaceus*
Superb Fairy-wren	*Malurus cyaneus*
Variegated Fairy-wren	*Malurus lamberti*
Spotted Pardalote	*Pardalotus punctatus*
White-browed Scrubwren	*Sericornis frontalis*
Large-billed Scrubwren	*Sericornis magnirostra*
Brown Gerygone	*Gerygone mouki*
White-throated Gerygone	*Gerygone albogularis*
White-throated Treecreeper	*Cormobates leucophaea*
Brown Thornbill	*Acanthiza pusilla*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
Yellow Thornbill	*Acanthiza nana*
Striated Thornbill	*Acanthiza lineata*
Buff-rumped Thornbill	*Acanthiza reguloides*
Red Wattlebird	*Anthochaera carunculata*
Little Wattlebird	*Anthochaera chrysoptera*
Noisy Friarbird	*Philemon corniculatus*
Bell Miner	*Manorina melanophrys*
Noisy Miner	*Manorina melanocephala*
Lewin's Honeyeater	*Meliphaga lewinii*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
White-plumed Honeyeater	*Lichenostomus penicillatus*
Brown-headed Honeyeater	*Melithreptus brevirostris*
White-naped Honeyeater	*Melithreptus lunatus*



Common Name	Scientific Name
New Holland Honeyeater	*Phylidonyris novaehollandiae*
Eastern Spinebill	*Acanthorhynchus tenuirostris*
Scarlet Honeyeater	*Myzomela sanguinolenta*
Jacky Winter	*Microeca fascinans*
Rose Robin	*Petroica rosea*
Eastern Yellow Robin	*Eopsaltria australis*
Eastern Whipbird	*Psophodes olivaceus*
Crested Shrike-tit	*Falcunculus frontatus*
Golden Whistler	*Pachycephala pectoralis*
Rufous Whistler	*Pachycephala rufiventris*
Grey Shrike-thrush	*Colluricincla harmonica*
Black-faced Monarch	*Monarcha melanopsis*
Leaden Flycatcher	*Myiagra rubecula*
Restless Flycatcher	*Myiagra inquieta*
Magpie-lark	*Grallina cyanoleuca*
Rufous Fantail	*Rhipidura rufifrons*
New Zealand Fantail	*Rhipidura fuliginosa*
Willie Wagtail	*Rhipidura leucophrys*
Spangled Drongo	*Dicrurus bracteatus*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
White-bellied Cuckoo-shrike	*Coracina papuensis*
Olive-backed Oriole	*Oriolus sagittatus*
Dusky Woodswallow	*Artamus cyanopterus*
Grey Butcherbird	*Cracticus torquatus*
Australian Magpie	*Cracticus tibicen*
Pied Currawong	*Strepera graculina*
Australian Raven	*Corvus coronoides*
White-winged Chough	*Corcorax melanorhamphos*
Apostlebird	*Struthidea cinerea*
Eurasian Skylark	*Alauda arvensis*
Australasian Pipit	*Anthus novaeseelandiae rogersi*
House Sparrow	*Passer domesticus*
Red-browed Finch	*Neochmia temporalis*
Double-barred Finch	*Taeniopygia bichenovii*
Mistletoebird	*Dicaeum hirundinaceum*
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*Petrochelidon nigricans*
Fairy Martin	*Petrochelidon ariel*
Cicadabird	*Coracina tenuirostris*
Red-whiskered Bulbul	*Pycnonotus jocosus*
Australian Reed-warbler	*Acrocephalus australis*
Little Grassbird	*Megalurus gramineus*
Golden-headed Cisticola	*Cisticola exilis*

Common Name	Scientific Name
Silvereye	*Zosterops lateralis*
Eurasian Blackbird	*Turdus merula*
Common Starling	*Sturnus vulgaris*
Common Myna	*Sturnus tristis*



Appendix 4. Habitat requirements for locally-occurring threatened fauna species

Frogs

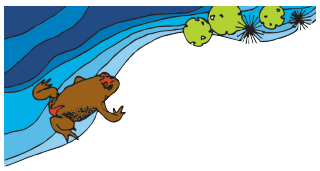
Common name ***Scientific name*** Schedule listing	**Preferred habitat**	**Comment**
Red Crowned Toadlet *Pseudorhyne australis* BC Act, Sch. 2, Vul.	Almost totally confined to the Hawkesbury sandstone formation. Found in damp situations but not usually associated with permanent water.	No suitable natural habitat occurs on the site.

Reptiles

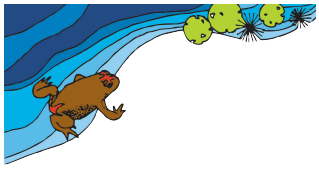
Common name ***Scientific name*** Schedule listing	**Preferred habitat**	**Comment**
Green Turtle *Chelonia mydas* BC Act, Sch. 2, Vul. EPBC Act, Vul.	Ocean dwelling species spending most of its life at sea, lays its eggs on beaches.	No suitable natural habitat occurs on the site.
Hawksbill Turtle *Eretmochelys imbricate* EPBC Act, Vul.	Ocean dwelling species spending most of its life at sea, lays its eggs on beaches in Queensland.	No suitable natural habitat occurs on the site.
Rosenberg's Goanna *Varanus rosenbergi* BC Act, Sch. 2, Vul.	Found in coastal heaths, humid woodlands and both wet and dry sclerophyll forests. Shelters in burrows, hollow logs and rock crevices.	No suitable natural habitat occurs on the site.

Birds

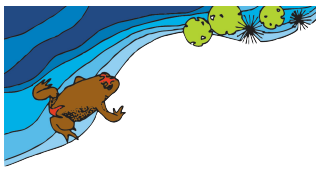
Common name ***Scientific name*** Schedule listing	**Preferred habitat**	**Comment**
Australasian Bittern *Botaurus poiciloptilus* BC Act, Sch. 2, Vul.	Inhabits wetlands that generally have permanent fresh water and dense vegetation of sedges, rushes and reeds.	No suitable natural habitat occurs on the site.



Common name ***Scientific name*** Schedule listing	Preferred habitat	Comment
Spotted Harrier *Circus assimilis* BC Act Sch. 2, Vul.	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	No suitable natural habitat occurs on the site.
Little Eagle *Hieraaetus morphnoides* BC Act Sch. 2, Vul.	Occupies open Eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands are also used. Builds a stick nests in winter in tall living trees within remnant patches.	Suitable natural habitat occurs on the site.
Square-tailed Kite *Lophoictinia isura* BC Act, Sch. 2, Vul.	Inhabits coastal forest and woodlands. Most commonly associated with ridge and gully forests dominated by Woollybutt, Spotted Gum or Peppermint Gum.	Suitable natural habitat occurs on the site.
Gang-gang Cockatoo *Callocephalon fimbriatum* BC Act, Sch. 2, Vul.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands – also in urban areas including parks and gardens. Requires tree hollows for nesting.	Suitable natural habitat occurs on the site.
Glossy Black-cockatoo *Calyptorhynchus lathami* BC Act, Sch. 2, Vul.	Found in open forests with Allocasuarina species and hollows for nesting.	No suitable natural habitat occurs on the site.
Little Lorikeet *Glossopsitta pusilla* BC Act, Sch. 2, Vul.	Inhabits the open forests and dead timber alongside watercourses. Also occurs in eucalypt forest in mountainous regions.	Suitable foraging habitat occurs on the site.
Swift Parrot *Lathamus discolor* BC Act, Sch. 2, Vul. EPBC Act, End.	Occurs in a variety of Eucalypt forests. Migrates from Tasmania to the mainland during the winter/autumn months to feed mostly on winter flowering Eucalypts.	No suitable foraging habitat occurs on the site.
Barking Owl *Ninox connivens* BC Act, Sch. 2, Vul.	Found in open forests, woodlands, dense scrubs, river red gums and other large trees near watercourses.	Suitable natural habitat occurs on the site.
Powerful Owl *Ninox strenua* BC Act, Sch. 2, Vul.	Pairs occupy permanent territories in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands and scrubs.	Suitable natural habitat occurs on the site.
Masked Owl *Tyto novaehollandiae* BC Act, Sch. 2, Vul.	Forests, open woodlands and farms with large trees, e.g. river red gums adjacent to cleared country.	No suitable natural habitat occurs on the site.



Common name ***Scientific name*** Schedule listing	**Preferred habitat**	**Comment**
Sooty Owl *Tyto tenebricosa* BC Act, Sch. 2, Vul.	Tall, wet forests in sheltered mountain gullies, usually with an east and Southeast aspect.	No suitable natural habitat occurs on the site.
Speckled Warbler *Pyrrholaemus sagittatus* BC Act Sch. 2, Vul.	Inhabits Eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	No suitable natural habitat occurs on the site.
Varied Sittella *Daphoenositta chrysoptera* BC Act Sch. 2, Vul.	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	No suitable natural habitat occurs on the site.
Dusky Woodswallow *Artamus cyanopterus cyanopterus* BC Act Sch. 2, Vul.	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	No suitable natural habitat occurs on the site.
Flame Robin *Petroica phoenicea* BC Act Sch. 2, Vul.	In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains.	No suitable natural habitat occurs on the site.
Diamond Firetail *Stagonopleura guttata* BC Act Sch. 2, Vul	Mostly inhabits grassy eucalypt woodlands, also occurring in open forest and riparian areas within these. Feeds exclusively on the ground, occurring in flocks between five to 40+ birds.	No suitable natural habitat occurs on the site.



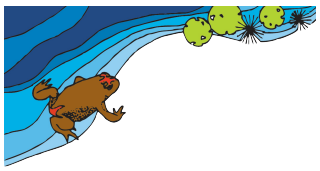
Mammals

Common name ***Scientific name*** Schedule listing	Preferred habitat	Comment
Spotted-tailed Quoll *Dasyurus maculatus* BC Act, Sch. 2, Vul. EPBC Act, End.	Occurs mostly in sclerophyll forest and woodlands as well as coastal heath lands and rainforests. Requires suitable den sites such as hollows or caves and large areas of intact vegetation.	No suitable natural habitat occurs on the site.
Koala *Phascolarctos cinereus* BC Act, Sch. 2, Vul.	Eucalypt forests rich in Swamp Mahogany (E. robusta), Forest Red Gum (E. tereticornis), and Grey Gum (E. punctata).	No suitable natural habitat occurs on the site.
Yellow-bellied Glider *Petaurus australis* BC Act, Sch. 2, Vul.	Restricted to tall, mature sclerophyll forests in regions of high rainfall. Requires nesting hollows and a year-round supply of flowering trees.	No suitable natural habitat occurs on the site.
Squirrel Glider *Petaurus norfolcensis* BC Act, Sch. 2, Vul.	Inhabits dry sclerophyll forest and woodland. Requires abundant hollow-bearing trees and a mix of Eucalypts, acacias and Banksias. At least one floral species should flower heavily in the winter and one or more species of Eucalypts need to be smooth-barked.	No suitable natural habitat occurs on the site.
Grey-headed Flying-fox *Pteropus poliocephalus* BC Act, Sch. 2, Vul. EPBC Act, Vul.	Found in rainforest, wet and dry sclerophyll forest and mangroves. Camps are usually in gullies, close to water and in vegetation with a dense canopy. Feeds on a wide variety of flowering and fruiting plants.	Suitable foraging habitat occurs on the site.
Eastern Freetail-bat *Mormopterus norfolkensis* BC Act, Sch. 2, Vul.	Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures.	Suitable foraging habitat occurs on the site.
Large-eared Pied Bat *Chalinolobus dwyeri* BC Act, Sch. 2, Vul.	Found in well-timbered areas containing gullies.	Suitable foraging habitat occurs on the site.
Eastern False Pipistrelle *Falsistrellus tasmaniensis* BC Act, Sch. 2, Vul.	Little known of habitat. Has been found roosting in stem holes of living Eucalypts.	Suitable foraging habitat occurs on the site.

Common name ***Scientific name*** Schedule listing	Preferred habitat	Comment
Eastern Bentwing-bat *Miniopterus schreibersii oceanensis* BC Act, Sch. 2, Vul.	Well-timbered valleys. Roosts in caves and storm-water channels and similar structures. Does not roost in tree hollows.	Suitable foraging habitat occurs on the site.
Southern Myotis *Myotis macropus* BC Act, Sch. 2, Vul.	Requires open areas of water over which it hunts. Roosts in caves, under bridges and buildings and sometimes in dense foliage in rainforests. May roost in tree hollows.	No suitable natural habitat occurs on the site.
Greater Broad-nosed Bat *Scoteanax rueppellii* BC Act, Sch. 2, Vul. EPBC Act, Lower risk (near threatened)	Found in woodlands, moist and dry sclerophyll forests and rainforests. Prefers gullies. Roosts in tree hollows only.	Suitable foraging habitat occurs on the site.

Invertebrates

Common name ***Scientific name*** Schedule listing	Preferred habitat	Comment
Cumberland Plain Land Snail *Meridolum corneovirens* BC Act, Sch. 1, End. EPBC Act, Vul.	Found amongst logs and debris in Cumberland Plain and Castlereagh woodlands.	No suitable natural habitat occurs on the site.
Dural Woodland Snail *Pommerhelix duralensis* EPBC Act, End.	Forested habitats that have good native cover and woody debris. Under rocks or inside curled-up bark. It does not burrow nor climb.	No suitable natural habitat occurs on the site.

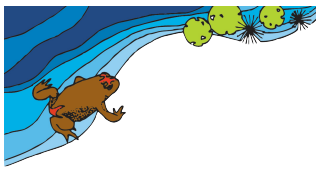


Appendix 5. Habitat requirements for locally-occurring threatened plant species

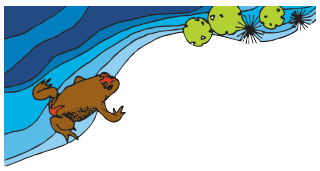
Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Acacia asparagoides ROTAP, 2R	Grows in dry sclerophyll forest or occasionally heath on sandstone in the Blue Mountains.	No
Acacia baueri subsp. aspera ROTAP, 2RC – BC Act, Sch. 2, Vul.	Grows in low heath, often on exposed sandstone ridges in the Blue Mountains and Royal National Park.	No
Acacia bynoeana ROTAP, 3VC - BC Act, Sch. 1, End. EPBC Act, Vul.	Grows mainly in heath and dry sclerophyll forest, in sandy soils.	No
Acacia clunies-rossiae ROTAP, 2RC - t BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest, in valleys, on slopes and ridges, and along creeks.	No
Acacia flocktoniae ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest on sandstone.	No
Acacia gordonii ROTAP, 2K BC Act, Sch. 1, End. EPBC Act, End.	Grows in dry sclerophyll forest and heath on sandstone outcrops.	No
Acacia pubescens ROTAP, 3VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Usually grows in dry sclerophyll forest and woodland in clay soils. Often in roadside and railside bushland remnants.	No
Acacia terminalis subsp. terminalis ROTAP, 2RCi BC Act, Sch. 1, End. EPBC Act, End.	Scattered or locally common in scrub and open eucalypt woodland or forest, usually in sandy soil on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms on cliffs.	No
Acrophyllum australe ROTAP, 2VCi BC Act, – Sch. 2, Vul. EPBC Act, Vul.	Grows in damp crevices in sandstone, usually near waterfalls. Restricted to the Blue Mtns, near Springwood, Linden, Woodford and Lawson.	No
Allocasuarina glareicola ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in open forest on lateritic soil; restricted to a few small populations in or near Castlereagh S.F., NE of Penrith.	No
Almaleea incurvata ROTAP, 2RC – t	Grows in swamps dominated by sedges and/or shrubs, on sandstone; restricted to the Blue Mtns.	No
Amperea xiphoclada var. papillata ROTAP, 3KC	Grows with other native sedges and rushes in swamps on sandstone at altitudes of greater than 600 m.	No

Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Ancistrachne maidenii ROTAP, 2KC - BC Act, Sch. 2, Vul.	Grows on sandstone soils; north of Sydney.	No
Angophora crassifolia ROTAP, 2RCa	Locally frequent but restricted to the Ku-ring-gai Plateau region.	No
Asterolasia elegans ROTAP, 2ECa BC Act, Sch. 1, End. EPBC Act, End.	Grows in wet sclerophyll forest on moist hillsides, known from only one locality, north of Maroota.	No
Atkinsonia ligustrina ROTAP, 2RCa	Occurs in woodland and heath in exposed sites, a single plant often parasitic on the roots of many nearby plants; confined to a small area in the Blue Mtns.	No
Banksia conferta var. penicillata BC Act, Sch. 1, End.	Grows in dry sclerophyll forest or woodland, restricted to small populations in the Blue Mtns on sandstone cliffs or steep slopes and around rocky outcrops.	No
Blandfordia cunninghamii ROTAP, 3RCi	Grows in damp shallow sandy and peaty soils, often on sandstone cliff edges; chiefly in the Blue Mtns and Illawarra areas.	No
Blechnum gregsonii ROTAP, 2RCa	Pendent clumps found in cool rainforest, often in damp places near waterfalls, sometimes epiphytic; chiefly in the Blue Mtns and Illawarra coastal ranges.	No
Boronia fraseri ROTAP, 2RCa (UBBS 97 Recommend)	Grows mainly in wet sclerophyll forest and in rainforest in gullies on sandstone, chiefly in the Sydney region.	No
Boronia serrulata ROTAP, 2RC -	Grows in moist heath in sandy situations, chiefly in a coastal band in the Sydney district; record for the SWS in Jacobs & Pickard (1981) not substantiated.	No
Brasenia schreberi ROTAP, 3RC- +	Widespread but rarely common, found in shallow freshwater lagoons or backwaters.	No
Callistemon linearifolius ROTAP, 2RCi BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest on the coast and adjacent ranges, chiefly from Georges R. to the Hawkesbury R.	Yes
Callistemon shiressii ROTAP, 3RC -	Grows on shale ridges, in moist eucalypt forest and rainforest gullies, occasionally along riverbanks; chiefly from Colo R. to Gosford district, also Howes Valley to Bulga district.	No
Carex klaphakei BC Act, Sch. 1, End.	Known only from a few localities on Central Tablelands near Blackheath, Mt Werong and Penrose at 600–1200 m alt.	No
Chamaesyce psammogeton BC Act, Sch. 1, End.	Grows on dunes and sea strandlines.	No
Cryptostylis hunteriana BC Act, Sch. 2, Vul. EPBC Act, Vul.	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland.	No

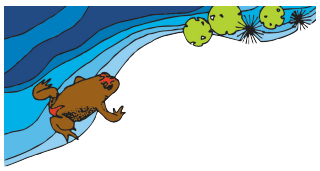
Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Cynanchum elegans ROTAP, 3ECi BC Act, Sch. 1, End. EPBC Act, End.	Rare, recorded from rainforest gullies scrub and scree slopes; from the Gloucester district to the Wollongong area and inland to Mt Dangar.	No
Cyphanthera scabrella ROTAP, 2RC -	Grows in dry or wet sclerophyll forest in sandstone-derived soil; restricted to Bilpin-Mt Wilson area in Blue Mtns.	No
Darwinia biflora ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on sandstone or in the understorey of woodland on shale-capped ridges; Cheltenham to Hawkesbury R., rare.	No
Darwinia diminuta ROTAP, 2RCi	Grows in heath or dry sclerophyll forest in poorly drained sandy soil; Manly to Ingleside and Loftus to Helensburgh, rare.	No
Darwinia fascicularis subsp. oligantha BC Act, Sch. 1, End. Pop. (Baulkham Hills)	Grows in heath or shallow soils; higher parts of the Blue Mtns.	No
Darwinia grandiflora ROTAP, 2RCi	Grows in dry sclerophyll forest and woodland on poorly drained sandy soil; Woronora Plateau and Illawarra region, rare.	No
Darwinia peduncularis ROTAP, 3RCi BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest on sandstone hillsides and ridges; Hornsby to Hawkesbury R. and west to Glen Davis, rare.	No
Deyeuxia appressa ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows on wet ground; in the Hornsby area.	No
Deyeuxia microseta ROTAP, 3KC -	Grows in montane sclerophyll forest, especially wetter areas.	No
Dillwynia tenuifolia ROTAP, 2RCa BC Act, Sch. 2, Vul.	Grows in dry sclerophyll woodland on sandstone, shale or laterite; from Cumberland Plain, Blue Mtns to Howes Valley area.	No
Discaria pubescens ROTAP, 3RCa	In woodland and forest, often in rocky situations; widespread, but considered endangered.	No
Diuris aequalis ROTAP, 3VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows among grass in sclerophyll forest, mainly in the ranges and tablelands; chiefly from Braidwood to Kanangra and Liverpool.	No
Epacris hamiltonii ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows in skeletal sandy soils in sheltered damp rock situations on sandstone in the Blackheath area.	No
Epacris muelleri ROTAP, – 3RC -	Grows on skeletal soils on damp rock faces on sandstone in the Blue Mtns and Wollemi N.P.	No



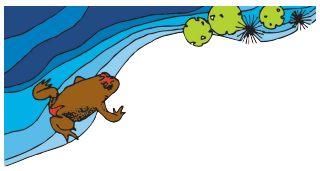
Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Epacris purpurascens var. purpurascens BC Act, Sch. 2, Vul.	Grows in sclerophyll forest, scrubs and swamps on sandstone from Gosford and Sydney districts.	No
Epacris sparsa ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in sandy soil among rocks beside Grose R.	No
Epacris sparsa ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Rare and localized, in mallee shrubland on skeletal sandy soil on sandstone; sporadic occurrences between Linden and Berrima.	No
Eucalyptus baeuerlenii ROTAP, 3RCa	Locally frequent but restricted, in wet forest or woodland in sheltered often sloping sites; from Wentworth Falls to Budawang Ra.	No
Eucalyptus benthamii ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Restricted but locally abundant, in wet forest on sandy alluvial soils along valley floors; confined to the lower Nepean R. area.	No
Eucalyptus burgessiana ROTAP, 2RCa	Locally frequent but restricted, in mallee shrubland on skeletal sand on sandstone; restricted to lower Blue Mtns.	No
Eucalyptus camfieldii ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Rare and localized, in coastal shrub heath on sandy soils on sandstone, often of restricted drainage; from Gosford to Royal N.P.	No
Eucalyptus cannonii ROTAP, 2VCi BC Act, Sch. 2, Vul.	Locally frequent but restricted, in sclerophyll woodland on shallow soil on rises; Rylstone to upper Wolgan Valley.	No
Eucalyptus copulans ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Locally frequent but restricted, in sclerophyll woodland on shallow soil on rises; Rylstone to upper Wolgan Valley.	No
Eucalyptus cunninghamii ROTAP, 2RCa	Restricted but locally frequent, in mallee heath skeletal sandy soil on sandstone; confined to central Blue Mtns.	No
Eucalyptus sp. 'Cattai' BC Act, Sch. 1, End.	Grows as isolated trees or small groups of trees in scrub, heath and low woodland, in sandstone-derived soils.	No
Eucalyptus leuhmanniana ROTAP, 2RCa	Locally abundant but restricted, in mallee heath on shallow infertile sandy soils of poor drainage on sandstone; confined to coastal plateau between the Hawkesbury R. and Bulli.	No
Euphrasia bowdeniae ROTAP, 2VCit BC Act Sch. 2, Vul. EPBC Act, Vul.	Grows on sandstone cliffs in shallow soil on ledges or sometimes trailing over rock, in higher parts of Blue Mtns.	No
Genoplesium baueri BC Act, Sch. 1, End.	Prefers sandy dry Eucalyptus habitats.	No



Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Grammitis stenophylla BC Act, Sch. 1, End.	Prefers moist shaded gullies, typically grows on rocks near moss.	No
Gonocarpus longifolius ROTAP, 3RC -	Grows in shrub communities on sandstone; mainly on the ranges from Armidale to the Blue Mtns, east of Rylstone.	No
Goodenia rostrivalvis ROTAP, 2RCa	Grows on damp south-facing sandstone cliffs in Blue Mtns, in the Wentworth Falls area, rare.	No
Grevillea caleyi BC Act, Sch. 1, End. EPBC Act, End.	Grows on sandy soil with lateritic influences, typically on ridges.	No
Grevillea juniperina subsp. juniperina BC Act, Sch. 2, Vul.	Grows in open dry sclerophyll (eucalypt-dominated) forest or woodland, at altitudes of less than about 50 m, in sandy to clay-loam soils and red pseudolateritic gravels.	No
Grevillea longifolia ROTAP, 2RC -	Grows in moist areas of sclerophyll forest, often near creeks, on Hawkesbury sandstone; chiefly the southern half of Sydney Basin, and Woronora Plateau; possibly also in Lawson area.	No
Grevillea obtusiflora BC Act, Sch. 1, End. EPBC Act, End.	Grows in sandy loam soils in open low scrub beneath dry sclerophyll forest in the Kandos area.	No
Grevillea parviflora subsp. parviflora BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heathy associations or shrubby woodland, in sandy or light clay soils usually over shale substrates.	No
Gyrostemon thesioides ROTAP, 2KC - BC Act Sch. 1, End.	Grows on hillsides and riverbanks, only from sites near Georges (30 yrs ago) and Nepean Rivers (90 yrs ago). May already be extinct.	No
Hakea constablei ROTAP, 2RCa	In dry sclerophyll forest on rocky outcrops, scattered in the Blue Mtns between 500–1100 m alt., from Bell to Mt Wilson, rare.	No
Haloragodendron lucasii BC Act, Sch. 1, End. EPBC Act, End.	Grows indry sclerophyll open forest on sheltered slopes near creeks on sandstone; confined to Sydney area, rare.	No
Hibbertia hermanniifolia ROTAP, 3RCa	Open forest on sandstone; confined to Bents Basin (Nepean R), Yarrowitch district and the coastal ranges south from Wadbilliga N.P.; rare.	No
Hibbertia nitida ROTAP, 2RC -	Widespread on sandstone in the Sydney district.	No
Hibbertia superans BC Act, Sch. 1, End.	Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	No
Hymenophyllum lyallii (was *Sphaerocionium lyallii*) ROTAP, 3RC – +	Grows on rocks or trees in moist rainforest in the Blue Mtns and ranges of the south coast.	No
Hymenophyllum pumilum ROTAP, 3RC -	Epiphytic in cooler rainforest of the Blue Mtns and adjacent ranges; uncommon.	No

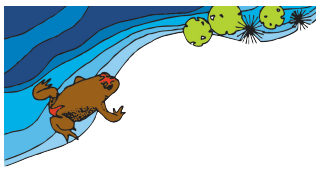


Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Isopogon fletcheri ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest and heath on sandstone; confined to sheltered moist positions on the escarpment in the Blackheath district of the Blue Mtns, rare.	No
Isotoma sessiliflora (was *Hypsela sessiliflora*) ROTAP, 2X BC Act, Sch. 1, End.	Grows in damp places, on the Cumberland Plain, very rare.	No
Keraudrenia corollata var. denticulata ROTAP, 3RC -	Mostly on sandstone. Rare; recorded from near Grafton and west of Sydney.	No
Kunzea cambagei ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath; known mainly from near Mt Werong and Berrima.	No
Kunzea rupestris ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on rock platforms; known only from between Lower Portland and Kuring-gai Chase N.P., one record at Ingleside.	No
Lasiopetalum joyceae ROTAP, 2RC - BC ACT, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on sandstone; Hornsby Plateau.	No
Leionema lachnaeoides ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Rare, from higher Blue Mtns, on barren rocky situations.	No
Lepidosperma evansianum BC Act, Sch. 2, Vul.	Grows on wet sandstone cliff faces.	No
Lepidosperma evansianum BC Act, Sch. 2, Vul. *Leptospermum rupicola* ROTAP, -3RC -	Grows in shrubby communities and heath on sandstone cliffs and escarpments.	No
Leptospermum deanei BC ACT, Sch. 2, Vul. EPBC Act, Vul.	Rare, only on forested slopes near watershed of Lane Cove R., Sydney.	
Leucopogon exolasius ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in woodland on sandstone, restricted to the Woronora and Grose Rivers and Stokes Creek, Royal N.P.	No
Leucopogon fletcheri subsp. fletcheri ROTAP, 2RC - BC Act, Sch. 1, End.	Grows in woodland on lateritic soils; rare, in the Springwood area.	No
Lissanthe sapida ROTAP, 3RCa	Grows in open woodland and dry sclerophyll forest, on rocky sandstone ridges and hillsides on sandy soil; occasional, from Bargo to Coloul Ra. and Blackheath.	No

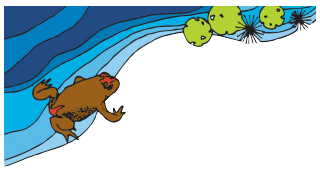


Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Lomandra brevis ROTAP, 2RC -	Grows in dry sclerophyll forest on sandstone-derived soils in the Sydney region; not common.	No
Lomandra fluviatilis ROTAP, 3RCa	Grows in creek beds on sandy soils; in the Royal N.P. to Colo R	No
Marsdenia viridiflora subsp. viridiflora BC Act, Sch. 1, End. Pop.	Grows in woodland and scrub; north from the Razorback Ra. (Bankstn, Blacktn, Camden, Campbelltn, Fairfield, Holroyd, Liverpool & Penrith LGAs)	No
Melaleuca deanei ROTAP, 3RC- BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in wet heath on sandstone; uncommon, in coastal districts from Berowra to Nowra.	No
Micromyrtus blakelyi ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath in depressions on sandstone rock platforms; restricted to areas near the Hawkesbury R.	No
Micromyrtus minutiflora ROTAP, 2V BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in dry sclerophyll forest in western part of the Cumberland Plain; rare.	No
Microtis angusii BC Act, Sch. 1, End. EPBC Act, End.	Difficult to determine, growing among weeds and on a disturbed soil. Possibly prefers sandy soils with lateritic influences.	No
Monotoca ledifolia ROTAP, 3RC - *Notochloe microdon* ROTAP, 2RC -	Grows in exposed sites in dry sclerophyll forest and shrubland on sandstone in the Woronora Plateau and Blue Mtns area.	No
Notochloe microdon ROTAP, 2RC -	Grows in moist shady areas of the Blue Mtns district.	No
Olearia cordata ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest and open shrubland, on sandstone; chiefly from Wisemans Ferry to Wollombi.	No
Olearia quercifolia ROTAP, 3RC -	Grows in swampy or moist terrain; confined to the Blue Mtns.	No
Ozothamnus adnatus ROTAP, 3KC-	Grows in sclerophyll forest and woodland, usually on sandy soil; rare, south from Guyra district.	No
Persoonia acerosa ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath or dry sclerophyll forest on sandstone; central Blue Mtns south to Hill Top.	No
Persoonia bargoensis ROTAP, 2V BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in woodland to dry sclerophyll forest, on sandstone and laterite; restricted to the Bargo area.	No

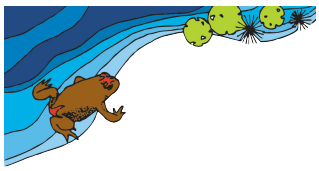
Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Persoonia hirsuta/revoluta ROTAP, 3KCi BC Act, Sch. 1, End. EPBC Act, End.	Grows in woodland to dry sclerophyll forest on sandstone; both subspecies occurring as isolated individuals or very small populations.	No
Persoonia laxa BC Act, Sch. 1, Ext. EPBC Act, Ext.	Considered extinct. Probably prefers heath or sclerophyll forest with sandy soils.	No
Persoonia mollis subsp. maxima ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in dry to wet sclerophyll forest on Hawkesbury sandstone, Cowan–Hornsby area.	No
Persoonia nutans ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows in woodland to dry sclerophyll forest on laterite and alluvial sand; confined to the Cumberland Plain.	No
Pherosphaera fitzgeraldii (was *Microstrobos fitzgeraldii*) ROTAP, 2ECi BC Act, Sch. 1, End.	Usually grows on wet rocks within the spray of waterfalls or on ledges or in caves near waterfalls; restricted to southerly aspects on sandstone near waterfalls in the Katoomba to Wentworth Falls area of the Blue Mtns.	No
Philotheca obovalis (was *Eriostemon obovalis*) ROTAP, 3RCa	Grows in heath and dry sclerophyll forest on sandstone; chiefly in the Blue Mountains, also recorded for Kydra Mountain.	No
Pilularia novae-hollandiae BC Act, Sch. 1, End.	Widespread but not common in seasonally dry depressions and margins of marshes; may grow submerged.	No
Pimelea curviflora var. curviflora BC Act, Sch. 2, Vul. EPBC Act, Vul.	Confined to coastal areas around Sydney on sandstone.	No
Pimelea spicata ROTAP, 3ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows on the coast from Lansdowne to Shellharbour and inland to Penrith; rare.	No
Platysace clelandii ROTAP, 2RCa	Grows among sandstone boulders in dry sclerophyll forest, from Glen Davis to Berowra.	No
Pomaderris brunnea ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	In open forest, confined to the Colo R. and upper Nepean R.	No
Prostanthera cryptandroides BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows chiefly in the Lithgow to Sandy Hollow districts.	No
Prostanthera densa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in sclerophyll forest and shrubland, on coastal headlands and near-coastal ranges, on sandstone	Yes
Prostanthera marifolia BC Act, Sch. 4, Ext A. EPBC Act, CE.	Occurs in sandy soils with clay-loam and ironstone on ridge tops.	No



Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Pseudanthus divaricatissimus ROTAP, 3RCa	Mostly from Muswellbrook to Bega, with outlying populations near Urbenville and Dubbo (Goonoo State Forest).	No
Pterostylis gibbosa ROTAP, 2E (X-WSyd) BC Act, Sch. 1, End. EPBC Act, End.	Grows among grass in sclerophyll forest; rare, chiefly in the southern parts of the central coast, with a disjunct population in the Hunter Valley.	No
Pterostylis saxicola ROTAP, (2E) BC Act, Sch. 1, End. EPBC Act, End.	Grows in shallow soil over sandstone sheets, often near streams; rare, from Picnic Point to Picton area.	No
Pultenaea sp. 'Genowlan Point' (NSW 417813) BC Act, Sch. 1, Crit. End. EPBC Act, Crit. End.	It is endemic to New South Wales and is only found at Genowlan Point in the Capertee Valley. At Genowlan Point, Pultenaea sp. 'Genowlan Point' (Allen s.n., 29 Nov. 1997) is restricted to well drained stoney soils.	No
Pultenaea glabra EPBC Act, Vul.	Grows in dry sclerophyll forest on sandstone; higher Blue Mtns and Glen Davis area.	No
Pultenaea parviflora ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in dry sclerophyll forest on Wianamatta Shale, laterite or alluvium, Cumberland Plain.	No
Pultenaea pedunculata BC Act, Sch. 1, End.	Grows in dry sclerophyll forest and disturbed sites on a variety of soils on the South Coast and edge of the Southern Tableland, but with disjunct restricted populations on Wianamatta Shale on the Cumberland Plain in N.S.W.	No
Pultenaea villifera var. villifera ROTAP, 3RC - BC Act, Sch. 1, End. Pop. (Lower Blue Mountains)	Grows in dry sclerophyll forest on sandy soil; lower Blue Mtns to Eden district.	No
Rhizanthella slateri ROTAP, 3KC - BC Act, Sch. 2, Vul. EPBC Act, End.	Grows in sclerophyll forest in shallow to deep loams. Collections tend to be accidental and it is not possible to determine distribution accurately; recorded for the Blue Mtns, also Bulahdelah south to Dharug N.P.	No
Rupicola apiculata ROTAP, 2RCa	Grows in skeletal sandy soils in damp situations on sandstone rock ledges between 700–1100 m alt.; restricted to the Blue Mtns.	No
Rupicola ciliata ROTAP, 2RC – t	Grows in skeletal sandy soils in rock crevices, on rock ledges and beneath cliff overhangs in Kurrajong Heights, Bilpin to lower Yarramun Creek areas in the Blue Mtns.	No
Rupicola sprengelioides ROTAP, 2RC – t	Restricted to skeletal sandy soils on sandstone ledges, cliff faces and rocky ground, in the Burragorang Valley.	No
Sprengelia monticola ROTAP, 2RC – t	Grows on wet rock faces and ledges or cliff bases on sandstone in the Blue Mtns.	No



Botanical name **Conservation status**	**Habitat description**	**Suitable habitat on site**
Syzygium paniculatum BC Act, Sch. 1, End. EPBC Act, Vul.	Rainforest and open forest near riparian zones.	No
Tetratheca glandulosa ROTAP, – 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in sandy or rocky heath or scrub, from Mangrove Mtn to the Blue Mtns and Sydney.	No
Tetratheca neglecta ROTAP, 3RC -	Grows in sandy heath and dry sclerophyll forest; chiefly in the Sydney district, south to Robertson.	No
Thesium australe ROTAP, 3VCi BC Act, -Sch. 2, Vul. EPBC Act, Vul.	Grows in grassland or woodland, often in damp sites; widespread but rare and possibly endangered.	No
Tylophora woollsii ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in wet sclerophyll forest and rainforest in the Clouds Creek area near Nymboida and in sclerophyll forest near Parramatta; rare.	No
Velleia perfoliata ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on shallow sandy soil over sandstone; confined to the Hawkesbury district to the upper Hunter Valley.	No
Veronica lithophila (was *Parahebe lithophila*) ROTAP, 2RC -	Grows on cliffs or rock exposures, in pockets of soil over sandstone or quartzite; Blue Mtns-Colong region at 650–870 m alt., uncommon.	No
Wilsonia backhousei BC Act, Sch. 2, Vul.	Grows in coastal saltmarshes; chiefly in the Sydney district, also common at Jervis Bay.	No
Zieria covenyi BC Act, Sch. 1, End. EPBC Act, End.	Grows in eucalypt woodland on sandy soils; known only from Narrow Neck Peninsular in the Blue Mtns N.P.	No
Zieria involucrata ROTAP, 2VCa BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in wet sclerophyll forest, chiefly in the Lower Blue Mtns; rare.	No
Zieria murphyi ROTAP, 2VC-	Grows in dry sclerophyll forest in sandy soils; on the ranges from Mt Tomah to Penrose district.	No
Zieria prostrata BC Act, Sch. 1, End. EPBC Act, End.	Restricted to low coastal heaths, near Coffs Harbour; rare.	No



Key

BC Act 2016:

Sch1 = Schedule 1: Endangered species
Part 1: endangered species
Part 2: endangered populations
Part 3: endangered ecological communities
Part 4: species presumed extinct
Sch2 = Schedule 2: Vulnerable species

EPBC Act 1999:

CE = Critically Endangered
E = Endangered
V = Vulnerable
EP = Endangered Population

ROTAP Codes

1 Known by one collection only
2 Geographic range in Australia < 100Km
3 Geographic range in Australia > 100Km
E Endangered
V Vulnerable
R Rare
X Extinct
K Poorly known
C Reserved
a > or = 1000 plants reserved
i < 1000 plants reserved
t Total known population reserved
- Reserved population size unknown
+ Overseas occurrence

Appendix 6. Matters of National Environmental Significance

The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site.

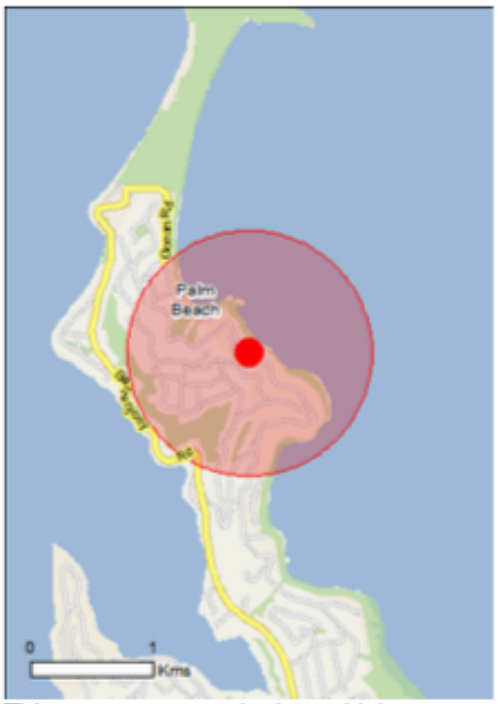
EPBC Act Protected Matters Report

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

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

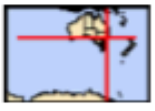
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/09/18 12:03:13



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



No World Heritage Properties, National Heritage Places, Wetlands of International Importance or Commonwealth Marine Areas are recorded for the area.

No Commonwealth Land, Commonwealth Heritage Places, Critical Habitats, Australian Marine Parks or Commonwealth Terrestrial Reserves were reported.

Three Listed Threatened Ecological Communities are recorded in the area: 1. Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland; 2. Coastal Upland Swamps in the Sydney Basin Bioregion; and 3. *Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion. These ecological communities are protected under Commonwealth legislation by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999) and are listed as Endangered.

Appendix 7. Company Profile

Abel Ecology has been in the biodiversity consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements, Biodiversity Development Assessment Reports and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of four scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 30 April 2021
NPWS GIS data licence number is CON95034
DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 December 2021
DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2021

The Consultancy Team

Dr Danny Wotherspoon

Grad Dip Bushfire Protection (University of Western Sydney 2012)
PhD (researching Cumberland Plain vegetation and fauna habitat, at Centre for Integrated Catchment Management, University of Western Sydney, 2008)
Planning for Bushfire Protection Certificate course (University of Technology, 2006)
Consulting Planners Bushfire Training Course (Planning Institute of Australia, 2003)
MA (Macquarie University, 1991)
Wildlife Photography Certificate (Sydney Technical College, 1987)
Herpetological Techniques Certificate (Sydney Technical College, 1986)
Applied Herpetology Certificate (Sydney Technical College, 1980)
Dip Ed (University of New England, 1978)
BSc (Zoology, Ecology) University of New England 1974)

Dr Daniel McDonald

B. Ag Sc; M. Agr; PhD (The University of Sydney)
Cert IV – GIS (Riverina TAFE)
Daniel is an accredited Biobanking Assessor (0075) and an accredited BAM assessor (BAAS17056)
Quantified Tree Risk Assessment (QTRA) and Visual Tree Assessment (VTA), White Card

Daniel is an experienced ecologist with expertise in fauna, plant species identification, vegetation assessment, agriculture, arboriculture, conservation genetics and seed collection and preservation. He is accredited both for BAM assessments, BioBanking assessments and Biodiversity Certification. His present research interest is in Eastern Suburbs Banksia Scrub and fragmented endangered ecological communities.

Mark Mackinnon

Qualifications: B Env. Sci. (Hons),

MEIANZ, White Card

Graduate Diploma of Bushfire Protection (enrolled)

Mark is a passionate and enthusiastic scientist who thrives in the field of natural resource management. In the last 6 years, Mark has worked for a number of inter-state government agencies and environmental consultancies. He has experience in threatened species, fire ecology, bushfire management, pest plant and animals, and landscape restoration. In particular he specializes in ornithology and bushfire management. Mark has a number of specialized field-based skills including: simple and complex tree climbing, working at heights, general firefighter departmental fire accreditation, venomous snake and reptile handling, immunization to handle bat species, and an A - class bird banding licence with mist-net endorsement. Mark is also skilled in ArcGIS mapping, first-aid, four -wheel-driving.

Dr Alison Hewitt
B. Sc. (Hons), PhD.
MESA, MAPS, MASBS, Snr 1st Aid cert, White card.
Alison has researched and published on the reproductive biology and ecology of Australian Melaleuca species, native plant responses to fire and the vegetation of western Sydney. Alison's interests include plant ecology and flora survey methodology, bush regeneration, plant identification and gardening. Alison teaches Botany and Ecology sessionally with Western Sydney University.

Dr Stephanie A Clark

BAppSc (Biochemistry), MSc, PhD
Member of the IUCN SSC Mollusc Specialist Group. Research Associate at both the Field Museum of Natural History, Chicago, IL, USA and The Australian Museum, Sydney, NSW.

Stephanie has been interested in the taxonomy, systematics and conservation of invertebrates particularly molluscs since the late 1970's when she first started volunteering at the Australian Museum. She has been an ecological consultant specialising in invertebrates since 1997. She has worked for private developers, mining companies, local community groups and local, state and federal government agencies in three countries (Australia, USA and Canada) and has been an expert witness for the NSW Land and Environment Court.
Stephanie's PhD researched the taxonomy, systematics and conservation of the NSW listed snail Meridolum corneovirens (Cumberland Plain Land Snail). She has given presentations to local, national and international conferences in Australia, Germany and USA. She has field experience in 16 countries, all states of Australia and 40 US states. Stephanie's has published more than 30 scientific papers in national and international journals and described more than 155 species.

Mark Sherring
BM, MAABR, Cert. Hort., Cert. Bush Regen, Cert. Rural Ops, White Card.

Member of the Australian Association of Bush Regenerators

Mark has extensive knowledge and experience of plant species in New South Wales. He has built up his expert knowledge on NSW native plant species over the many years that he has practised as a Botanist. He is regularly asked to contribute to the extensive (ongoing) flora surveys of the Sydney Basin and Blue Mountains carried out by the Royal Botanic Gardens, Sydney. Mark has extensive field survey experience, having worked for over ten years in various plant-related roles. His role in Abel Ecology is to provide expert advice on flora and on the full range of flora management issues encountered and in the design and management of environmental monitoring projects.