Flora and Fauna Assessment

6 Mitchell Rd Palm Beach

Final Report

By Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

September 2020

About this document

Copyright Statement©

Statement of Authorship

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

Limitations Statement

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

Document Control Sheet	
Title:	Flora and Fauna Assessment for 6 Mitchell Rd Palm Beach
Version:	Final Report
Authors:	Geraldene Dalby-Ball and Jack Hastings
Date:	September 2020
File location:	ECA 4 Projects\2 Projects\2019-2020\FF BAM\ 6 Mitchell Rd PB
Distribution:	Stephen Lesiuk stephenlesiuk@mac.com

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

Executive Summary

Introduction

- This Flora and Fauna was prepared for Stephen Lesiuk for the proposed development at 6 Mitchell Road Palm Beach, Northern Beaches Council LGA.
- The proposed development involves the modification of the existing building.
- Recommendations have been provided to reduce the likelihood of impact and mitigate loss if the proposal is approved.

Methods

- On-ground survey took place on 18th August and 3rd of September 2019 by Senior Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- Review of proposed development was evaluated for potential environmental impacts.

Results

- No threatened flora or fauna species were recorded on- site during survey or previously recorded via Bionet.
- Trees on site are a mix of exotic and native *Eucalyptus* and *Corymbia* spp.
- No significant habitat features, values or landscape corridors will be impacted by the proposed development.
- The proposal does not trigger entry into the BOS.
- Trees 8 and 11 are located within the development footprint and will require removal.
- Tree protection will be consistent with the Arborist report (Beecher 2020). Main trees to be managed are trees within close proximity to building works. NB: see final arborist report for details of works and tree numbers.
- The neighbouring bible garden/public recreation area will remain open to the public and unaffected by the proposal.
- All 5 part tests have concluded that the proposal is not likely to significantly affect Large Forest Owls, Grey-headed Flying-foxes or microbats and will not be likely to put the local populations at risk of extinction.

Mitigation Measures

If the development is approved mitigation works will be required.

Before works:

- Tree Protection as per Arborist report.
- Removal of weeds to prevent spread of seed.

During works:

- Preserve and protect sandstone outcrops
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

- Landscaping works will be conducted, native species recommended from Sydney Sandstone Coastal Communities.
- Management of the sites interface with the Bible Garden– to be detailed in a VMP.

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

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Biodiversity Conservation Act 2016 (BC Act).*
- *Fisheries Management Act 1994 (FM Act).*
- *National Parks & Wildlife Act 1974 (NP&W Act).*
- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*

Table of Contents

1 Introduction

1.1 Scope of works

Kingfisher Urban Ecology & Wetlands (Kingfisher) has been contracted by Stephen Lesiuk to provide a "Flora and Fauna Assessment" to assess potential direct and indirect impacts on any threatened species, populations and communities as per section 5A of the Environmental Planning & Assessment Act 1979. The 'test of significance' has been undertaken in accordance with the NSW Department of Planning, Industry and Environment (DPIE) 'threatened species test of significance'. The test of significance is set out in s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act).

1.1 Limitations of the Study

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

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

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

1.2 The Site

The subject site identified as 6 Mitchell Rd Palm Beach – Lot 1 DP 1086858. The site is zoned 'E4 Environmental Living' within Northern Beaches Council LEP 2014. The land area is 695.10 m^2

Figure 1. Location of the site. Source: Six Maps, 2020.

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

- An existing residential dwelling
- Northerly aspect
- Vegetation is exotic species gardens
- Adjacent to RE1: Public Recreation 'Bible Gardens'.

2 Proposed Actions

The proposed actions involve demolition of the existing dwelling and construction of a new dwelling at the site. The neighboring bible garden/public recreation area will remain open to the public and unaffected by the proposal.

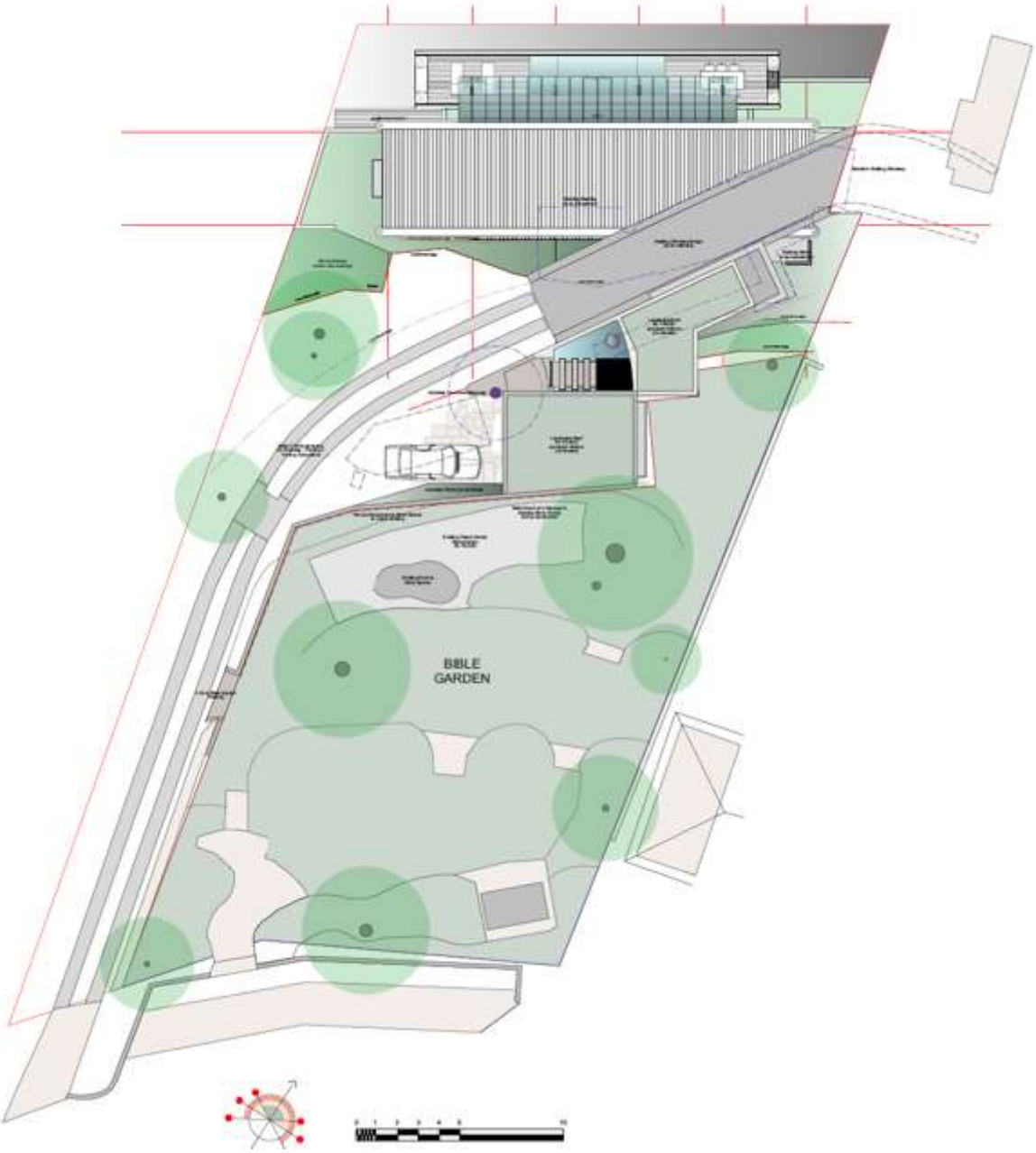


Figure 2. Site plan, 'bible garden' included to provide context.

2.1 Legislation and policy

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

- *Comonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

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

  Matters of national environmental significance identified in the Act are:

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

  The site has no ecological matters of national significance.

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

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

- *Biodiversity Conservation Act 2016 (BC Act).*

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

- *National Parks & Wildlife Act 1974 (NP&W Act).*

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

- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*

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

2.1.1 Biodiversity Offsets Scheme Threshold

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

It has been concluded that the ***development does not trigger the BOS*** area clearing threshold nor is the site located on the BV map. The area clearing threshold trigger is based on the minimum lot size associated with the property (<1Ha) and the thresholds for clearing which triggers BOS (0.25Ha or more). The building footprint will not remove more than 0.25Ha of native vegetation therefore the development does not trigger the BOS.

Area clearing threshold

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

Minimum lot size associated with site is <1Ha and the development will not clear >0.25Ha of vegetation.

Thus, the BOS area clearing threshold does not apply.

Biodiversity Values Map threshold

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

The site (blue dot) is not located on high biodiversity value land as identified on the Biodiversity Values Map.

Therefore, the development does not trigger the BOS as per the Biodiversity Values Map threshold.

Figure 2.2. The site (blue dot) located on the BV map

3 Methods

3.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball assessed the site in August and September 2019 and June 2020. Weather was fine and sunny during day-time then cooler in the evening survey.

During site visits, notes and photos were taken of the vegetation types, flora and fauna present. Due to the small area of proposed impacts, detailed or systematic surveys were not performed. Surveys were general and opportunistic in nature and were performed by traversing the site. Surveys included one diurnal bird and fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified.

Powerful Owl surveys were conducted in the area and results of previous Micro-bat surveys were used as reference.

3.1 Site Photos

Figure. 2.0. Landscaped gardens across the site.

Figure. 2.1. Native canopy on driveway.

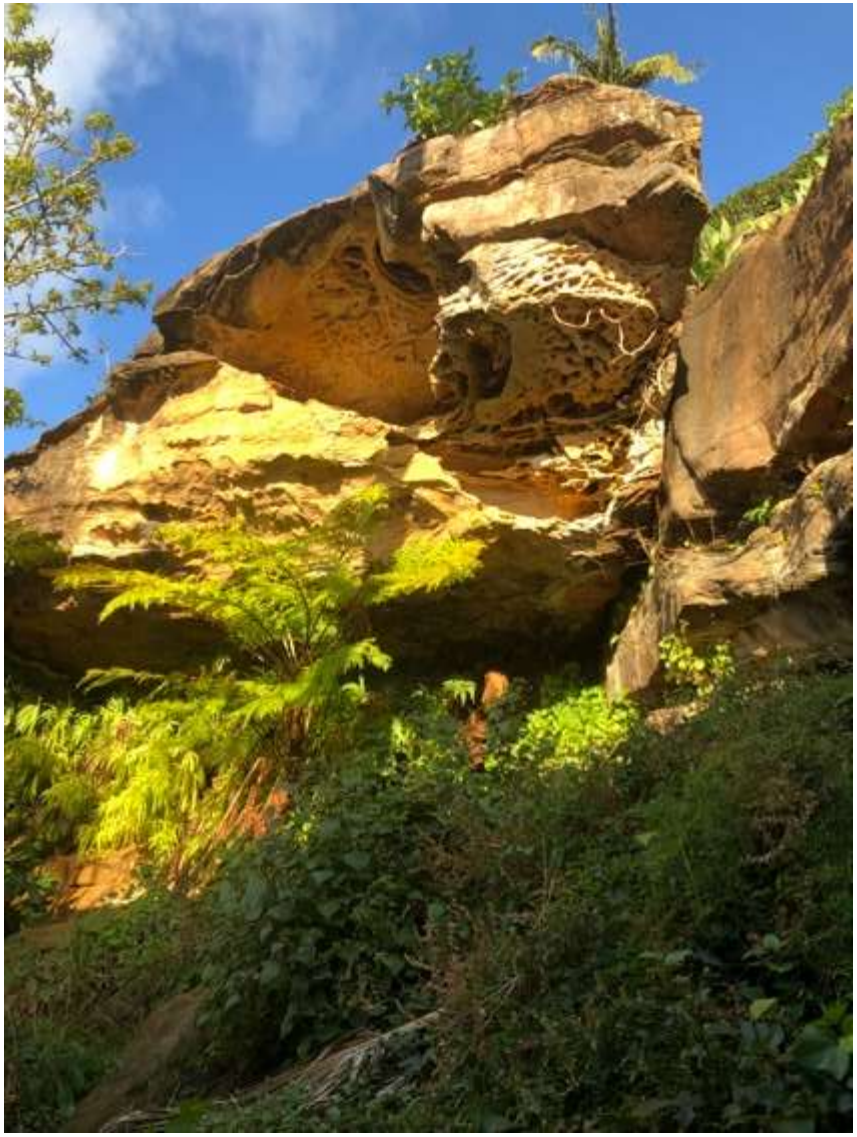


Figure 2.2. Rock overhang on SW of the house

Figure 2.3. Landscaped garden at entrance of property

Figure 2.4. Current condition of vegetation on site. Asparagus Fern will be removed.

Figure 2.5. Front (north-east facing) aspect of the site. Exotic plants and weed species dominate. The slope is steep and soil shallow.

3.2 Previous studies

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

Records from the following databases were collated and reviewed:

- Atlas of NSW Wildlife (Bionet). New South Wales, Office of Environment and Heritage (OEH).
- NSW Threatened Species Information (DPIE).
- The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.
- PlantNET (The Royal Botanic Gardens and Domain Trust 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Plans and drawings specific to this development;

- Preliminary Tree Assessment, prepared by Ecological Consultants Australia Pty Ltd, dated 02/01/2019
- Arboricultural Impact Assessment (AIA) 6 Mitchell Road, Palm Beach, NSW 2108. Date: 02/09/2020. V. Beecher
- • Plan of Lots 1 & 2 in DP1086858 at No 6 Mitchell Rd, Palm Beach, prepared by DP Surveying, dated 11/09/2018 & 12/03/2019
- • Development Application Plans, prepared by Stephen Lesiuk, dated July 2020, sheets DA006, DA007, DA008, DA009, DA010, DA011 and DA017

4 Flora

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

4.1 Plant Community Type (PCT)

The site and surrounding landscape of the Barrenjoey Peninsula has been heavily modified and is now a discontinuous patchy landscape of Plant Community Types (PCT). BioNet and SEED mapping have identified the site as having no associated PCT. It is difficult to conclude which PCT would have originally been found onsite.

However, using PCT mapping and species surveyed in the Arborist report it was concluded that PCT 1776 (Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast) may have been found on-site. Some canopy species of this PCT remain on-site and there is a patch of this PCT present within 250m of the site (figure 3.1)

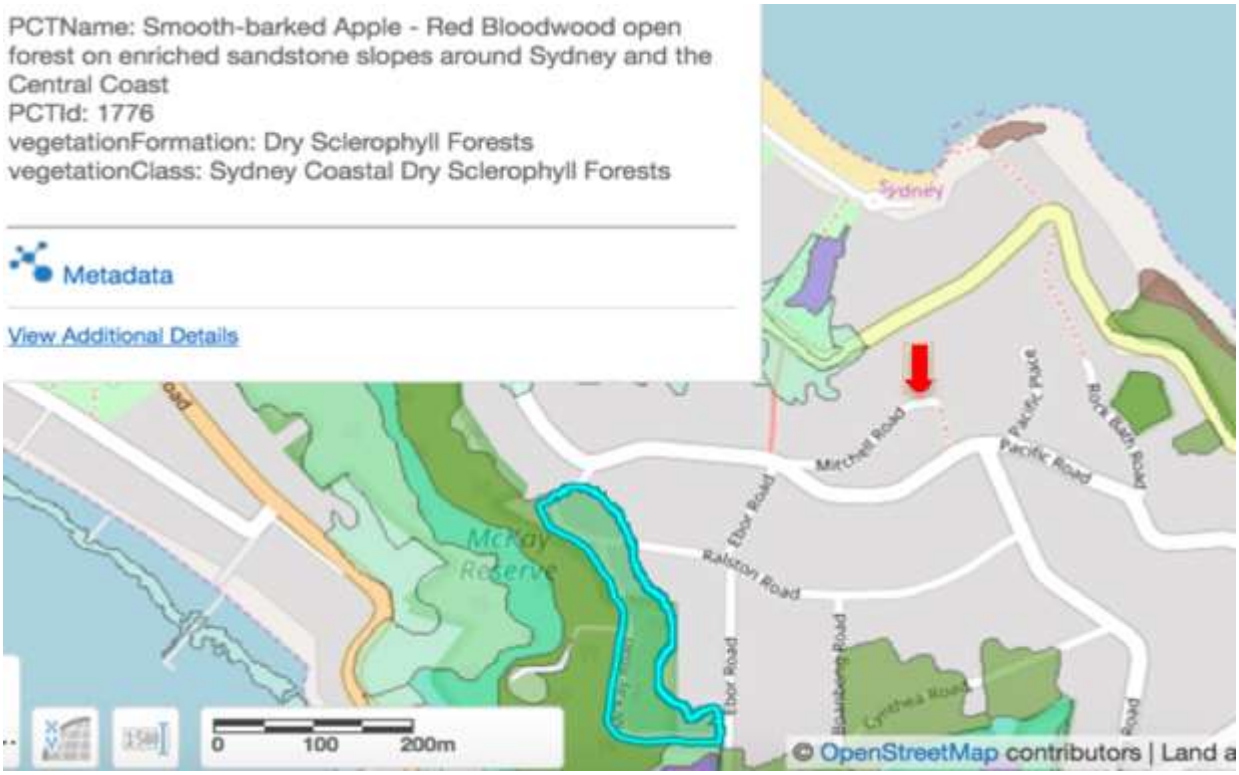


Figure 3.1. The site (red marker) has no associated PCT however PCT 1776 may have been found on-site prior to modification.

4.2 Threatened flora

BioNet records within 10km of the study site had 6 flora species currently listed as vulnerable or endangered under state and/or commonwealth legislation. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 1** below.

Table 1. Threatened flora recorded within a 10km radius since 1993. Source: NSW OEH Bionet 2020.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Myrtaceae	^^*Callistemon linearifolius*	Netted Bottle Brush	V,3		22
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	1
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	E4A		2
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	11
Proteaceae	^^*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	3
Rutaceae	*Asterolasia elegans*		E1	E	1

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

4.3 Flora Findings from Site Investigations

4.3.1 Threatened plant species findings

No threatened plant species were found during site assessments. The site does not contain an Endangered Ecological Community.

4.3.2 Arborist report findings

A total of eleven trees were surveyed as part of the Arborist report. They consist of a mixture of native and exotic species arranged in a formalised landscape planting around the existing driveway and dwelling. Trees were found to be in good condition. Species found on-site can be found below, compressive tree data can be found within the tree assessment schedule Appendix V (Beecher 2020).

Apple Tree	*Malus* spp
Various	*Mixed Screening Hedge*
Mexican Palm	*Washingtonia robusta*
Red Bloodwood	*Corymbia gummifera*
Red Bloodwood	*Corymbia gummifera*
Smooth – barked Apple Gum	*Angophora costata subsp. costata*
Port Jackson Fig	*Ficus rubiginosa*
Mexican Palm	*Washingtonia robusta*
Mexican Palm	*Washingtonia robusta*
Carob	*Seratonia siliqstrum*
Illawarra Flame Tree	*Brachychiton acerifolius*

5 Fauna

5.1 Threatened fauna

Forty-four (44) fauna species are currently Bionet listed as vulnerable or endangered under state and/or commonwealth legislation within a 10km radius of the activity sight. The vulnerable and endangered species to focus on-site searches for can be seen in Table 2 below, this is based on likelihood of occurrence.

Table 2. Threatened fauna observed in previous ecological surveys within a 10km radius since 1993. Source: NSW OEH Bionet 2020.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	40
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	V,P		49
Reptilia	*Caretta caretta*	Loggerhead Turtle	E1,P	E	2
Reptilia	*Chelonia mydas*	Green Turtle	V,P	V	5
Reptilia	*Eretmochelys imbricata*	Hawksbill Turtle	P	V	2
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		3
Aves	*Ptilinopus regina*	Rose-crowned Fruit-Dove	V,P		1
Aves	*Diomedea exulans*	Wandering Albatross	E1,P	E,J	1
Aves	*Diomedea gibsoni*	Gibson's Albatross	V,P	V	1
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P	C	30
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		2
Aves	*^^Pandion cristatus*	Eastern Osprey	V,P,3		2
Aves	*Burhinus grallarius*	Bush Stone-curlew	E1,P		36
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		5
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	7
Aves	*^^Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		1
Aves	*^Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		28
Aves	*Glossopsitta pusilla*	Little Lorikeet	V,P		2
Aves	*^^Ninox connivens*	Barking Owl	V,P,3		12
Aves	*^^Ninox strenua*	Powerful Owl	V,P,3		152
Aves	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		2

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Aves	*^Dasyornis brachypterus*	Eastern Bristlebird	E1,P,2	E	1
Aves	*Petroica boodang*	Scarlet Robin	V,P		1
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	3
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	8
Mammalia	*Phascolarctos cinereus*	Koala	V,P	V	20
Mammalia	*Phascolarctos cinereus*	Koala in the Pittwater Local Government Area	E2,V,P	V	1
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V,P		6
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V,P		1
Mammalia	*Petaurus norfolcensis*	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	60
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		1
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	2
Mammalia	*Myotis macropus*	Southern Myotis	V,P		2
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		2
Mammalia	*Vespadelus troughtoni*	Eastern Cave Bat	V,P		1
Mammalia	*Pseudomys novaehollandiae*	New Holland Mouse	P	V	1
Mammalia	*Arctocephalus forsteri*	New Zealand Fur-seal	V,P		2
Mammalia	*Arctocephalus pusillus doriferus*	Australian Fur-seal	V,P		2
Mammalia	*Eubalaena australis*	Southern Right Whale	E1,P	E	4
Mammalia	*Megaptera novaeangliae*	Humpback Whale	V,P	V	11
Mammalia	*Physeter macrocephalus*	Sperm Whale	V,P		1
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	V,P		8
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V		11

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

5.1.1 Likelihood of occurrence

The likelihood of occurrence is a broad categorisation used by ECA to indicate the potential for a species to occur within the study area. It is based on expert opinion and implies the relative value of a study area for a species. See Appendix I for rationale of likelihood of occurrence.

5.1.2 Assessment of Significance (5-part tests) Summary

During the survey, no threatened species were observed on-site. Marginal foraging habitat is present on the study site for Grey-headed Flying-fox, Microbats (various species) and Large Forest Owls. These highly mobile species would be expected to utilize the vegetation canopy for invertebrate foraging resources.

All 5 part tests have concluded that the proposal is not likely to significantly affect Large Forest Owls, Grey-headed Flying-foxes or microbats and will not be likely to put the local populations at risk of extinction.

Full 5 part tests can be found in appendix IV.

5.1.3 Endangered Populations

Two **endangered populations** have been recorded to occur within 10km of the site. Table 3 outlines these populations.

Squirrel Gliders on the Barrenjoey Peninsula and Koalas on the Barrenjoey Peninsula. Neither are within the study site or a corridor linking populations to those communities. No further assessment is required for these communities. Squirrel Gliders could be in the vegetation of McKay reserve and the ridge-top woodland. This site is discontinuous with habitat that many be used by Squirrel Gliders. The most recent glider records are from Chisholm Avenue in Avalon 2018.

Table 3. Endangered Populations within 10km of site.

Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala in the Pittwater Local Government Area	E2,V,P	V	73
Mammalia	Petauridae	*Petaurus norfolcensis*	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1

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

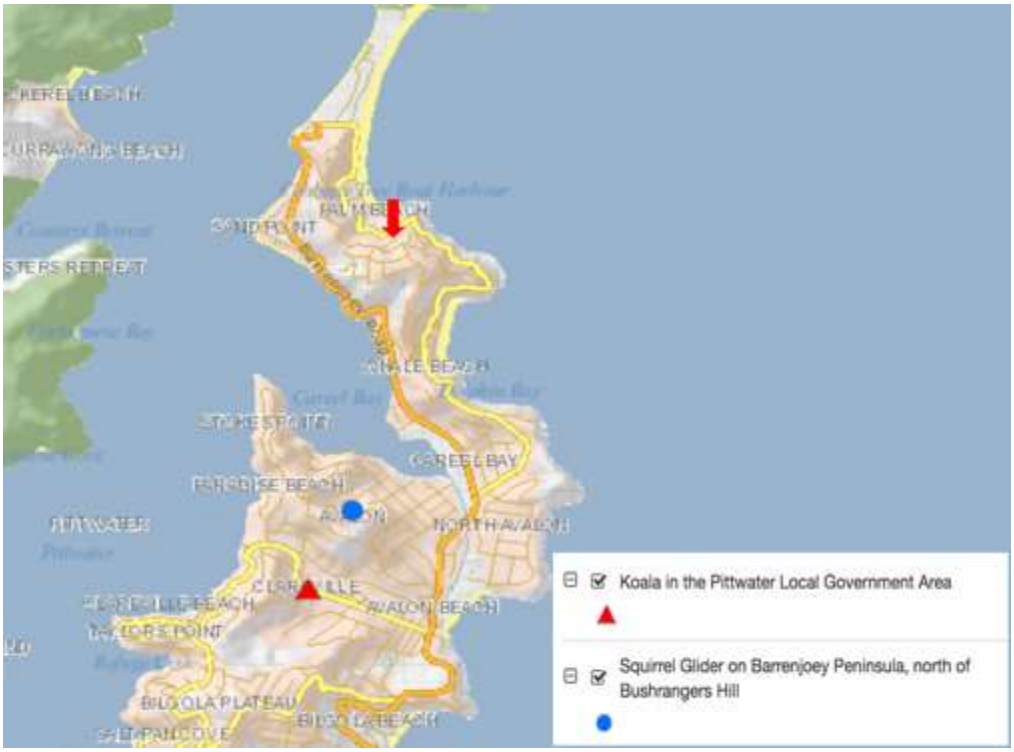


Figure 3.2. Site (red marker) and proximity to the endangered populations.

6 Impacts

6.1 Direct Impacts

6.1.1 Vegetation removal

Tree 8 (*Washingtonia robusta* (Mexican Palm)) and 11 (*Brachichyton acerifolius* (Illawarra Flame Tree)) are located within the development footprint and will require removal. Tree 11 is regarded as an exempt tree species under local tree preservation conditions.

No tree pruning works were identified as being required as part of the proposed development.

6.2 Indirect Impacts

Indirect impacts affecting species or communities will be insignificant as the site is already developed and the works will include staged weed removal and recreation of native flora of this community.

6.2.1 Weed growth

Weed species are already present and, if not treated, will grow in the direct works zone and surrounding landscaped areas through soil disturbance or by being brought in as seed on work machinery, tools, equipment and worker clothes (e.g. boots).

6.2.2 Introduction of pathogens

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

6.2.1 Runoff

The proposed actions may result in transport of sediment from the work zones as the site is steep. Sediment management will be essential along the northern boundary.

7 Recommendations

7.1 Mitigation Measures

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

7.1.1 Delineation of work areas and tree protection

During construction delineate of works zones so that the area opened is minimised.

Implement protective measure (bunting/signage etc for rock faces.

Tree protection will be consistent with the Arborist report (Beecher 2020). Main trees to be managed are trees within close proximity to building works. NB: see final arborist report for details of works and tree numbers.

7.1.1 Erosion and runoff

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

7.1.2 Weed management, bush regeneration and planting

Weed management is required at all stages of the works. A weed management plan is being implemented for staged weed removal and native species landscaping is planned. No areas on the site had native species resilience and are not expected to naturally regenerate. Planting is required and a list of native nurseries has been included in Appendices.

7.1.3 Weed Removal Techniques

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

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

It is recommended that seed heads are removed prior to commencement of primary works. This would be best performed carefully by hand with secateurs with the aim of avoiding the spread flowers or seeds into planting zones.
See Appendix III for further details. For key weed photo guide see Appendix VIII.

7.1.4 Pathogen prevention

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

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

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

7.2 Appendix I – Threatened Species Habitat Preferences

Flora – following are considerations of species likelihood of being on-site or impacted by proposed activities.

Scientific Name	Common Name	Habitat Requirements	Likelihood of occurance
^^Callistemon linearifolius	Netted Bottle Brush	For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Was more widespread across its distribution in the past. There are currently only 5-6 populations in the Sydney area, of the 22 populations recorded in the past. Three of these are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve, and Spectacle Island Nature Reserve. Further north it has been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges.	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.
Eucalyptus nicholii	Narrow-leaved Black Peppermint	A medium-sized tree 15 - 20 m tall with rough, thick, grey-brown bark which extends to the larger branches. This species is widely planted as an urban street tree and in gardens but is quite rare in the wild	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.
Syzygium paniculatum	Magenta Lilly Pilly	A tree to 15 m tall, but is generally 3–8 m high and shrubby in form. Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest.	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.
^^Persoonia hirsuta	Hairy Geebung	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone from near sea level to 600m altitude. It is usually present as isolated individuals or very small populations	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.
Rhodamnia rubescens	Scrub Turpentine	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.

		and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	
Asterolasia elegans		Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.	No flora bearing the key identifying features of this species was seen within the site. No likelihood of occurrence.

Terrestrial Fauna.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Burhinus grallarius	Bush Stone-curlew	Inhabits open forests and grassy woodlands. Fallen branches and logs are key habitat features that provides camouflage for the bird as well as areas for foraging. It is found in all states, except for Tasmania. Feeds at night on insects and small vertebrates including frogs, lizards, snakes and mice.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Species found in heath or open forest with a heathy understorey on sandy or friable soils. hey feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogenous (underground-fruiting) fungi.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Heleioporus australiacus	Giant Burrowing Frog	Sites must have native vegetation. The species has not been found on cleared land. Occurs in hanging swamps on sandstone shelves and along perennial creeks. The species is not restricted to watercourses.	The site presents low quality and no potential habitat within the site or in the immediate vicinity. Low potential for the

Scientific Name	Common Name	Habitat Preferences	Site Suitability
			species to occur within the site. No further assessment or consideration is required.
Pseudophryne australis	Red-crowned Toadlet	Occurs in open forests on Hawkesbury and Narrabeen Sandstones. Inhabits ephemeral drainage lines below sandstone ridges. Requires shelter in the form of rocks, dense vegetation and thick leaf litter.	Low potential for the species to occur within the site due to low quality of the site. No further assessment or consideration is required.
Varanus rosenbergi	Rosenberg's Goanna	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	The site presents low quality and no potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Ptilinopus superbus	Superb Fruit-Dove	The species is found in rainforests, rainforest margins, mangroves, wooded stream-margins, and even isolated figs, lilly pillies and pittosporums. The Superb Fruit-Dove may migrate to New Guinea in winter, but little is known of its movements, or the reasons for its sometimes southerly flights as far as Tasmania. Feeds almost exclusively on fruit, mainly in large trees.	There is low potential for the species to occur within the site. No further assessment is required.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Occurs along the coastline and occasionally larger waterways.	Records of this species were recorded > 3 km away. Low potential for the species to occur within the site as limited foraging. No further assessment or consideration is required.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Hieraaetus morphnoides	Little Eagle	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Records of this species were recorded > 3 km away. Moderate potential for the species to occur within the site. No further assessment or consideration is required.
Haematopus fuliginosus	Sooty Oystercatcher	Inhabits rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Glossopsitta pusilla	Little Lorikeet	Prefers open Eucalypt forest and woodlands. Primarily feeds within the canopy of Eucalyptus, Angophora and Melaleuca trees. Prefers riparian areas but may visit isolated trees in open or cleared land.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Dasyurus maculatus	Spotted-tailed Quoll	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal animal feeding on medium-sized (500g-5kg) mammals.	The site presents low quality and low potential for the species to occur within the site. No further assessment or consideration is required.
Phascolarctos cinereus	Koala	Inhabit eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	The site presents no potential for the species to occur within the site. No further assessment or consideration is required.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Cercartetus nanus	Eastern Pygmy-possum	Found in rainforests communities to sclerophyll (including Box-Ironbark) forests, woodland and heath. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, soft fruits are eaten when flowers are unavailable and insects.	The site presents no potential for the species to occur within the site. No further assessment or consideration is required.
Petaurus norfolcensis	Squirrel Glider	Inhabits mature or old growth Blackbutt-Bloodwood forests with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Requires abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	The site presents no potential for the species to occur within the site. No further assessment or consideration is required.
Pteropus poliocephalus	**Grey-headed Flying-fox**	**Occurs within tall sclerophyll forests and woodlands, heath, swamp subtropical and temperate rainforests, and urban areas. Occurs within 20km of a significant food source. May be found close to gullies and water within vegetation with a dense canopy.**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Mormopterus norfolkensis	**Eastern Freetail-bat**	**Prefers to roost in tree hollows buy may roost under flaking bark or in man-made structures. Occurs east of the Great Dividing Range throughout dry sclerophyll forest, woodlands, swamp forest and mangrove forests.**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate**

Scientific Name	Common Name	Habitat Preferences	Site Suitability
			foraging resources. (5 part test appendices IV)
Chalinolobus dwyeri	Large-eared Pied Bat	Roosts in caves, cliff crevices, mine shafts and in old nests of the Fairy Martin. Typically inhabits low to mid elevation well-timbered dry open forests and woodlands in close proximity to suitable nesting. Prefers areas containing gullies.	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Miniopterus australis	Little Bentwing-bat	Roosts in tree hollows, caves, tunnels, mine shafts, stormwater drains, culverts, bridges and buildings. Forages for insects in the tree canopy in densely vegetated areas. Prefers moist eucalyptus forests, rainforests, vine thickets, wet and dry sclerophyll forests, Melaleuca swamps, dense coastal forests and banksia scrub. Prefers well-timbered areas.	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Miniopterus orianae oceanensis	Large Bent-winged Bat	**Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate**

Scientific Name	Common Name	Habitat Preferences	Site Suitability
			foraging resources. (5 part test appendices IV)
Myotis macropus	**Southern Myotis**	**Roosts in groups of 10-15 in areas close to water. Will utilise caves, mine shafts, tree hollows, storm water drains, buildings, bridges and dense foliage. Forages over water bodies catching insects and small fish.**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Scoteanax rueppellii	**Greater Broad-nosed Bat**	**Roosts in tree hollows but may be found in buildings. Primarily found in gullies and river systems that drain the Great Dividing Range. Occurs in a range of habitats including woodlands to moist or dry eucalypt forest, rainforest with greatest preference for tall wet forests. Forages along creeks and river corridors.**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Calyptorhynchus lathami	Glossy Black-Cockatoo	Lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Glossy black-cockatoos occasionally eat seeds from eucalypts, angophoras, acacias and hakeas, as well as eating insect larvae.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Pandion cristatus	Eastern Osprey	Inhabits coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Callocephalon fimbriatum	Gang-gang Cockatoo	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required.
Ninox connivens	**Barking Owl**	**Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits.**	**Potential foraging habitat occurs within the site and in the surrounding areas. Specifically, the species would be expected to hunt small mammals from the outer canopy.** **There is moderate potential for the species to occur within the site. Further assessment is required. (5 part test appendices IV)**

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Ninox strenua	**Powerful Owl**	**The species requires large tracts of forest or woodland, however fragmented landscapes can contribute to their range. Breeds in forests and woodlands but may forage in open areas. Mainly preys upon medium sized arboreal mammals. Requires tree hollows for breeding.**	**Potential foraging habitat occurs within the site and in the surrounding areas. Specifically, the species would be expected to hunt small mammals from the outer canopy.** **There is moderate potential for the species to occur within the site. Further assessment is required. (5 part test appendices IV)**
Tyto novaehollandiae	**Masked Owl**	**The species prefers dry eucalypt forests and woodlands and hunts along the edges and forests and roadsides. Mainly preys upon arboreal and ground mammals, primarily rats. Requires tree hollows in moist gullies for breeding.**	**Potential foraging habitat occurs within the site and in the surrounding areas. Specifically, the species would be expected to hunt small mammals from the outer canopy.** **There is moderate potential for the species to occur within the site. Further assessment is required. (5 part test appendices IV)**
Phascolarctos cinereus	Koala in the Pittwater Local Government Area	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	No kola has been seen within the site. Low potential for the species to occur within the site. No further assessment or consideration is required

Scientific Name	Common Name	Habitat Preferences	Site Suitability
Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	The availability of a year-round supply of carbohydrates (nectar, sap, gum, and honeydew) appears to be an important habitat feature. In NSW, this corresponds to a high diversity of tree and shrub species, including a high nectar producing species and one or more winter flowering species. In Pittwater, important food sources are likely to be the winter flowering Coast Banksia (*Banksia integrifolia*) and Spotted Gum (*Corymbia maculata*) and the summer flowering Old Man Banksia (*B. serrata*) and Grey Ironbark (*Eucalyptus paniculata*). Other likely food sources include *Angophora costata, Banksia spinulosa, Corymbia gummifera, Eucalyptus botryoides, E. punctata, E. robusta, Melaleuca quinquernervia*, mistletoes and *Xanthorrhoea* species. This animal will gouge and lick incisions on the trunks and main branches of *Eucalyptus, Corymbia* and *Angophora* trees to feed on sap and on *Acacia* trees and shrubs to feed on gum, especially when nectar is in short supply.	No sightings nor markings were present on the trunks of foraging trees. No further assessment or consideration is required
Petroica boodang	Scarlet Robin	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required
Dasyornis brachypterus	Eastern Bristlebird	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required
Numenius madagascariensis	Eastern Curlew	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh.	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the

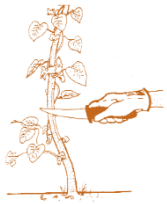
Scientific Name	Common Name	Habitat Preferences	Site Suitability
			species to occur within the site. No further assessment or consideration is required
Vespadelus troughtoni	**Eastern Cave Bat**	**The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. Very little is known about the biology of this uncommon species**	**Potential habitat occurs within the site and in the surrounding areas. The species may utilize the remnant vegetation within the site as foraging habitat. Specifically, the species would be expected to utilize the vegetation canopy for invertebrate foraging resources. (5 part test appendices IV)**
Pseudomys novaehollandiae	New Holland Mouse	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. Lives predominantly in burrows shared with other individuals	The site presents low quality and low potential habitat within the site or in the immediate vicinity. Low potential for the species to occur within the site. No further assessment or consideration is required

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

7.3 Appendix II– Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
Hand Removal 	Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height. Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.	Tools: Gloves, Rakes, Knife and Weed Bags
Crowning 	Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning. A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility Soil disturbance is to be kept to a minimum when using this technique.	Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.

Technique	Method	Equipment
Cut and Paint Stems 	Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent of vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent. Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump. Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.
Scrape and Painting 	More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license. Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plants height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants. Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.	Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.

Technique	Method	Equipment
Cut with a Chainsaw and Paint 	Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license. Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant. If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants. Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.

Flame Weeding

Thermal (flame) weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted.
While flame weeding is not suited to most streetscapes due to the fire hazard nor can it be used on materials such as soft fall and similar playground equipment it is noted that 'flame' weeding in waterways allows weed management in areas where herbicides are not permitted.
Also for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, *Bidens pilosa*. Flame weeding is also effective in killing persistent weeds like

Mother of Millions.

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

7.4 Appendix III– Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.

- And, always assume that the activity you are about to undertake has the potential to introduce the disease.

- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.

- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.

- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.

- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.

- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.

- Never drag vegetation with exposed roots and soil through bushland.

- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.

- Try not to get the bag itself dirty; don’t put it on/in a muddy area.

- Always work from the lower part of a slope to the upper part.

- Always work in areas known to be free of the pathogen before working in infected areas.

- Minimise activities wherever possible when the soil is very wet.

- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)

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

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

Facts about Phytophthora

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

Symptoms including Dieback

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

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

Infection

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

7.5 Appendix IV– Tests of Significance

Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats
The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:
Source: https://legislation.nsw.gov.au/#/view/act/2016/63/part7/div1/sec7.3

7.5.1 Large Forest Owls;

Barking Owl (Ninox connivens)

Powerful Owl (Ninox strenua)

Masked Owl (Tyto novaehollandiae)

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

The proposed work is not expected to remove any vegetation which would be considered foraging habitat for the species. Marginal foraging habitat for owl prey species may be removed (in the form of two trees) however this is not expected to cause a significant impact for forest owls.

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

Not EEC

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

N/A

(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,

N/A

(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

Habitat for Large Forest Owls will not be removed because of this development. Marginal foraging habitat for owl prey species may be removed (in the form of two trees) however this is not expected to cause a significant impact for forest owls.

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

(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,

Trees being removed do not host optimal habitat requirements for forest owls. It is unlikely that the proposal would impact upon the long-term survival of the species 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),

No areas of outstanding biodiversity value yet listed for this area.

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

Clearing is a KTP, although the trees being removed are not expected to be significantly contributing to the species survival in the locality.

Conclusion:

This proposal is not likely to significantly affect Large Forest Owls and will not be likely to put the local population at risk of extinction.

7.5.2 Microbats

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

- Eastern Freetail-bat (Mormopterus norfolkensis)
- Large Bent-winged Bat Miniopterus orianae oceanensis
- Little Bent-winged Bat (Miniopterus australis)
- Southern Myotis (Myotis macropus)
- Large-eared Pied Bat (Chalinolobus dwyeri)
- Greater Broad-nosed Bat (Scoteanax rueppellii)
- Eastern Cave Bat (Vespadelus troughtoni)

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

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

The proposed work is not expected to remove vegetation which would be considered optimal or significant foraging/breeding habitat for the species. Marginal foraging habitat for microbat species may be removed (in the form of two trees) however this is not expected to place any microbat species at risk of extinction.

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

Not EEC

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

N/A

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

N/A

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

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

Optimal breeding and/or foraging habitat for Mircobats will not be removed because of this development. Marginal foraging habitat for microbat species may be removed (in the form of two trees) however this is not expected to place any microbat species at risk of extinction.

.

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

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

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

Trees being removed do not host optimal habitat requirements for microbat species. It is unlikely that the proposal would impact upon the long-term survival of the species 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),

No areas of outstanding biodiversity value yet listed for this area.

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

Clearing is a KTP, although the trees being removed are not expected to be significantly contributing to the species survival in the locality.

Conclusion:

This proposal is not likely to significantly affect Microbats and will not be likely to put the local population of microbats at risk of extinction.

Recommendations

Micro-bat boxes could be installed on-site x 2 in trees in the Bible Garden area of the site or on the house structure in a non-exposed area. Boxes to be marine ply or equivalent and installed so that there is no nailing into the tree (see best practice – hanging of boxes and using coil-springs to keep in place). Boxes to be at least 4m above the ground.

7.5.3 Grey-headed Flying-Fox (*Pteropus poliocephalus*)

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

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

The proposed work is not expected to remove vegetation which would be considered optimal or significant foraging/breeding habitat for the species. Marginal foraging habitat for the GHFF may be removed (in the form of two trees) however this is not expected to place the GHFF at risk of extinction.

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

Not EEC

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

N/A

(vi) 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,

N/A

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

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

Optimal breeding and/or foraging habitat for the GHFF will not be removed because of this development. Marginal foraging habitat for the GHFF may be removed (in the form of two trees) however this is not expected to place the species at risk of extinction.

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

(ix) 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,

Trees being removed do not host optimal habitat requirements for the species. It is unlikely that the proposal would impact upon the long-term survival of the species in the locality.

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

No areas of outstanding biodiversity value yet listed for this area.

(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.

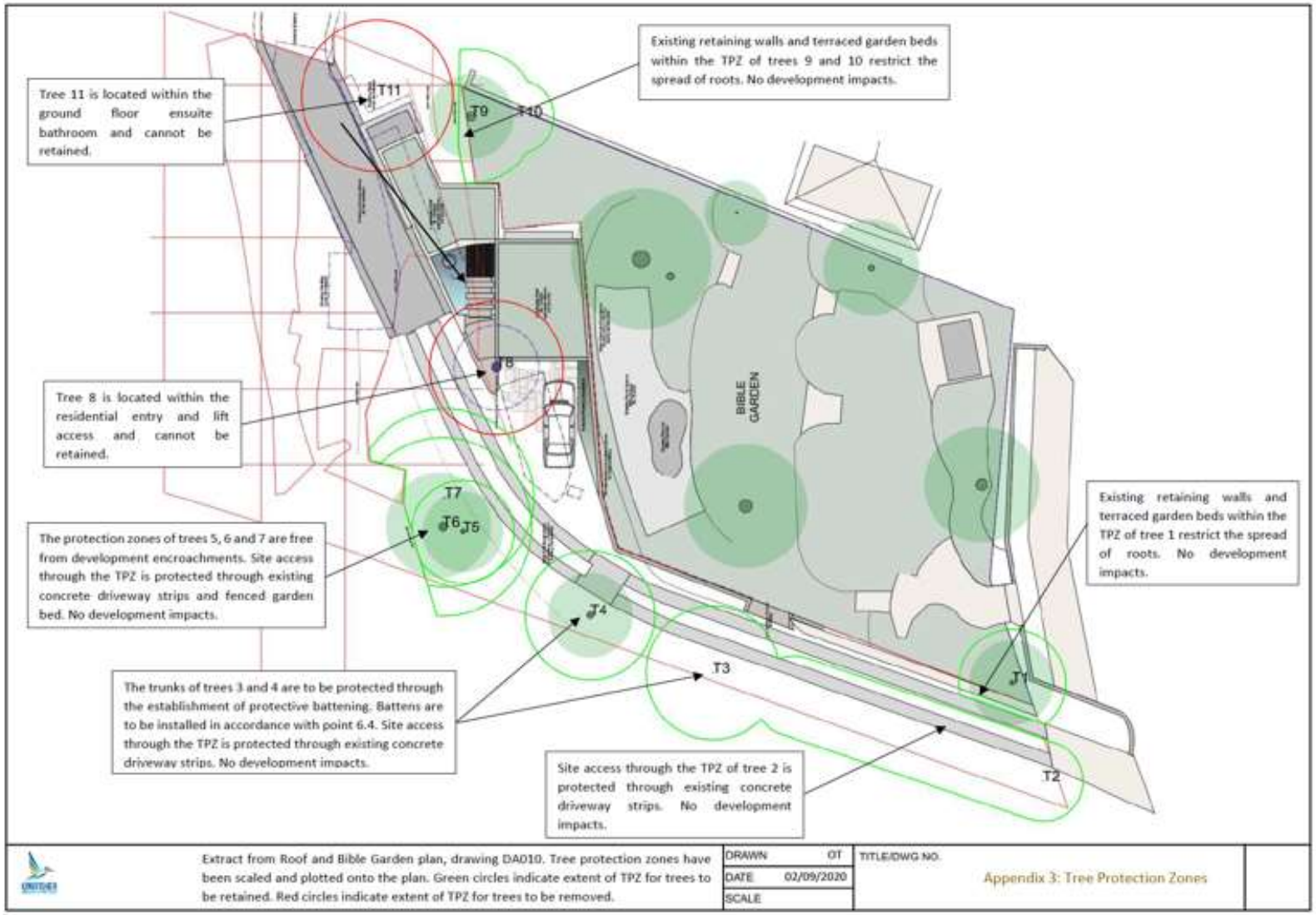
Clearing is a KTP, although the trees being removed are not expected to be significantly contributing to the species survival in the locality.

<u>Conclusion:</u>

This proposal is not likely to significantly affect the GHFF and will not be likely to put the local population of at risk of extinction.

7.1 Appendix V. Tree schedule and Tree Protection Zones

The following figures are an extract from the Arboricultural Impact Assessment (AIA) 6 Mitchell Road, Palm Beach, NSW 2108. Date: 02/09/2020. V. Beecher



Appendix 2: Development Impacts & Controls

Tree No	Botanical name Common name	Development Impacts	Controls	Retain or Remove Tree
1	*Malus* sp (Apple Tree)	TPZ free from development encroachments. Root system of tree likely to be restricted to contained and terraced areas of garden beds within the Bible Garden.	No controls required, monitor tree health and condition throughout development process. Monitor site access requirements along driveway.	Retain
2	Mixed Screening Hedge	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. Monitor site access requirements along driveway.	Retain
3	*Washingtonia robusta* (Mexican Palm)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. Install trunk protection battening around trunk to prevent potential damage from vehicle access along driveway.	Retain
4	*Corymbia gummifera* (Red Bloodwood)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. Install trunk protection battening around trunk to prevent potential damage from vehicle access along driveway.	Retain
5	*Corymbia gummifera* (Red Bloodwood)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. No building materials or stockpiling of spoil to be placed within the TPZ.	Retain
6	*Angophora costata* subsp *costata* (Smooth-barked Apple)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. No building materials or stockpiling of spoil to be placed within the TPZ.	Retain
7	*Ficus rubiginosa* (Port Jackson Fig)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process. No building materials or stockpiling of spoil to be placed within the TPZ.	Retain
8	*Washingtonia robusta* (Mexican Palm)	Tree is located within the footprint of the proposed entry stairs and lift access.	No controls required. Tree cannot be retained under current design.	Remove
9	*Washingtonia robusta* (Mexican Palm)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process.	Retain
10	*Seratonis Siliqua* (Carob)	TPZ free from development encroachments.	No controls required, monitor tree health and condition throughout development process.	Retain
11	*Brachichyton acerifolius* (Illawarra Flame Tree)	Tree located within footprint of ground floor ensuite bathroom.	No controls required. Tree cannot be retained under current design.	Remove

7.2 Appendix VI. Native Plant Nurseries

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