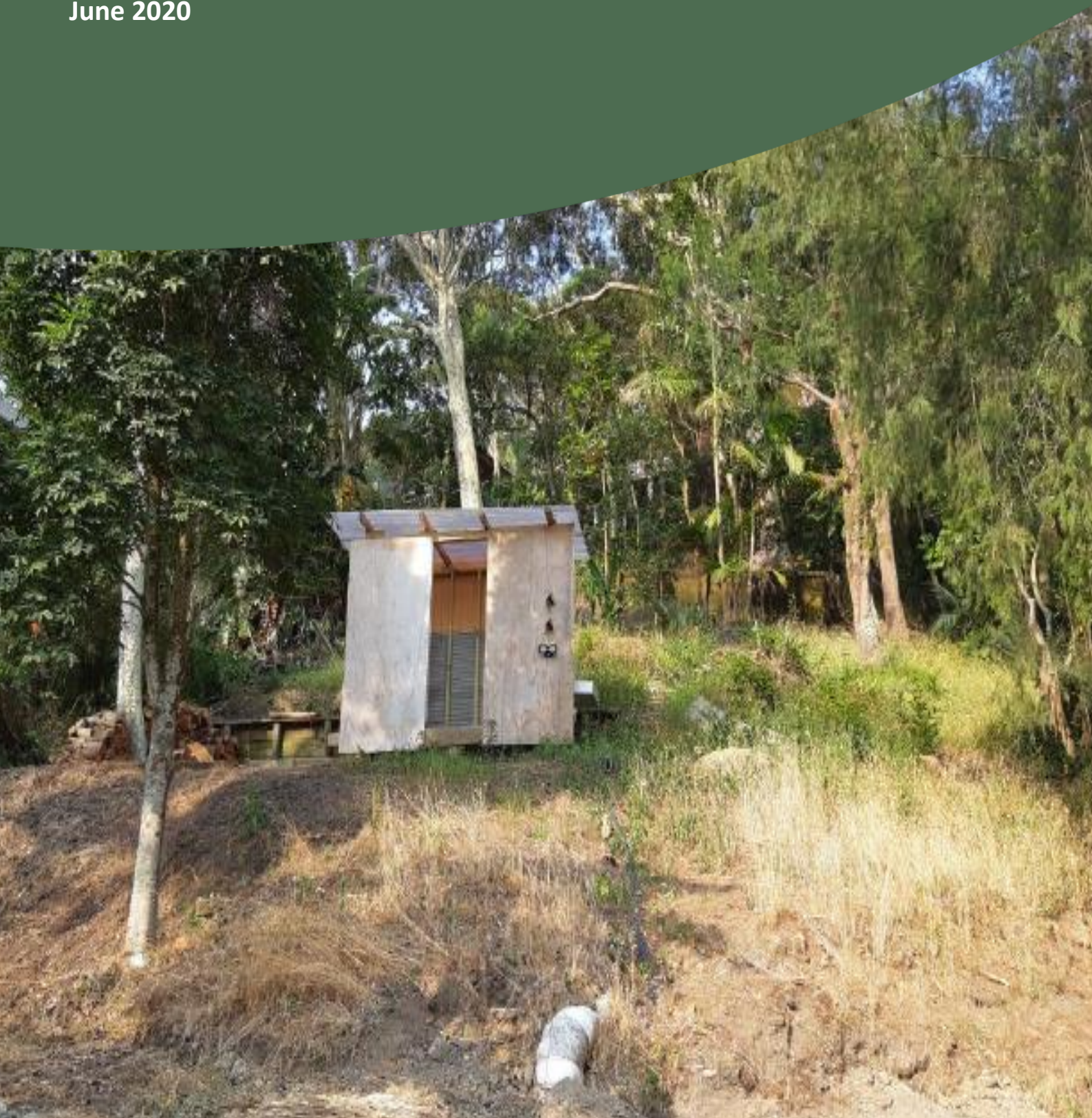


# Ecology Report and Test of Significance for 790A Barrenjoey Road, Palm Beach Final

*By Ecological Consultants Australia Pty Ltd TA*

*Kingfisher Urban Ecology and Wetlands*

**June 2020**





## About this document

### Copyright Statement®

*Ecological Consultants Australia Pty Ltd is the owner of the copyright subsisting in this publication. This publication may be reprinted providing the original words are used and acknowledgement is given to Ecological Consultants Australia and the report authors.*

*The document may be used for any purposes that benefit the environment of the site and are approved by the Client. Ecological Consultants Australia assumes no responsibility where the document is used for purposes other than those for which it was commissioned.*

### 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, Lisa Jones and Julian Reyes with qualifications BSc. Majoring in Ecology.*

### 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:	Ecology Report and Test of Significance for 790A Barrenjoey Road, Palm Beach
Version:	Final
Author:	Geraldene Dalby-Ball and Jack Hastings
Date:	4th June 2020
File location:	ECA 4 Projects\2 Projects\2019-2020\Flora Fauna\Ecological Report for 790A Barrenjoey Road, Palm Beach
Distribution:	John + Belinda Ritchie 21 Wakefield Street NORTH MANLY NSW 2100 c/ johnritchiebuilding@gmail.com

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

## Executive Summary

### Introduction

- The development proposal includes construction of a secondary dwelling and landscaping of the site.
- NBC has requested a 5-part test for Pittwater Spotted Gum Community be submitted with this development.
- Recommendations have been provided to reduce the likelihood of impact and mitigate loss on this Endangered Ecological Community.

### Methods

- On-ground survey took place on the 18<sup>th</sup> of April 2020 by Senior Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos and samples of flora species were taken 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.
- DPIE mapping was consulted via SEED Portal particularly Sydney Metro Area v3.1 2016 E - VIS 4489

### Results

- The site is within PWSG EEC however it has also been planted with species not locally native and the under and mid-story is dominated by weeds.
- The building area is small and the design has taken into account the trees and maximises their retention.
- It is preferred that a single tree (T8) Swamp she-oak (*Casuarina glauca*) be removed as the development encroaches on the SRZ. The tree is in marginal condition and native landscaping post development will offset its removal from the site.
- No threatened flora or fauna species were found on-site during on site searches.
- Test of significance has been conducted for PWSG Forest – while it resulted in a ‘not significant’ impact for this community recommendations have been made to assist the long-term sustainability of this community. Appendix III contains 5-part tests.
- Landscaping has been designed in consultation with ecologist to maximise the restoration of PWSG Forest and to replace native species removed as part of the development. The PWSG Forest can be in better condition due to the landscaping and on-going maintenance than it currently is.

### Mitigation Measures

#### Before works:

- Tree Protection as per Arborist report by Complete Arborcare 2018.
- Effective site management to ensure soils are managed.

#### During works:



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

After completion of works:

- Revegetation works will be conducted as per Landscaping Plan for flora species. Ensure planting of local PSG species including canopy trees. Tube stock – not larger is recommended.
- NB: Arborist report: states *trees to be chosen in accordance with AS 2303-2015 (Tree Stock for Landscape Use), & must be in a minimum container size of 45 litres. All replanting works are to be undertaken by a suitably qualified AQF person/s before the issuing of a Certificate of Occupancy (see Appendix D of this report)*. This is disagreed with as to keep the genetic integrity of the EEC local stock is required and this would be supplied in Tube-stock. Evidence of planting in this area also shows the tube-stock grow well and quickly reach the size of more advanced stock and have been root systems (as they develop in-situ). In this case the ecological integrity of the EEC overrules the Arborist comment and replacement trees are to be tube stock not 45L.
- Optional installation of micro-bat nest box.

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

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

**Conclusions and Recommendations**

- Weed removal and landscaping to be implemented.
- Arborist report recommendations to be applied – with the exception of plant sizes (tube stock not 45L).
- Microbat nest boxes (x 1) is recommended

## Table of Contents

<b>About this document .....</b>	<b>2</b>
<b>Executive Summary.....</b>	<b>3</b>
<b>1 Introduction.....</b>	<b>7</b>
<b>1.1 Site Location .....</b>	<b>7</b>
<b>2 Proposed Actions .....</b>	<b>9</b>
<b>2.1 Legislation and policy .....</b>	<b>17</b>
<b>2.2 Scope of works .....</b>	<b>19</b>
<b>2.3 Limitations of the Study.....</b>	<b>19</b>
<b>3 Methods .....</b>	<b>19</b>
<b>3.1 Site Inspections .....</b>	<b>19</b>
<b>3.2 Previous studies .....</b>	<b>20</b>
<b>4 Flora .....</b>	<b>20</b>
<b>4.1 Threatened flora.....</b>	<b>21</b>
<b>4.2 Flora Findings from Site Investigations .....</b>	<b>22</b>
4.2.1 Threatened plant species findings .....	22
4.2.2 Observed Flora .....	22
4.2.3 Disturbances to Flora .....	22
4.2.4 Arborist report findings .....	22
<b>5 Fauna.....</b>	<b>23</b>
<b>5.1 Threatened fauna.....</b>	<b>23</b>
<b>5.2 Endangered populations .....</b>	<b>25</b>
<b>5.3 Fauna findings from site assessment .....</b>	<b>25</b>
<b>6 Impacts.....</b>	<b>25</b>
<b>6.1 Direct Impacts .....</b>	<b>25</b>
6.1.1 Vegetation disturbance and loss.....	25
<b>6.2 Indirect Impacts. ....</b>	<b>26</b>
6.2.1 Weed growth and invasion .....	26
6.2.2 Introduction of pathogens .....	26
<b>6.3 Assessment of Significance (5-part tests) Summary.....</b>	<b>26</b>
<b>7 Recommendations .....</b>	<b>27</b>
<b>7.1 Mitigation Measures.....</b>	<b>27</b>
7.1.1 Delineation of work areas and vegetation clearing .....	27
7.1.2 Tree Protection .....	27
7.1.3 Weed management, bush regeneration and planting .....	27
7.1.4 Weed Removal Techniques.....	27
7.1.5 Native Seed Collection .....	27

7.1.6	Landscaping.....	27
7.1.7	Nest boxes.....	27
7.1.8	Pathogen prevention.....	28
7.1.9	Vertebrate Pests .....	28
<b>7.2</b>	<b>Appendix I – Key Weed Removal Methods.....</b>	<b>29</b>
<b>7.3</b>	<b>Appendix–II Bushland Hygiene Protocols for Phytophthora .....</b>	<b>33</b>
<b>7.4</b>	<b>Appendix III– Tests of Significance.....</b>	<b>34</b>
7.4.1	Pittwater Wagstaff Spotted Gum Community EEC .....	34
7.4.2	Powerful Owl ( <i>Ninox strenua</i> ) .....	35
7.4.3	Microbats .....	36
<b>7.1</b>	<b>Appendix III– MNES .....</b>	<b>38</b>
<b>8</b>	<b>Expertise of authors .....</b>	<b>40</b>

# 1 Introduction

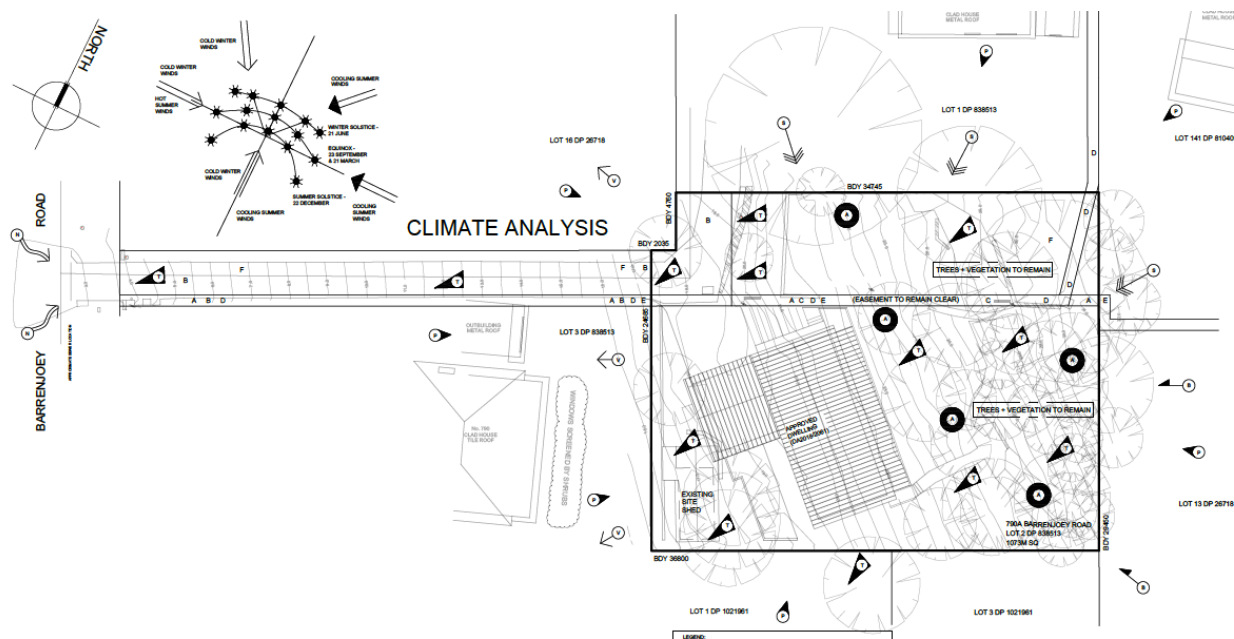
Ecological Consultants Australia (ECA) has been contracted by David Lamb to provide a “Test of Significance” to assess potential direct and indirect impacts on Pittwater Wagstaff Spotted Gum Forest EEC – as per request by NB Council and as per section 5A of the Environmental Planning & Assessment Act 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 Site Location

The study area is 790A Barrenjoey Road, Palm Beach (see Figure 1-1).



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

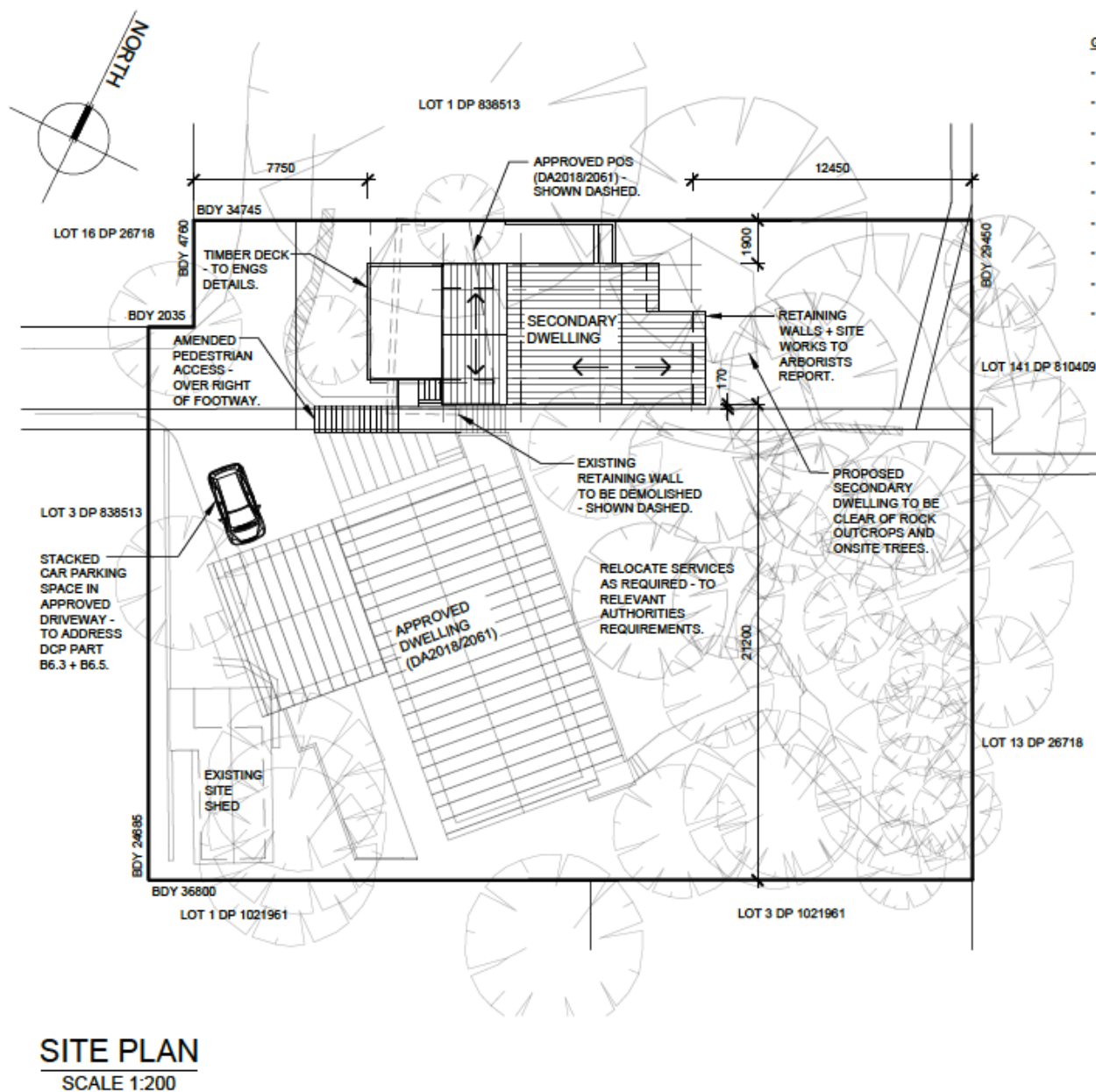


**Figure 1-2. Location of the site as set back from Barrenjoey Road.** Note – Approval has been granted for the primary dwelling on the site (DA2018/2061). Source: *David Lamb 2020 - Architectural Plans – J + B Ritchie Secondary Dwelling, DA Issue (Revision B, dated 25/05/2020).*



## 2 Proposed Actions

Construction of a secondary dwelling associated infrastructure and landscaping – see DA submission and Figure 2.



**Figure 2-1. Proposed construction layout.** Source: David Lamb 2020 - Architectural Plans – J + B Ritchie Secondary Dwelling, DA Issue (Revision B, dated 25/05/2020).

## Landscaping

### Proposed Landscaping

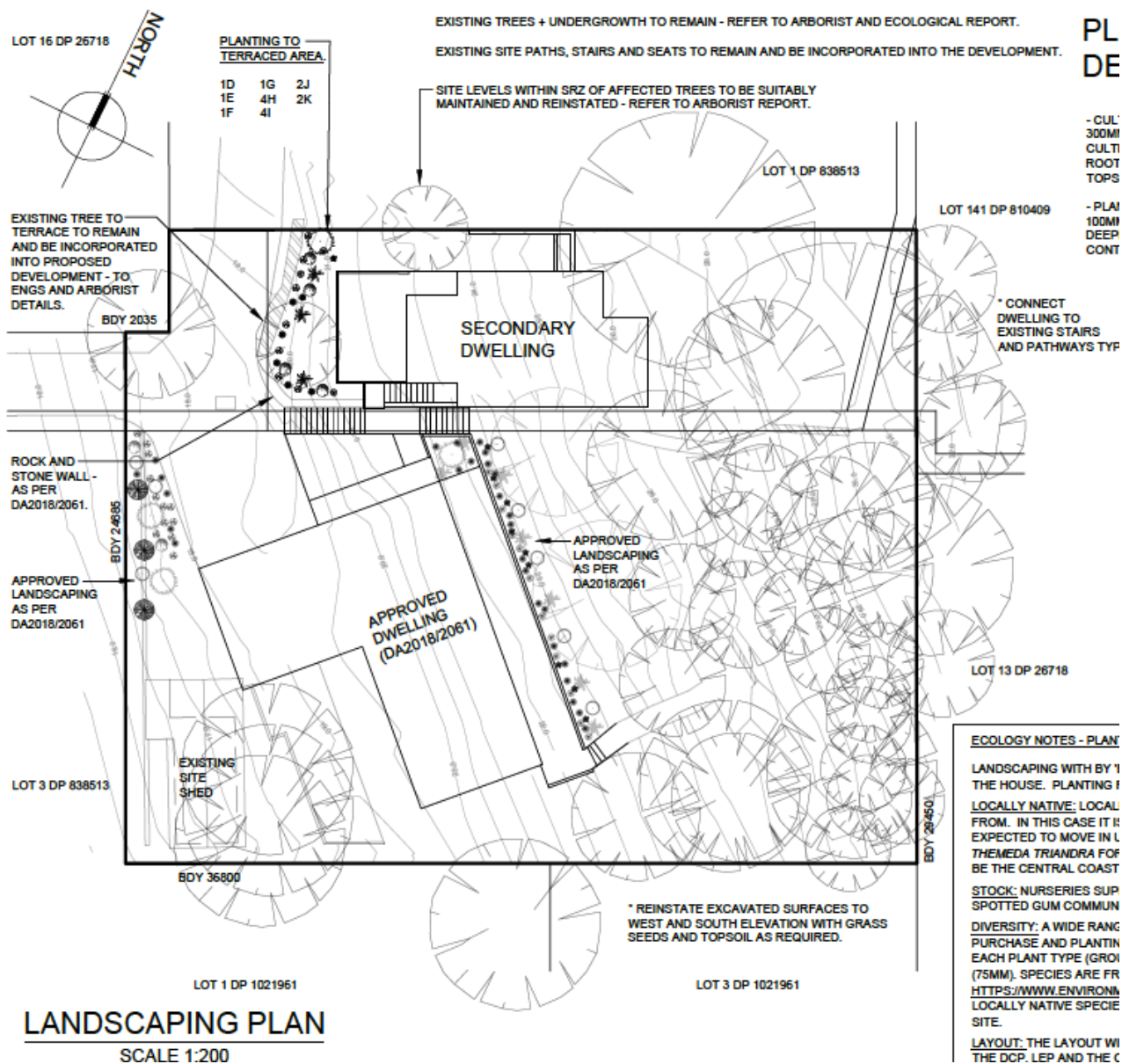


Figure 2-2. Proposed landscaping layout. Source: David Lamb 2020 - Architectural Plans – J + B Ritchie Secondary Dwelling, DA Issue (Revision B, dated 25/05/2020).

PLANT SCHEDULE					
	ID	BOTANICAL NAME	COMMON NAME	POT SIZE	QUANTITY
TREES	A	CORYMBIA MACULATA	SPOTTED GUM	HIKOS (50MM)	NA
	B	CERATOPETATUM GUMMIFERA	CHRISTMAS BUSH	AND / OR	3
	C	ACMENA SMITHII	BROAD-LEAF LILLYPILLY		3
SHRUBS	D	ACACIA MYRTIFOLIA	WATTLE	FORESTRY TUBES (75MM)	15
	E	DODONEA TRIQUETRA	HOP BUSH		15
	F	BANKSIA ROBUR	SWAMP BANKSIA		4
	G	PITTOSPORUM REVOLUTUM	SMALL PITTOSPORUM		4
GROUND COVER	H	ENTOLASIA SPECIES	ENTOLASIA		20
	I	THEMEDA TRIANDRA	KANGAROO GRASS		25
	J	LOMONDRA LONGIFOLIA	LOMANDRA		20
	K	DIANELLA CAERULEA	BLUE FLAX LILY		20
VINES	L	HARDENBERGIA VIOLACEA	FALSE SARSAPARILLA		AS REQUIRED
	M	HIBBERTIA SCANDENS	GOLDEN GUINEA FLOWER		

**Figure 2-3 Landscape Plan (extract) and species list.**

The landscape plan was compiled with input from the ecologist and is suitable for this location.

See full landscape plan submitted with DA for further details. See also ecology-notes extract below.

#### ECOLOGY NOTES - PLANTING:

LANDSCAPING WITH BY 'BUSH-SCAPING' IN MOST AREAS WITH A SMALL AREA OF CRUSHED GRANITE (OR SANDSTONE) ADJOINING THE HOUSE. PLANTING FINAL DENSITY WILL BE ~ 5M2.

LOCALLY NATIVE: LOCALLY NATIVE PLANTS WILL BE USED. LOCALLY NATIVE REFERS TO THE AREA THE STOCK IS COLLECTED FROM. IN THIS CASE IT IS THE AREA THAT THE NATURAL POLLINATORS AND / OR NATURAL DISPERSAL AGENTS WOULD BE EXPECTED TO MOVE IN USUAL CIRCUMSTANCES. FOR SOME PLANTS THIS WILL BE SMALL AREAS SUCH AS KANGAROO GRASS, *THEMEDA TRIANDRA* FORMALLY KNOWN AS *T. AUSTRALIS*. FOR OTHERS LIKE BANKSIA AND SPOTTED GUMS LOCALLY NATIVE CAN BE THE CENTRAL COAST TO BUNDEENA.

STOCK: NURSERIES SUPPLYING LOCALLY NATIVE PLANTS HAVE BEEN INCLUDED IN THE 5-PART TEST FOR PITTWATER WAGSTAFF SPOTTED GUM COMMUNITY.

DIVERSITY: A WIDE RANGE HAS BEEN PROVIDED TO ENSURE A DIVERSITY OF LOCALLY NATIVE PLANTS IS AVAILABLE FOR PURCHASE AND PLANTING. THE PLANT SCHEDULE SUMMARISES THE MINIMUM DIVERSITY (NUMBER OF DIFFERENT SPECIES) OF EACH PLANT TYPE (GROUND, VINES, SHRUBS, & TREES). SIZE: ALL PLANTS CAN BE HIKOS (50MM) AND / OR FORESTRY TUBES (75MM). SPECIES ARE FROM:

[HTTPS://WWW.ENVIRONMENT.NSW.GOV.AU/DETERMINATIONS/PITTWATERSPOTTEDGUMFORESTENDCOMLISTING.HTM](https://www.environment.nsw.gov.au/determinations/pittwaterspottedgumforestendcomlisting.htm) OR LOCALLY NATIVE SPECIES NOTED BY THE PROJECT ECOLOGIST AS NATURALLY GROWING IN SIMILAR CONDITIONS CLOSE TO THE SITE.

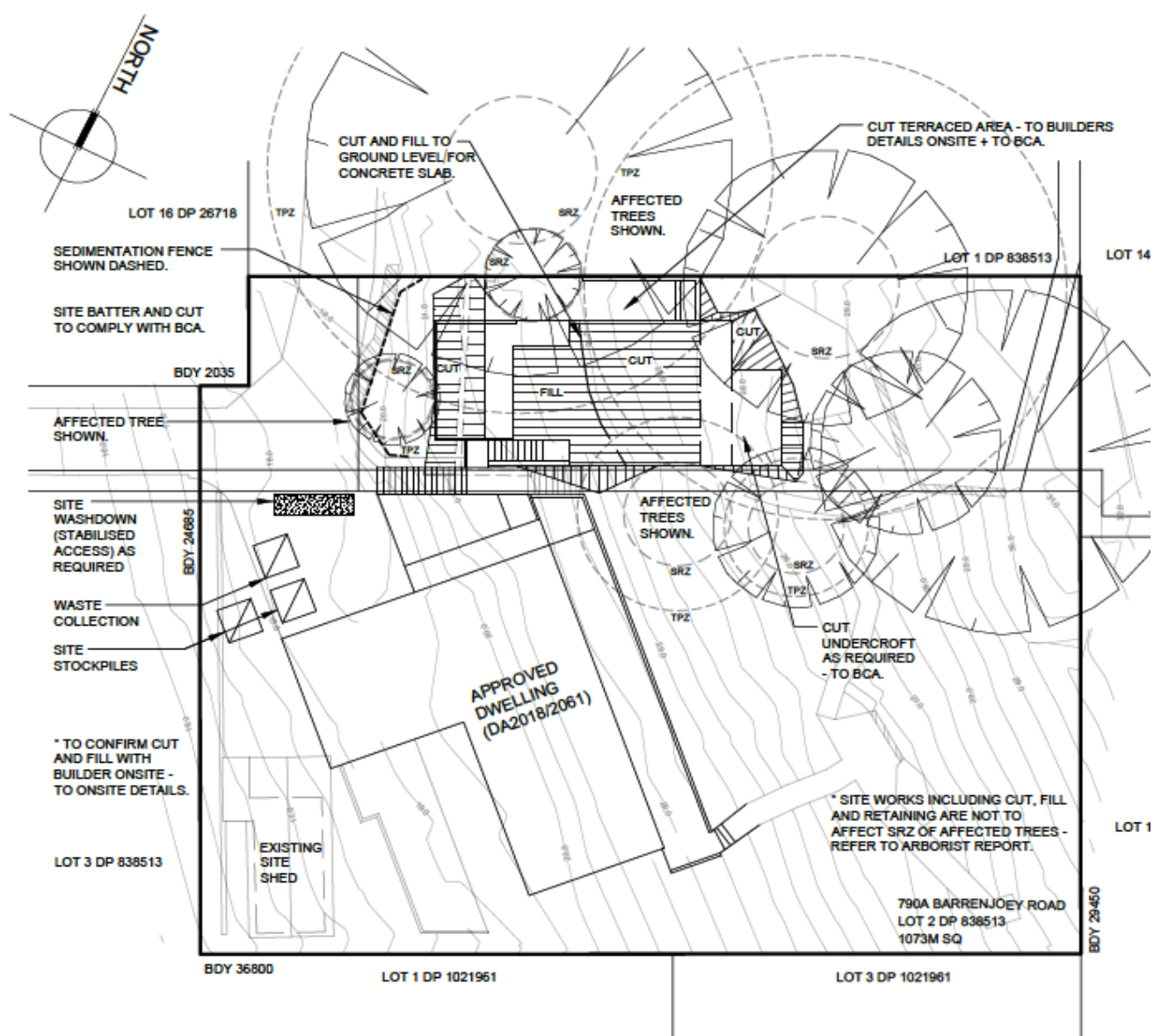
LAYOUT: THE LAYOUT WILL BE AS PER THE LANDSCAPE DRAWING AND WILL FULFIL THE SCREENING REQUIREMENTS OF BOTH THE DCP, LEP AND THE COASTAL MANAGEMENT ACT.

## Cut and Fill

Cut and fill is within the area of exotic grasses – no significant ecological impact from cut and fill.

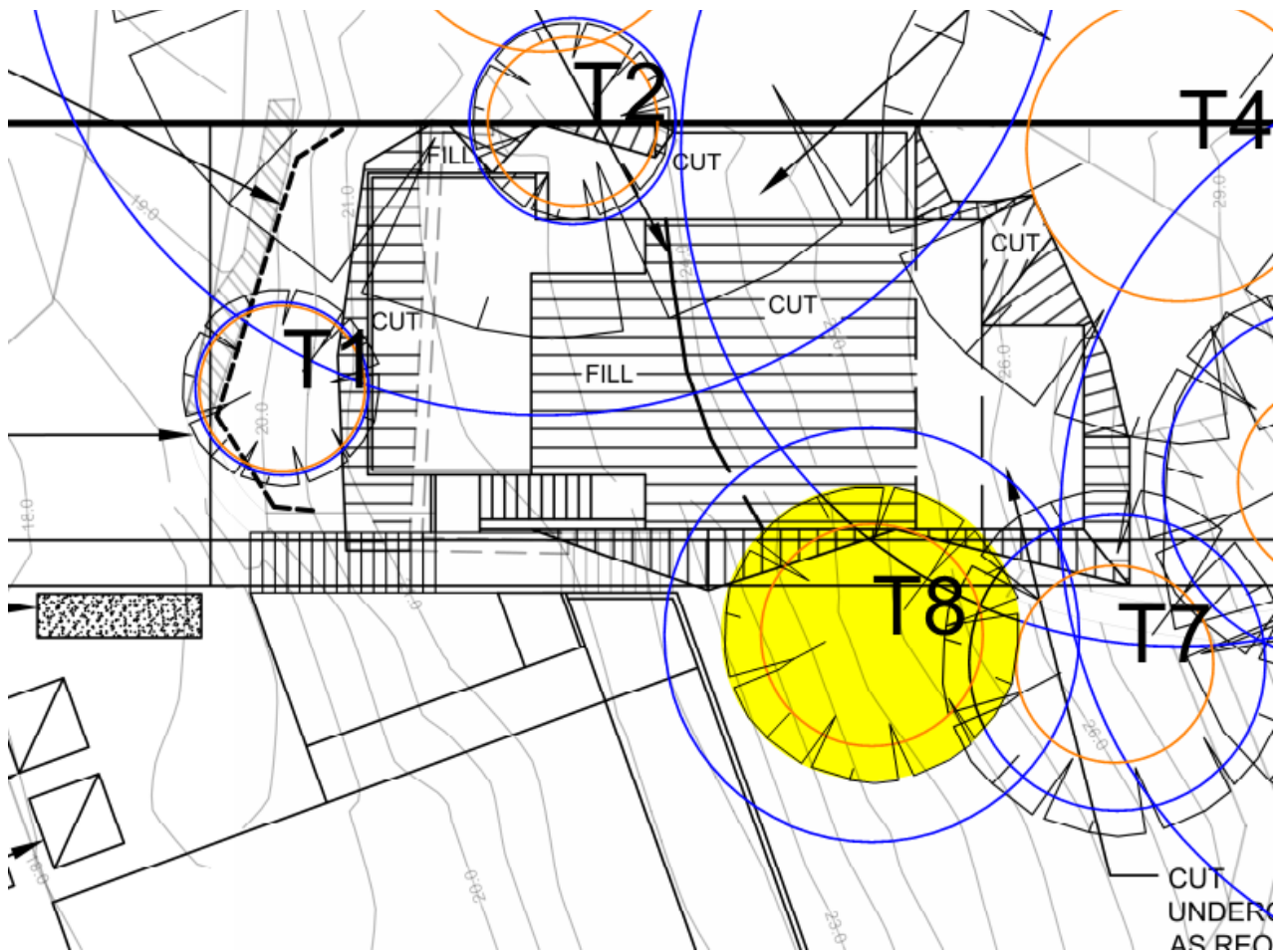
It is preferred that a single tree (T8) Swamp she-oak (*Casuarina glauca*) be removed as the development encroaches on the Structural root zone (SRZ), see figure 2-5. Removal of the tree will not result in significant ecological impacts on site, the tree is in marginal condition.

Native landscaping post development will offset impacts if the tree is to be removed from the site. There will be an overall increase in native vegetation cover and abundance on site post development, the current health of native vegetation on site is poor.



**Figure 2-4 Cut and fill plan showing no impact on trees or SRZ of trees onsite.** Source: David Lamb 2020 - Architectural Plans – J + B Ritchie Secondary Dwelling, DA Issue (Revision B, dated 25/05/2020).





**Figure 2-5.** It is preferred that the Swamp she-oak (*Casuarina glauca*) (Tree 8) is removed as the proposal encroaches on the SRZ. The tree is in marginal condition and ecological impacts are expected to be negligible, if the tree is removed.

### Photos from the site

The site has an understory of exotic herbs – mainly *Ehrata sp* grass. The mid-story is exotics with the exception of Burrawang Palms (x2) and these are locally native and remnant (also transplantable).

Canopy on site is a mix of local native, Cheese Trees, Coachwood, Forest She-Oak and planted non-local native species. The impact area is dominated by weed species (figure 3.0), existing ecological values onsite will not be significantly impacted by the proposal.



Figure 3.0. Looking east at the proposed development site. Cheese tree to be retained.





Figure 3.1. Looking west over the proposed development site.



Figure 3.3. Site understorey is dominated by herbaceous weeds.



Photo include planted specimens – these can be se with the protector tubes at their bases still. Upper Canopy is Spotted Gum and the trees are on neighbouring properties.



Plate 1. Front (western ) side looking to access way from site



Plate 2. Bushland at rear of the site proposed for bush regeneration.



Plate 3. Forest She-Oak on site.



Plate 4. Spotted Gum on neighbour property



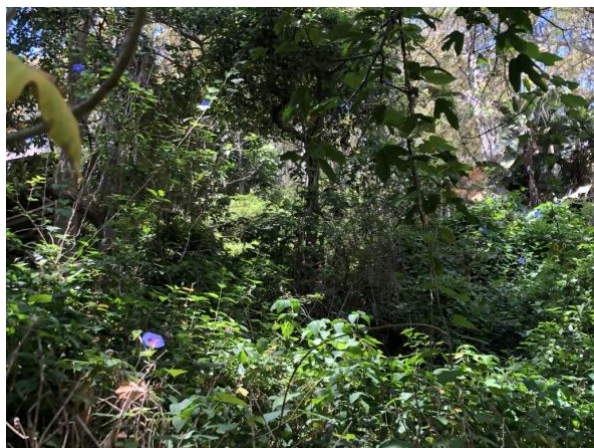


Plate 5. Dense weed understory

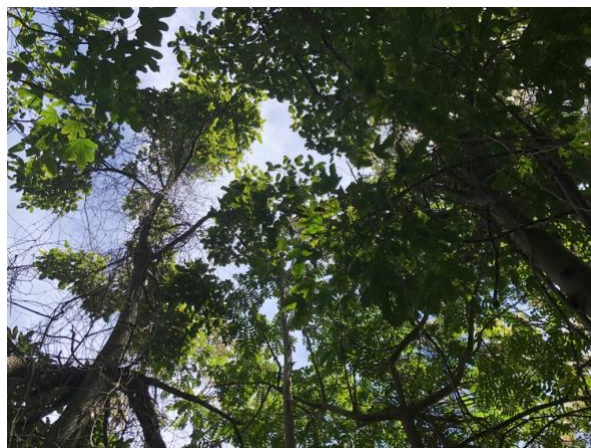


Plate 6. Canopy cover in the area that is being retained

## 2.1 Legislation and policy

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

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

Proposed development is compliant with the EPBC Act and does not impact any threatened species. A Matters of National Environmental Significance search has been conducted and results included in appendix IV.

- *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 indicate no significant impact on threatened species, populations or communities.

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

The *Biodiversity Conservation Act 2016* (BC Act 2016) is the key legislation that enables the conservation of biodiversity within the state of New South Wales. The BC Act 2016 facilitates the assessment and on-going protection of flora and fauna, including threatened species and ecological communities. The BC Act 2016 outlines assessment and offsetting requirements for activities with the potential to impact on threatened species and ecological communities in NSW, and the clearing of native vegetation which exceeds the threshold.

The BC Act also:

- Outlines the licences required under the BC Act to harm protected flora and fauna;
- Lists Threatened species and ecological communities in Schedules 1 and 2;
- Sets out monetary and imprisonment penalties for offences relating to the harming of protected flora and fauna;
- Under Part 7 (s7.4), introduces a list of activities/proposal that exceeds the biodiversity offsets scheme threshold (BOS)

The NSW *Biodiversity Conservation Regulation 2017* sets out the Biodiversity Offsets Scheme entry threshold for Part 4 developments under the EP&A Act 1979. If the development triggers as least one (1) entry threshold, the development must be assessment under The BC Act using the Biodiversity Assessment Method (BAM) (OEH 2017). See also <https://www.environment.nsw.gov.au/biodiversity/entryrequirements.htm>

### BOS Threshold

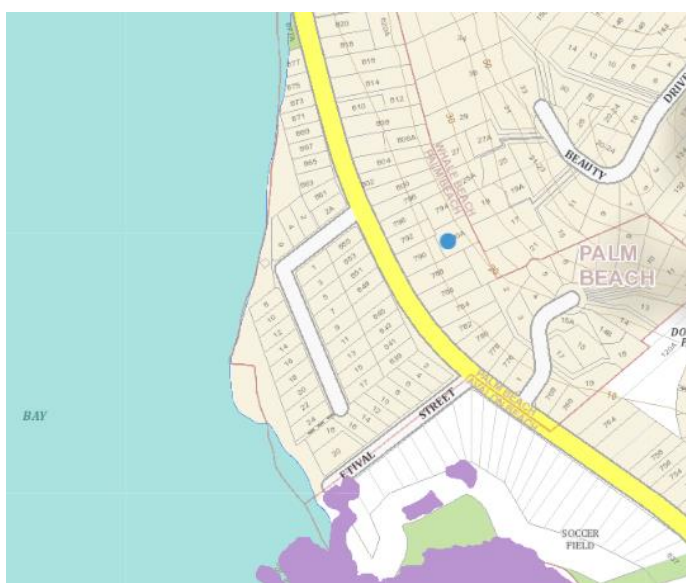
The proposal does not trigger the biodiversity offsets scheme threshold. It does not exceed the clearing area threshold nor is it located on the BV Map.

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 700m<sup>2</sup>

The proposed development will not clear >0.25Ha of vegetation.

Thus, the BOS area clearing threshold does not apply.



The site (blue) is not located within an areas of high biodiversity value as per the BV map.

- *Fisheries Management Act 1994 (FM Act).*

The proposed development is compliant with the objective of the FMA as there will be full retention of Mangrove and no blocks to fish passage. Stormwater from on-site will be managed such that there is to be a positive or neutral impact on the receiving water. See Stormwater Plan for details.

- *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 is to manage, and eradicate and Weeds that cause a high level of environmental, economic or social harm. The site and associated works will be compliant with the objectives of this Act.

- Northern Beach Council DCP and LEP

The proposal satisfies provisions outlined in both the Pittwater Local Environmental Plan 2014 -7.6 (Biodiversity protection) and Pittwater Development Control Plan 21 - DCP - B4.7 (Pittwater Spotted Gum Forest).

## 2.2 Scope of works

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

## 2.3 Limitations of the Study

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

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

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

# 3 Methods

## 3.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball assessed the site in April 2020. Inspections for the original DA (now approved) took place in December 2018. Weather was fine and sunny during the daytime 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. An opportunistic survey which was based off the BAM methodology was used to gather ecological information about the site. The included a fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified.

### 3.2 Previous studies

Bionet, previous studies and the author's knowledge of the local area, were used to determine the possible occurrence of endangered ecological communities and threatened plant species on-site. The Bionet records accessed cover a 10km<sup>2</sup> area extending from the site and include recordings from 1990 to the present day.

Records from the following databases were collated and reviewed:

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

Other sources of biodiversity information:

- Relevant vegetation mapping, including:
  - Vegetation Information System, VIS Mapping (OEH).

The following reports were also reviewed:

- Arboricultural Impact Assessment (2018)
- Report and designs submitted with this DA
  - Architectural Plans – J + B Ritchie Secondary Dwelling, DA Issue (Revision B, dated 25/05/2020)
- Office of Environment and Heritage and National Parks & Wildlife Service documents and mapping were also consulted.

## 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.



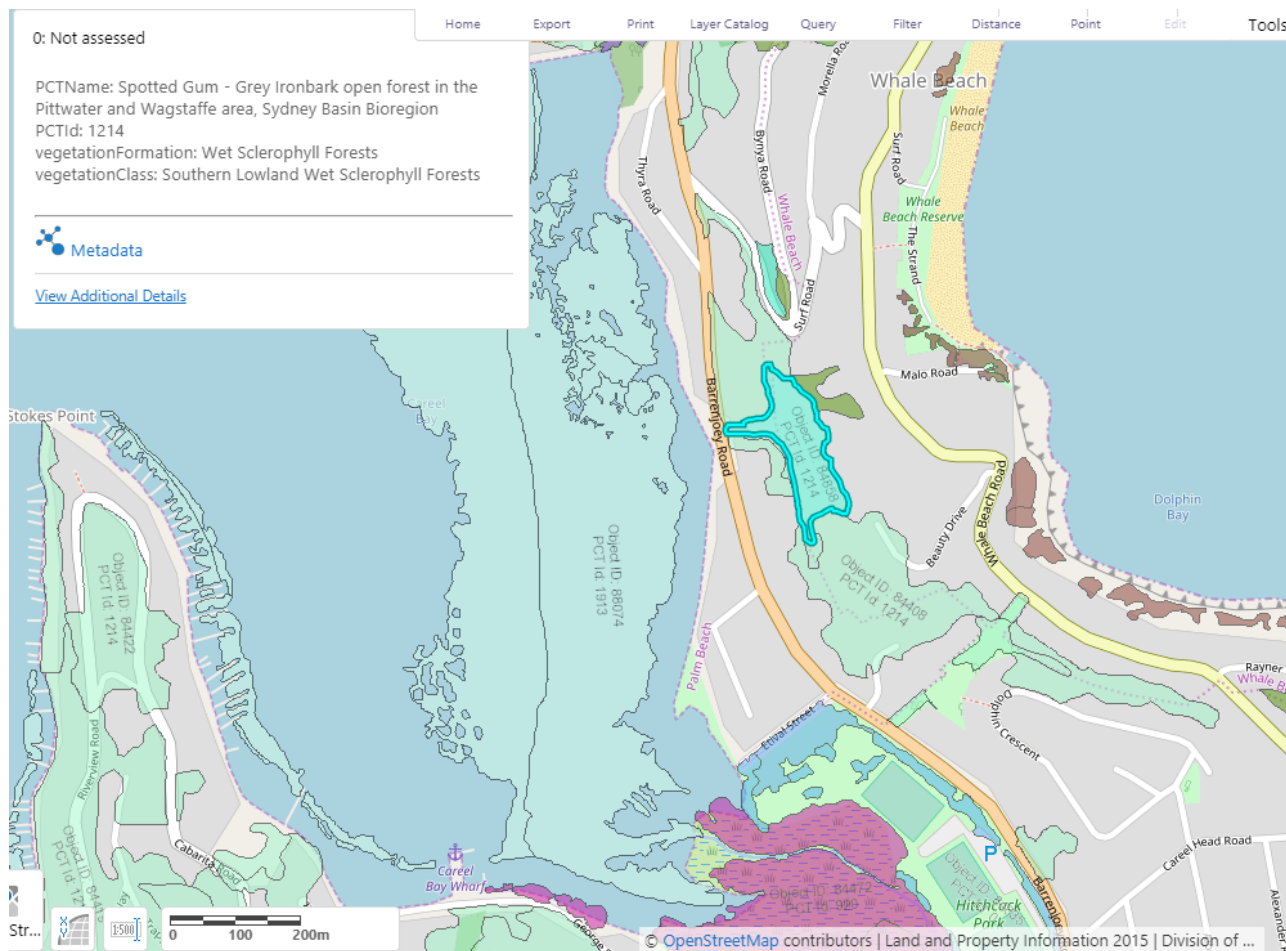


Figure 4-1 Desk top results – Pittwater Spotted Gum Forest

## 4.1 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 1990. Source: NSW OEH Bionet 2020.**

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,3		23
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	1
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A		3
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	11
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E1,P,3	E	5
Rutaceae	<i>Asterolasia elegans</i>		E1	E	1

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

Search criteria: Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Plants in selected area [North: -33.55 West: 151.27 East: 151.37 South: -33.65] recorded since 01 Jan 1990 until 24 Apr 2020 returned a total of 44 records of 6 species. Report generated on 24/04/2020 3:46 PM.

## 4.2 Flora Findings from Site Investigations

### 4.2.1 Threatened plant species findings

No threatened plant species were found during site assessments.

### 4.2.2 Observed Flora

During the site visit a variety of native flora was observed.

**Table 4-1. Flora observed during the ecological assessment.**

Scientific Name	Common Name	NSW Status	Comth. Status
<i>Adiantum aethiopicum</i>	Common Maidenhair	P	
<i>Corymbia maculata</i>	Spotted Gum	P	
<i>Allocasuarina torulosa</i>	Forest She-Oak	P	
<i>Cayratia clematidea</i>	Native Grape	P	
<i>Glochidion ferdinandi</i>	Cheese Tree	P	
<i>Elaeocarpus reticulatus</i>	Blue Berry Ash	P	
<i>Angophora floribunda</i>	Coachwood	P	
<i>Macrozamia communis</i>	Burrawang Palm	P	

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

### 4.2.3 Disturbances to Flora

#### Remnant Bushland zone

The vegetation at the rear (east) of the site will be retained and regenerated using bush re-aeration techniques.

#### Tree Removal

It is preferred that T8 - Swamp she-oak (*Casuarina glauca*) be removed as the development encroaches on the Structural root zone (SRZ). Removal of the tree (T8) will not result in significant ecological impacts on site, the tree is in marginal condition. All other tree on site will be retained.

#### 4.2.4 Arborist report findings

See Arboricultural Report (2018) trees being retained will require protection during works and construction to keep and protect the roots. See Arborist report for details.

## 5 Fauna

### 5.1 Threatened fauna

During the survey, no threatened species were observed on-site. However, marginal foraging habitat and refugee habitat for the Grey-headed Flying-fox, Little Eagle and Large Forest Owls were recorded within the study area. Other marginal habitats identified for various Microbat species.

48 fauna species are currently Bionet listed as vulnerable or endangered under state and/or commonwealth legislation within a 10km radius of the activity site. 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 1990. Source: NSW OEH Bionet 2020.**

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V,P	V	44
Amphibia	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V,P		55
Reptilia	<i>Caretta caretta</i>	Loggerhead Turtle	E1,P	E	2
Reptilia	<i>Chelonia mydas</i>	Green Turtle	V,P	V	7
Reptilia	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	P	V	2
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		4
Aves	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		1
Aves	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		1
Aves	<i>Diomedea exulans</i>	Wandering Albatross	E1,P	E,J	1
Aves	<i>Diomedea gibsoni</i>	Gibson's Albatross	V,P	V	1
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P	C	34
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		3
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		4
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		40
Aves	<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A,P		1
Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		5
Aves	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	7

Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		1
Aves	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		40
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		3
Aves	<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	2
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		4
Aves	<i>Ninox connivens</i>	Barking Owl	V,P,3		15
Aves	<i>Ninox strenua</i>	Powerful Owl	V,P,3		166
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		2
Aves	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E1,P,2	E	1
Aves	<i>Petroica boodang</i>	Scarlet Robin	V,P		3
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	3
Mammalia	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	9
Mammalia	<i>Phascolarctos cinereus</i>	Koala in the Pittwater Local Government Area	E2,V,P	V	2
Mammalia	<i>Phascolarctos cinereus</i>	Koala	V,P	V	24
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		6
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		1
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	67
Mammalia	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		3
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	6
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V,P		5
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		2
Mammalia	<i>Vespadelus trougtoni</i>	Eastern Cave Bat	V,P		2
Mammalia	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	2
Mammalia	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		2
Mammalia	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		2
Mammalia	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	E	7
Mammalia	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	7
Mammalia	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		1
Mammalia	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		23



Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		25
----------	---------------------------------------	-----------------------	-----	--	----

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

Search criteria: Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Animals in selected area [North: -33.47 West: 151.17 East: 151.27 South: -33.57] recorded since 01 Jan 1990 until 23 Apr 2020 returned a total of 132 records of 29 species. Report generated on 23/04/2020 10:51 AM.

## 5.2 Endangered populations

Two endangered populations have been recorded to occur within 10km of the site. Squirrel Gliders may be present on the peninsula but not recorded for in the past 10 years – Sugar Gliders have been reported. No Koalas in this area anymore (past 20 years).

**Table 5. Endangered Populations in the LGA. Source NSW OEH Bionet 2020.**

Endangered Population	Scientific Name	NSW Status	Comth. Status	No. of records
Koala	<i>Phascolarctos cinereus</i>	E2,V,P	V	7
Squirrel Glider	<i>Petaurus norfolcensis</i>	E2,V,P		1

## 5.3 Fauna findings from site assessment

No threatened fauna identified onsite.

# 6 Impacts

## 6.1 Direct Impacts

### 6.1.1 Vegetation disturbance and loss

The proposed secondary dwelling is to be clear of trees onsite, apart from a single tree; Swamp she-oak (*Casuarina glauca*) (T8). It is preferred that T8 - Swamp she-oak (*Casuarina glauca*) be removed as the development encroaches on the Structural root zone (SRZ). Works including; cut, fill and retaining walls are expected not to affect other trees onsite.

Removal of the tree (T8) will not result in significant ecological impacts on site, the tree is in marginal condition. Therefore, this assessment is valid for either outcome - the tree being retained or the tree being removed.

Trees being retained will be incorporated into proposed landscaping onsite. Vegetation condition onsite is set to improve post development as “bush-scaping” techniques are expected to improve habitat quality for native fauna.

## 6.2 Indirect Impacts.

### 6.2.1 Weed growth and invasion

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

### 6.2.2 Introduction of pathogens

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

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

See Appendix III for full 5-Part Tests.

### Pittwater Wagstaff Spotted Gum Forest EEC

Pittwater Wagstaff Spotted Gum Forest EEC will be benefitted by the removal of weeds and the regeneration of the areas on-site that are currently dominated by weed species. The development has been sighted to minimise impact.

### Large Forest Owls

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

### Mircobats

Threatened Microbat species (Eastern Freetail-bat, Yellow-bellied Sheath-tail Bat, Eastern False Pipistrelle, Eastern Bentwing-bat and Southern Myotis) were identified as having potential foraging habitat within the site. The proposal would have little effect on microbat species. Trees onsite may contain marginal foraging habitat for species which feed on insects in or above the canopy. This habitat may be disturbed temporarily during proposed works.

## 7 Recommendations

### 7.1 Mitigation Measures

#### 7.1.1 Delineation of work areas and vegetation clearing

During construction, impacts on the site and adjacent vegetation should be minimized by the delineation of works zones. Most of the vegetation planned for clearing is currently weed. In this case, no vegetation clearing control measures are necessary. Refer to Arborist report for tree protection measures.

#### 7.1.2 Tree Protection

Tree protection will be consistent with the Arborist report.

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

Weed management, landscaping and bush regeneration will occur as per Landscaping Plan (See Landscaping Plan) with on-going bush regeneration on other parts of the site.

#### 7.1.4 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.

#### 7.1.5 Native Seed Collection

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

#### 7.1.6 Landscaping

Landscaping will follow the Landscaping Plan.

#### 7.1.7 Nest boxes

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

Image from: [nestboxes.com.au](http://nestboxes.com.au)



#### 7.1.8 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.)

#### 7.1.9 Vertebrate Pests




Vertebrate pests (cats, dogs, foxes) are a significant problem in this area. Cats to be kept in at night and not able to enter any bushland at any time. Dogs to be restrained from entering bushland unsupervised.



Foxes – NB Council has a program in place to manage foxes.



## 7.2 Appendix I – Key Weed Removal Methods

### Physical removal

Technique	Method	Equipment
<b>Hand Removal</b> 	<p>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.</p> <p>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.</p>	<p>Tools: Gloves, Rakes, Knife and</p> <p>Weed Bags</p>
<b>Crowning</b> 	<p>Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning.</p> <p>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</p> <p>Soil disturbance is to be kept to a minimum when using this technique.</p>	<p>Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.</p>
<b>Cut and Paint Stems</b> 	<p>Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent or vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent.</p> <p>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.</p> <p>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.</p>	<p>Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.</p>

Technique	Method	Equipment
<p>Scrape and Painting</p> 	<p>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.</p> <p>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 <math>\frac{3}{4}</math> of the plants height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk.</p> <p>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.</p> <p>Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.</p>	<p>Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>
<p>Cut with a Chainsaw and Paint</p> 	<p>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.</p> <p>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.</p> <p>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.</p> <p>Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.</p>	<p>Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>

Technique	Method	Equipment
Spot Spraying	<p>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.</p> <p>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.</p>	<p>Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.</p>

### 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.

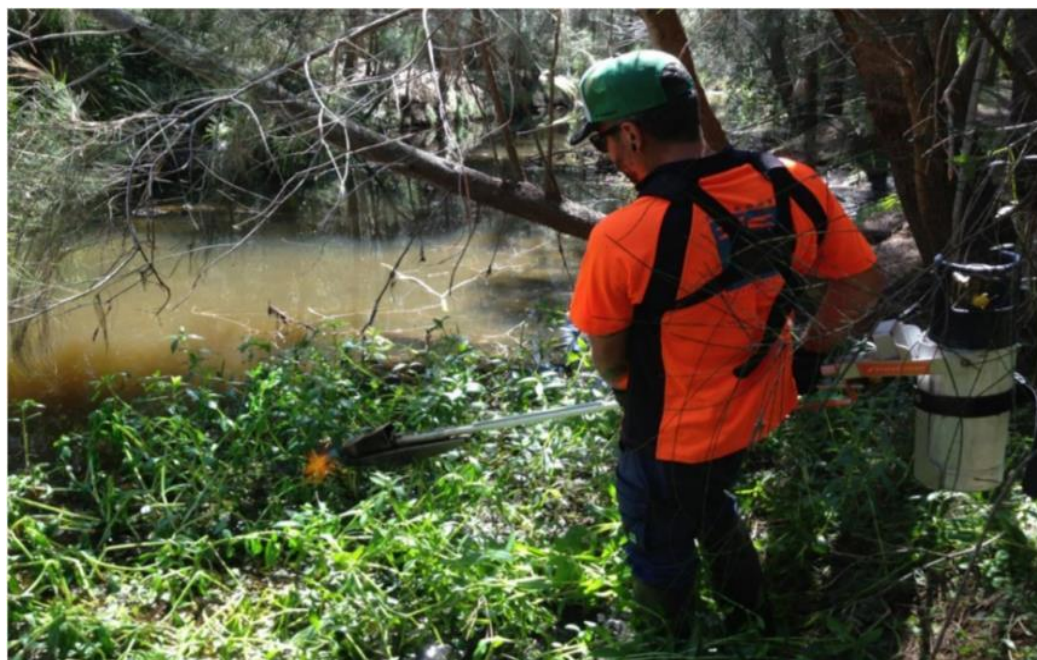
## FLAME WEEDER – ECO BURN

Case Study: Weed  
Mgt and Eco-burn  
Glenorie in the  
Hills Shire Council



Images provided by Dragonfly  
Environmental

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





### 7.3 Appendix–II 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.

## **7.4 Appendix III– Tests of Significance**

### **7.4.1 Pittwater Wagstaff Spotted Gum Community EEC**

- 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,*

Not a Threatened Species

*In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

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

The local occurrence of PWSGF is already at risk of extinction. But this area has a high opportunity for restoration. Soil seed bank is largely intact and natural regeneration has been observed (particularly post thermal weeding) – largely from there being no to low recruitment. The inclusion of canopy tree planting and planting of locally native mid and understory species will be a benefit to the community. Only tube-stock and local source is needed.

- (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,*

At this site the area is highly modified – landscape exotic species garden with low value for native fauna and no representation of the original PWSG Forest. The local occurrence is at risk of extinction and the proposed development, with appropriate landscaping and planting of canopy trees will be an improvement from the current situation.

- b) *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*

Works associated with the secondary dwelling may remove one tree from the site - (T8) Swamp she-oak (*Casuarina glauca*). This tree is in poor condition and is not significantly contributing the health of the EEC. The area of impact is primarily weeds. The proposal will not be a major impact on the PWSGC EEC.

- (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*

Already is fragmented and the proposed will not increase this providing there is tree planting.

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

No core habitat will be removed or modified as a result of the proposed development.

- c) 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),*

Declared areas of outstanding biodiversity value have not yet been declared in this area.

- d) 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.*

Land clearing is a key threatening process. Although the area of impact is dominated by weeds. The building will not cause a increase in any KTP.

#### **7.4.2 Powerful Owl (*Ninox strenua*)**

##### **5-Part Test**

*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:*

- 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 works are not expected to adversely affect the life cycle of Large Forest Owls such that a local population would become extinct. Impacts are potentially from the removal of trees. No trees have hollows suitable for owls to breed in however the trees are habitat for Owl prey species.

- f) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*
  - (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
  - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

The Powerful Owl species in the area are not part of an endangered population.

- g) In relation to the habitat of a threatened species or ecological community:*

- (iv) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
- (v) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*

- (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,*

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. Areas of bushland (as of April 2020) are being retained.

Sightings of Powerful Owls have been recorded nearby the site. The proposed vegetation remove a small area of potential foraging habitat. It is not expected, on its own, to significantly influence the long-term survival of PO 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),*

Declared areas of outstanding biodiversity value have not yet been declared in this area.

- i) *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.*

Land clearing is a key threatening process for the Powerful Owls. The proposed development will not result in clearing of Large Forest Owl species breeding or roosting habitat.

#### Conclusion:

This proposal is not likely to significantly affect Populations of Powerful Owls (*Ninox strenua*). A local population for Powerful Owls would include 1 breeding pair. No breeding habitat was observed, or previously recorded, on-site. While foraging habitat and prey species would be reduced no known breeding habitat would be lost so the proposal is not likely to put the local population at risk of extinction. Revegetation is required (will need to include off-site planting) so that there is habitat for prey species and no-nett loss of habitat long-term.

#### **7.4.3 Microbats**

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

- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Little Bentwing-bat (*Miniopterus australis*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Southern Myotis (*Myotis macropus*)





Microbats are mobile but do tend to use and re-use suitable areas and roost trees. Although these species have differing habitat requirements, they have been assessed together as the trees to be removed are habitat either directly for roosting (cracks, crevices, hollows) or indirectly for food (flying insects) for all eight species.

#### 5-Part Test

*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 suitable habitat trees will be removed as a result of this development.

The low number of recorded sightings tree roosting species suggest that the area is not currently being used as primary breeding habitat (Bionet, 2020). This indicates a low potential for the life cycles of local populations to be put at risk as the site may be used primarily for foraging resources. The proposed actions would be expected to have a lesser impact upon cave dwelling species including the Eastern Bentwing-bat and the Southern Myotis. Trees do not comprise breeding habitat for these species and would not impact their life cycles. The Eastern Freetail Bat, the Eastern Bentwing Bat and the Southern Myotis have relatively higher recorded sightings within a 10km are surrounding the site (Bionet, 2020). This indicates that the site may be used occasionally or opportunistically for foraging purposes within canopy vegetation.

- b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

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

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

Microbats are not an EEC but they do live within EECs and re key pollinators of some species so to that extent they are part of the EEC.

- 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,*

Trees may contain marginal foraging habitat for species which feed on insects in or above the canopy. These trees will not be removed or modified. Therefore, the development is not expected to result in the loss of local populations of microbats.

- 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),*

Declared areas of outstanding biodiversity value have not yet been declared in 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.

No

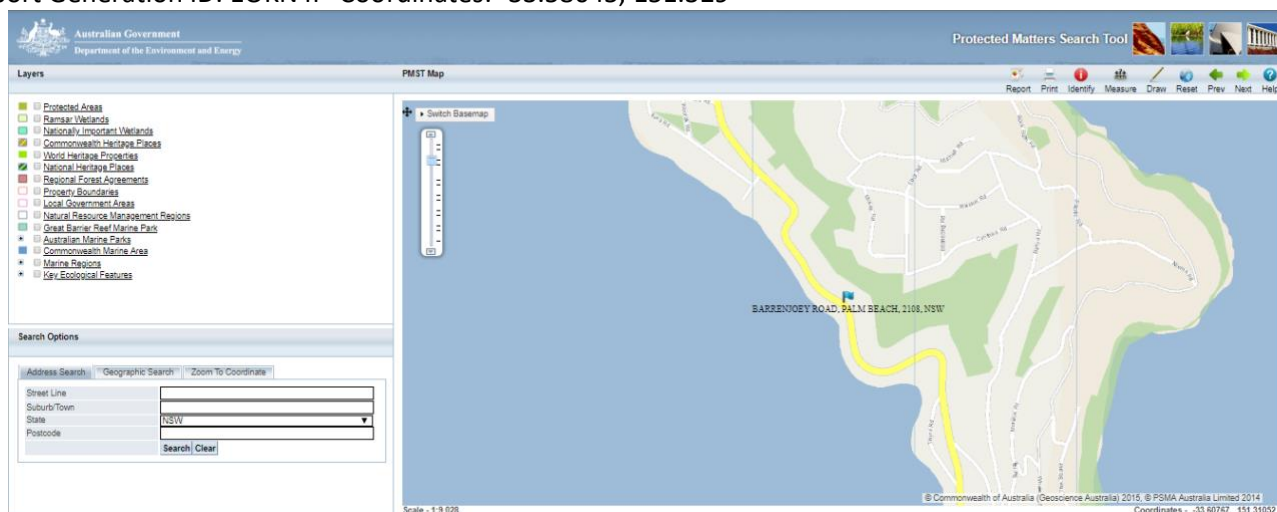
### Conclusion

The proposed actions will not result in the loss of trees or foraging habitat. Thus, the development is not expected to result in the loss of local populations of microbats.

## 7.1 Appendix III– MNES

A Protected Matters Search was conducted.

Report Generation ID: 10KN4F Coordinates: -33.58045, 151.329



## Summary

### Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance relate to, the area you nominated. Further information is available in the detail accessed by scrolling or following the links below. If you are proposing to und significant impact on one or more matters of national environmental significance [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	3
<a href="#">Listed Threatened Species:</a>	66
<a href="#">Listed Migratory Species:</a>	56

## Listed Threatened Ecological Communities

## [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
<a href="#">Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community may occur within area
<a href="#">Coastal Upland Swamps in the Sydney Basin Bioregion</a>	Endangered	Community may occur within area
<a href="#">Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion</a>	Endangered	Community likely to occur within area

### Frogs

#### [Heleioporus australiacus](#)

Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
-----------------------------	------------	--

#### [Litoria aurea](#)

Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
-----------------------------------	------------	--

#### [Litoria littlejohni](#)

Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
--	------------	--

### Mammals

#### [Balaenoptera musculus](#)

Blue Whale [36]	Endangered	Species or species habitat may occur within area
-----------------	------------	--

#### [Chalinolobus dwyeri](#)

Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

#### [Dasyurus maculatus maculatus \(SE mainland population\)](#)

Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
---	------------	--

#### [Eubalaena australis](#)

Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
---------------------------	------------	--

#### [Isodon obesulus obesulus](#)

Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
--	------------	--

#### [Megaptera novaeangliae](#)

Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
---------------------	------------	---

#### [Petrogale penicillata](#)

Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
---------------------------------	------------	--

#### [Phascolarctos cinereus \(combined populations of Qld, NSW and the ACT\)](#)

Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
--	------------	---

## 8 Expertise of authors

With over 20 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

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

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

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

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

### Geraldene Dalby-Ball DIRECTOR



#### SPECIALISATIONS

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

#### CAREER SUMMARY

- **Director and Ecologist**, Ecological Consultants Australia. 2014-*present*
- **Director and Ecologist**, Dragonfly Environmental. 1998-2013
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

#### QUALIFICATIONS AND MEMBERSHIPS

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



Jack is a passionate ecologist who has worked with various stakeholders across both the public and private sectors to deliver sustainable environmental outcomes. He has worked on projects with major construction contractors and has been able to deliver tailored environmental solutions on time and within budget.

As an undergraduate student, he published a study that examined the cost of revegetation across the Richmond River Catchment in NSW. This study provided Jack with a deep understanding of urban and landscape ecology and the environmental factors associated with habitat restoration.

He has advanced communication skills and can deliver professional ecological assessments. He has a thorough understanding of current NSW and Commonwealth environmental legislation. He is also competent in the practical application of flora and fauna surveying and monitoring techniques.

Jack would be a valuable addition to any ecology project as he is committed to achieving the best possible outcome for both the client and the environment.

**Key Projects Include:**

- Monitoring of Endangered Species, various locations
- Environmental consultant for many civil developments throughout the Sydney region
- Researching the On-farm costs of revegetation in the Richmond River Catchment
- Sustainable business transformation proposal for a retail store.

## Jack Hastings

### ECOLOGIST



### SPECIALISATIONS

- Urban and landscape ecology – design and re-creation
- Environmental Impact Assessments (EIA)
- Review of Environmental Factors for development applications
- Flora and Fauna management plans
- Habitat tree assessment, marking and mapping
- GIS mapping
- Sound understanding and practical application of experimental design
- Grant writing and grant assessment

### CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. *2019-present*
- **Environmental Consultant**, BBN Consulting. *2018-2019*

### QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Environmental Science**, Southern Cross University.
- **Certificate II Agriculture**.
- **WHS General Induction of Construction Industry NSW White Card**.