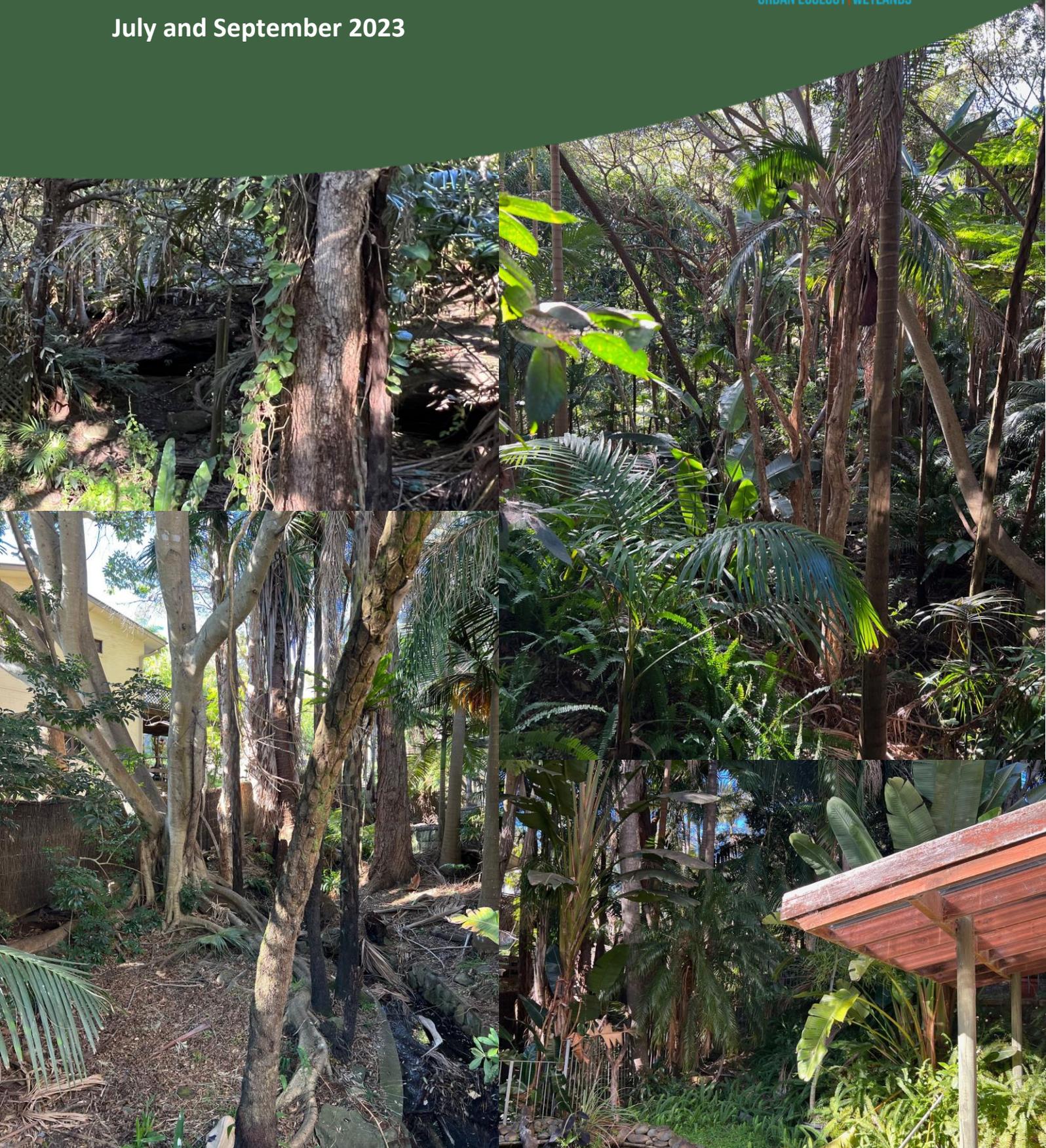


Flora and Fauna Assessment

337 Lower Plateau Rd, Bilgola Plateau NSW 2107

Prepared by Ecological Consultants Australia Pty Ltd TA
Kingfisher Urban Ecology and Wetlands

July and September 2023





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Statement of Authorship

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

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	
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Distribution:	Ray and Mary Trevisan C/- Gartner Trovato Architects 10 Park Street Mona Vale NSW 2103

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

A handwritten signature in black ink, appearing to read "G Dalby-Ball".

Summary

Introduction

Ecological Consultants Australia (ECA) trading as Kingfisher Urban Ecology & Wetlands has been contracted by Ray and Mary Trevisan to provide a **Flora and Fauna Assessment** for the proposal at 337 Lower Plateau Road, Bilgola Plateau NSW 2107 within the Northern Beaches Council LGA.

The proposed development is for a 3 lot subdivision at 337 Lower Plateau Road, Bilgola Plateau NSW 2107.

Methods

- On-ground site inspection took place on the 10 July 2023 by Principal Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos, and samples of flora species were taken, on-site and neighbouring sites, to assess the ecological health and value of the site.
- BioNet searches were performed for flora, fauna, endangered populations, and communities to identify if there were previous records of threatened species occurring within the local area using a 10 km radius around the site.
- Review of the proposed development was evaluated for potential environmental impacts.

Results

- No threatened flora or fauna species were recorded on the site during the survey or previously recorded via BioNet.
- No significant habitat features, values or landscape corridors will be impacted by the proposed development.
- The proposal does not trigger entry into the BOS.
- Tree protection will be consistent with the Arboricultural Impact Assessment
- The site contains vegetation that may have been part of Escarpment Moist Forest and PCT 3592 – Sydney Coastal Enriched Sandstone Forest. However, the community is highly degraded with most plants being from out of area (Palms). Replanting and weed removal are expected to improve the condition of the vegetation communities on-site.
- Test of significance (5-part tests) have been conducted for the microbat species. Appendix V contains 5-Part Test of Significance.
- While the 5-part test resulted in a ‘not significant’ impact for the species assessed, recommendations to include habitat augmentation are restricted onsite, however can be implemented in future stages of this sites development particularly around the creek line.

Mitigation Measures

If the development is approved mitigation works will be required at the time of DA submission for future dwellings. The key one being the implementation of a VMP including stormwater drainage and waterway management.

Before works:

- Tree protection as per the Arboricultural Impact Assessment by Urban Forestry Australia. December 2022.
- Removal of biosecurity listed weeds in works areas.
- Effective site management to minimise sediment runoff.
- Nest box installation (x1 microbat box) in trees to be retained.

During works:

- Tree protection as per the Arboricultural Impact Assessment by Urban Forestry Australia..
- Effective site management to minimise sediment runoff.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

- Weed management.

Other matters such as VMP, full site weed works, landscaping can be detailed with individual applications for dwellings.

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

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

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Request from Council – fullfill dby he report and the associated study.

Natural Environment Referral Response - Biodiversity

Application Number:	DA2023/0511
Proposed Development:	Demolition of existing structures, removal of trees and subdivision of one lot into three lots.
Date:	25/05/2023
Responsible Officer	Nick Keeler
Land to be developed (Address):	Lot 5 DP 222134 , 337 Lower Plateau Road BILGOLA PLATEAU NSW 2107

Reasons for referral

This application seeks consent development on land, or within 40m of land, containing:

- All Development Applications on
- Actual or potential threatened species, populations, ecological communities, or their habitats;
- Wildlife corridors;
- Vegetation query stipulating that a Flora and Fauna Assessment is required;
- Vegetation query - X type located in both A & C Wards;

And as such, Council's Natural Environment Unit officers are required to consider the likely potential environmental impacts.

Officer comments

The proposal seeks approval for the demolition of existing structures, removal of trees and subdivision of one lot into three lots.

The comments in this referral relate to the following applicable controls and provisions:

- Pittwater LEP 2014 - Part 7.6 Biodiversity Protection
- Pittwater 21 DCP - Clause B4.4 Flora and Fauna Habitat Enhancement Category 2 and Wildlife Corridor

The proposal has been submitted with an Arboricultural Impact Assessment with the resulting assessment of a total of 287 trees. The report has recommended the removal of a total of 93 trees with a total of 26 prescribed trees being proposed for removal and a total of 67 trees being exempt under current Tree removal exemptions.

No Flora and Fauna Assessment report has been submitted with the application as per the Biodiversity Requirements for Development Applications: <https://files-preprod-d9.northernbeaches.nsw.gov.au/nbc-prod-files/documents/general-information/environmental-and-community-protections/biodiversity-requirements-development-applications.pdf>.

Therefore, the Biodiversity referral of the application will continue upon reception of an Flora and Fauna Assessment prepared by a suitably qualified ecologist. The ecologist will have to submit the relevant information and confirm whether the proposed development triggers the thresholds for entry into the Biodiversity Offsets Scheme.

Flora and Fauna Assessment Preparation

This Flora and Fauna Assessment (FFA) has been prepared in accordance with the Northern Beaches Council’s requirements for a Flora and Fauna Assessment, outlined in the guiding document, *Biodiversity Requirements for Development Applications – Guideline 1: Flora and Fauna Assessment*. A compliance table demonstrating how the FFA satisfies the Northern Beaches Council guidelines is presented in the table below.

Compliance of technical requirements of a FFA as per the Northern Beaches Council guiding document *Biodiversity Requirements for Development Applications – Guideline 1: Flora and Fauna Assessment*.

Chapter	Required Information	Section
Introduction	<ul style="list-style-type: none"> • Identification and description of the site. 	Section 1.3
	<ul style="list-style-type: none"> • Description of the proposed development and references to plans and reports used for the assessment. 	Section 1.4 Section 1.5
	<ul style="list-style-type: none"> • The regional context and physical description of the study area including hydrology, geology, soils, landforms, climate and types and conditions of the habitat(s) in, and adjacent to, the land affected by the proposal. 	Section 1.3
Legislative and planning requirements	<ul style="list-style-type: none"> • An outline of legislative requirements relevant to the proposal, addressing local and state environmental planning instruments relevant to biodiversity. 	Section 1.6
	<ul style="list-style-type: none"> • Consideration of the proposal against the thresholds of the NSW Biodiversity Offsets Scheme (BOS). 	Section 1.7
Survey methodology and results	<ul style="list-style-type: none"> • The level of survey effort will depend on the size of the development and the level of impact. However, at minimum, all FFAs should include the following information: <ul style="list-style-type: none"> – Details of desktop and field survey methods employed; – A map and photos of the study area and subject site; – A list of flora and fauna species (native and introduced) identified on site; – A list and map of threatened species and ecological communities known or likely to occur in the study area and locality; – Description, map and photographs of any Plant Community Types (PCTs) identified within the study area; – List of threatened flora surveyed for, including whether the survey was undertaken within the 	
		Section 2.1 Section 3
		Section 1.3 Section 2.2
		Section 3.4
		Section 3.1 Section 3.5 Section 3.6 Section 3.7
		Section 2.2 Section 3.1
		Section 3.5

Chapter	Required Information	Section
	<p>recommended survey period as outlined in the Threatened Biodiversity Data Collection (TBDC).</p> <ul style="list-style-type: none"> – Description of fauna habitat available on the site; – Map of all hollow-bearing trees located within the study area, including a description of the size of the hollow (cm); – Map of survey method locations (including any specialist fauna survey methods), including a map of GPS tracks, survey dates, times and weather conditions; – Map of environmental features and habitat types (such as sandstone outcrops, culverts or overhangs); – Discussion of any constraints or limitations of the study. 	<p></p> <p>Section 3.3</p> <p>Section 3.3</p> <p>Section 2.1</p> <p>Section 1.3</p> <p>Section 1.2</p>
<p>Impact assessment</p>	<ul style="list-style-type: none"> • The FFA should identify all direct and indirect impacts to biodiversity values associated with the proposal. This includes impacts associated with: demolition and construction; excavation and fill; construction access and staging areas; materials and debris stockpiling; installation of services and stormwater infrastructure; onsite effluent disposal areas, establishment of bush fire APZs; landscaping, and ongoing operation of the development. • Direct and indirect impacts may include: clearing and modification of vegetation; removal of habitat features such as hollows, caves and rock outcrops; fragmentation or isolation of habitat; changes to flora and fauna dispersal routes; soil disturbance, run-off and sedimentation; increased noise, vibration, increased lighting and traffic in natural areas, and demolition or modification of human-made structures utilised by wildlife (such as bats). • The area (ha) of native vegetation required to be cleared for the development should be clearly stated. 	<p>Section 4</p>

Chapter	Required Information	Section
	<ul style="list-style-type: none"> Threatened species 'Tests of Significance' for any applicable threatened entities, prepared in accordance with Section 7.3 of the BC Act. Where relevant, an assessment against the Environmental Protection and Biodiversity Conservation Act 1999 (Significant Impact Guidelines 1.1 – Matters of National Environmental Significance) is also required. 	Appendix III
		N/A
Avoid and minimise	Discussion of measures undertaken to avoid and minimise impacts of the development.	Section 5
Mitigation measures	Identification of mitigation and/or compensatory measures to reduce impacts following avoidance and minimisation of impacts. Appropriate mitigation measures are outlined further in Guidelines 4.	Section 5
Conclusion	Assessment of the proposal against the biodiversity controls and legislation applicable to the site. A statement summarising the overall direct, indirect, ongoing and cumulative impacts of the proposal on biodiversity values of the subject site and locality, with specific reference to impacts to threatened entities and important wildlife habitat.	Section 6

1 Introduction

1.1 Scope of works

Ecological Consultants Australia (ECA) has been contracted by Ray and Mary Trevisan to provide a **Flora and Fauna Impact Assessment** to assess potential direct and indirect impacts on any threatened species, populations, and communities as per section 5A of the *Environmental Planning & Assessment Act 1979* (EP&A Act 1979). The 'test of significance' has been undertaken in accordance with the NSW Department of Planning, Industry, and Environment (DPIE) 'threatened species test of significance'. The test of significance is set out in s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act 2016).

1.2 Limitations of the study

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

Surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific

periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame and assess the suitability of habitat for particular species. Considering the site and habitat availability Kingfisher are confident that this survey is representative of the likely species and vegetation community and that future studies at other times would not change the conclusions in this report.

1.3 Identification and description of the site

The Subject Site (the “Site”) is the area of direct and likely indirect impacts and is defined as the whole of the property. The study area includes the site, as well as any additional surrounding land traversed during the site survey. The site is identified as 337 Lower Plateau Road, Bilgola Plateau NSW 2107. The site is approximately 0.47 ha in size and is zoned as C4 Environmental Living. The site is within the local government area of Northern Beaches Council. The site fronts Barrenjoey Rd. The site contains an existing residential dwelling.

Table 1.1. Site administrative information.

Category	Details	Category	Details
Title Reference (Lot/DP)	5/DP 222134	Street Address	337 Lower Plateau Road, Bilgola Plateau NSW 2107
Area (m ²)	3,410	LGA	Northern Beaches Council
		Land Zoning	C4 Environmental Living



Figure 1.1. Site map. Source: SIX Maps. Date accessed: 4/09/2023.

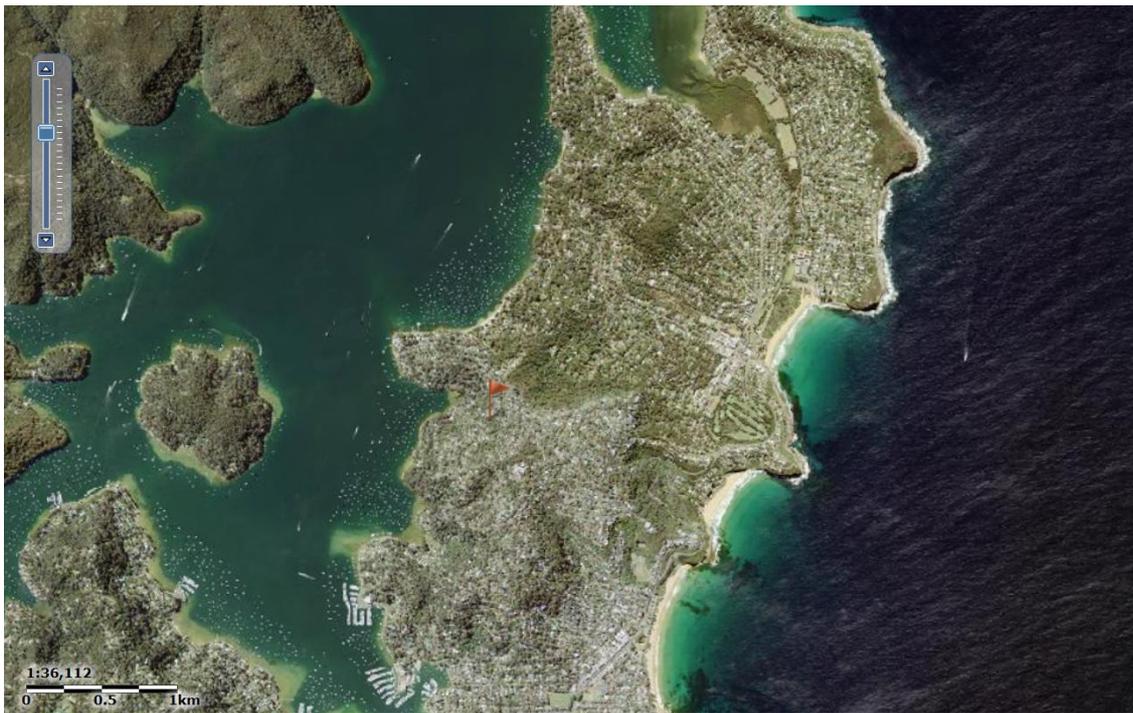
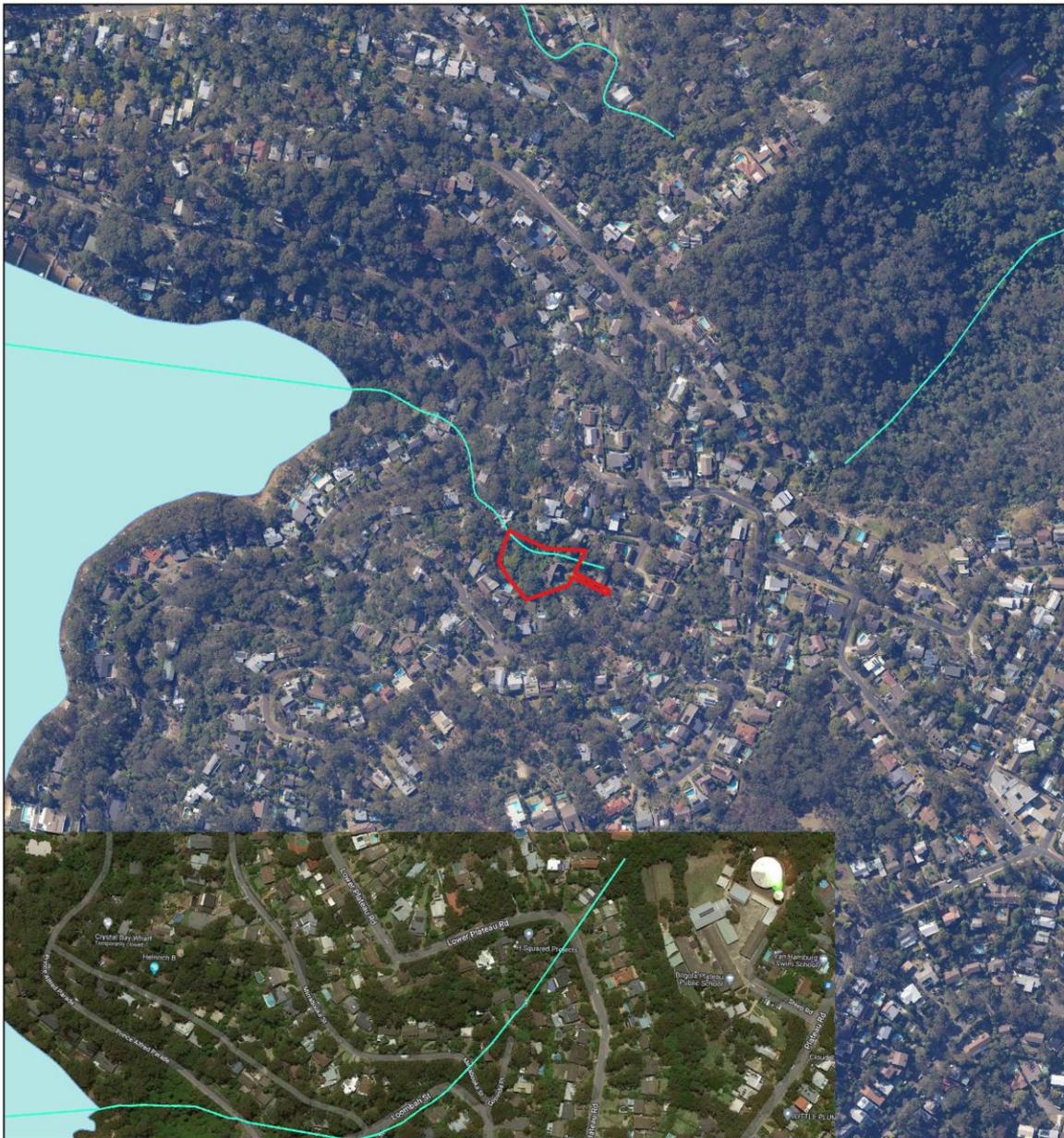


Figure 1.2. Location map. Source: SIX Maps. Date accessed: 4/09/2023.

1.3.1 Catchment context

Property is within the Refuge Cove hydroline. See Figure 1.3. The Hydroline is a first order waterway and only on the northern part of the site. An ephemeral drainage line exists on the south-western side. See separate Waterway Impact Statement (Sept 2023).



Legend

-  Subject Site
-  Hydro Line
-  Hydro Area

100 0 100 200 m



Coordinate System: GDA94 / NSW Lambert
Image Source: NSW Imagery 2014
Data Source: NSW Hydrography 2016
Project: FF 337 Lower Plateau Rd, Bilgola Plateau
Date: 22 August 2023
Author: Brooke Thompson

1.3.2 Geology and soil landscapes

The property is situated upon a Narrabeen Group of sediments consisting of mostly interbedded laminate and shale with quartz to lithic quartz sandstone, minor sedimentary breccia, claystone, and conglomerate. The dominant soil landscape identified on the site is Watagan soil landscape. See Figure 1.4.

Watagan— rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 60–120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial sideslopes, occasional sandstone boulders and benches. Tall eucalypt open-forest with closed-forest (rainforest) in sheltered positions.



Figure 1.3. Soil landscapes. Source: eSpade 2.0 2023.

1.4 Proposed development

The proposed development is for a 3-lot subdivision. The future view of the site has been taken into account with the design of the 3 residential dwellings (Figure 1.5). Footprints and construction methods have been taken into consideration in order to determine the impacts of the potential future builds and indirect impacts of having 3 residential properties on the site. Proposed Lot 1 and 2 are largely within the footprint of the existing dwelling. Lot 3 is in an area dominated by weeds and not impacting the drainage line (not a creek). Works methods will be from the disturbance side, including the existing drive, leaving the bulk of the vegetation on the site will remain intact and undisturbed.

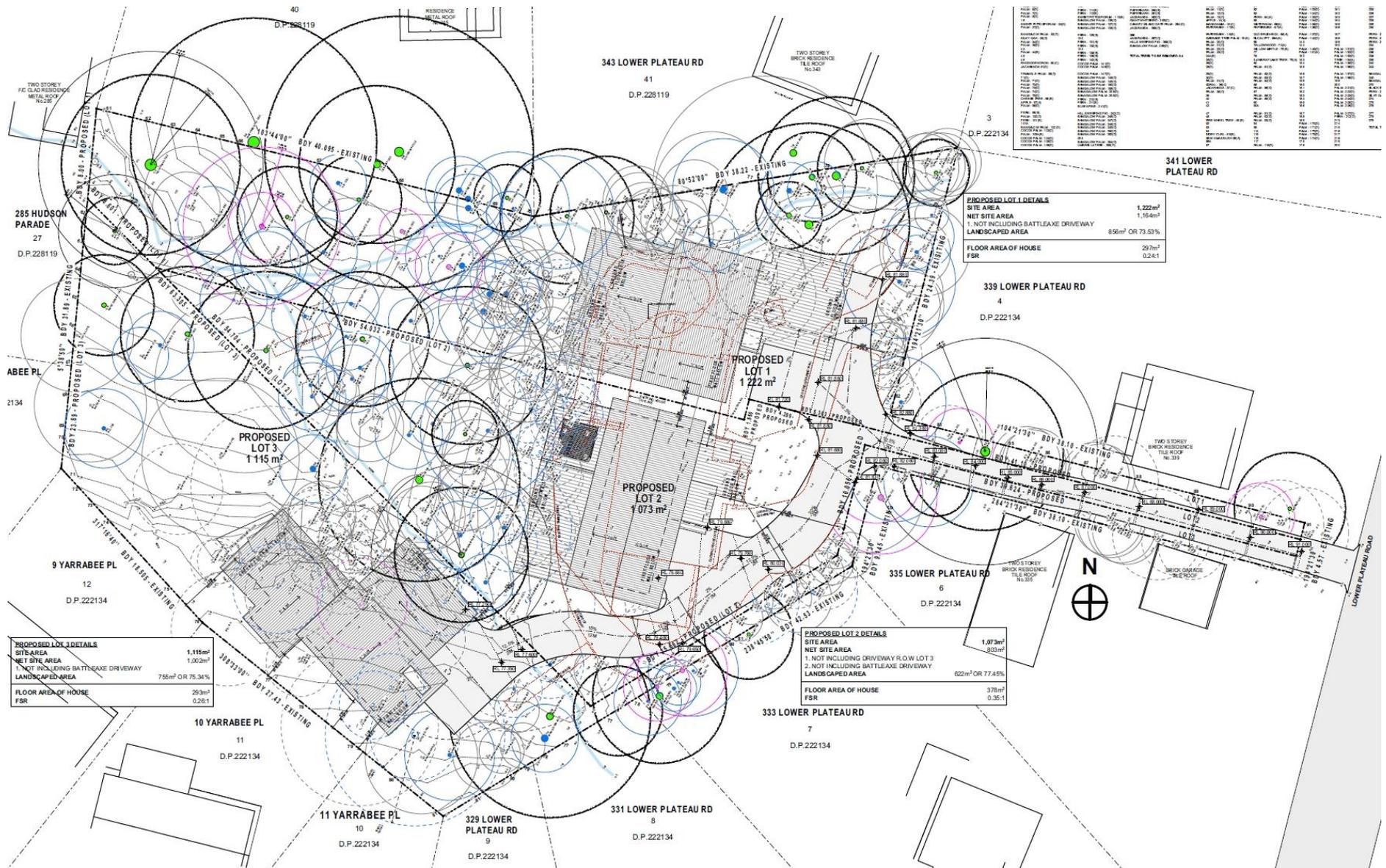


Figure 1.4. Site Plan. Source: Proposed Subdivision. Gartner Trovato. 30/08/2022.

1.5 Sources of information used in the assessment

The following sources of information were used for the assessment.

BioNet, previous studies, and the author's knowledge of the locality were used to determine the likelihood of occurrence of threatened species or ecological communities, or their habitats onsite. BioNet records within a 10 km radius of the subject site were accessed and include records from 1993 to the present day.

Records from the following databases were collated and reviewed:

- Atlas of NSW Wildlife (BioNet) Office of Environment and Heritage (OEH).
- Biodiversity Values Map and Threshold Tool
<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>
- eSPADE v2.2 <https://www.environment.nsw.gov.au/eSpade2Webapp/>
- Nearmap.
- SEED Maps.
- SIX Maps.
- NSW Six Map.
- NSW Threatened Species Information (DPIE).
- PlantNET (The Royal Botanic Gardens and Domain Trust, 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Plans and drawings specific to this development:

- Arboricultural Impact Assessment by Urban Forestry Australia. December 2022.
- DA-01 Survey. Gartner Trovato Architects, 30/08/2022.
- DA-02 Site Plan. Gartner Trovato Architects, 30/08/2022.

1.6 Legislative and planning requirements

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

1.6.1 NSW Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000* institutes and sets out a system for environmental planning and assessment in NSW and requires that the assessing body, in this case local government, consider the proposal with respect to this report the impacts on threatened species, populations, and communities. The proposal indicates no significant impact on threatened species, populations, or communities.

1.6.2 NSW Biodiversity Conservation Act 2016 and associated documents

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 threatened species and ecological communities in NSW, and the clearing of native vegetation.

The BC Act 2016 also:

- Outlines the licences required under the BC Act 2016 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 that exceed the biodiversity offsets scheme threshold.

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 2020). See also

<https://www.environment.nsw.gov.au/biodiversity/entryrequirements.htm>

The BC Act 2016 replaces the Threatened Species Conservation Act and includes the test of significance for impacts on threatened species or ecological communities, or their habitats. The test of significance has been conducted and the proposal was found to not have a significant impact on threatened species or ecological communities, or their habitats. The proposal is compliant with the BC Act.

1.6.3 Biosecurity Act 2015

The Biosecurity Act 2015 replaced the Noxious Weeds Act, and the objectives of this Act are to manage, and eradicate weeds that cause a high level of environmental, economic, or social harm. With the removal of and management of weeds the proposed work will be compliant with the objectives of this Act.

1.6.4 Biodiversity Offsets Scheme entry

The Biodiversity Offsets Scheme applies to local development (assessed under Part 4 of the Environmental Planning and Assessment Act 1979) that triggers the Biodiversity Offsets Scheme threshold (see section 1.6)

or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the Biodiversity Conservation Act 2016.

The Biodiversity Conservation Regulation 2017 sets out the threshold level for when the BOS will be triggered. The threshold has two elements:

- whether the amount of native vegetation being cleared exceeds an area threshold
- whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head

Area Clearing Threshold

The proposal does not trigger the area clearing threshold as per the BOS entry requirements. The impact area does not exceed the threshold for clearing, above which BAM and offsets scheme apply (see Table 1.2).

Table 1.2. Minimum lot size and threshold trigger.

Minimum lot size	700 m ²
Threshold for clearing, above which the BAM and offsets scheme apply	0.25 ha or more
Impact area	Xxx (vegetation) xxx (existing built form)

Area clearing threshold

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

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

Figure 1.5. Area clearing threshold as per the BOS entry requirements. Source:

<https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/about-the-biodiversity-offsets-scheme/when-does-bos-apply>

Biodiversity Values Map threshold

The Biodiversity Values 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 the clearing of native

vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the Biodiversity Values Map.

The proposal does not trigger the Biodiversity Values Map threshold as per the BOS entry requirements.

The proposal does not require the clearing of native vegetation or other biodiversity impacts on land identified on the Biodiversity Values Map as published by the Chief Executive of the NSW Office of Environment and Heritage (see Figure 1.5).



Figure 1.6. Biodiversity Values Map. Source: Biodiversity Values Map and Threshold Tool <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap> Date accessed: 3/08/2023.

1.6.5 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

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)' was likely, thus providing a trigger for the referral of the proposal to the Department of Environment and Heritage.

Matters of national environmental significance identified in the Act are:

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

The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal is not expected to significantly impact any MNES.

1.6.6 Pittwater Local Environmental Plan 2014

The site is classified as “Biodiversity” on the Pittwater Biodiversity Map (Figure 1.6) and therefore subject to Clause 7.6 of the Pittwater Local Environmental Plan (LEP) 2014.

The objective of this clause is to maintain terrestrial, riparian and aquatic biodiversity by–

- (a) protecting native fauna and flora, and*
- (b) protecting the ecological processes necessary for their continued existence, and*
- (c) encouraging the conservation and recovery of native fauna and flora and their habitats.*

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that–

- (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or*
- (b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or*
- (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.*

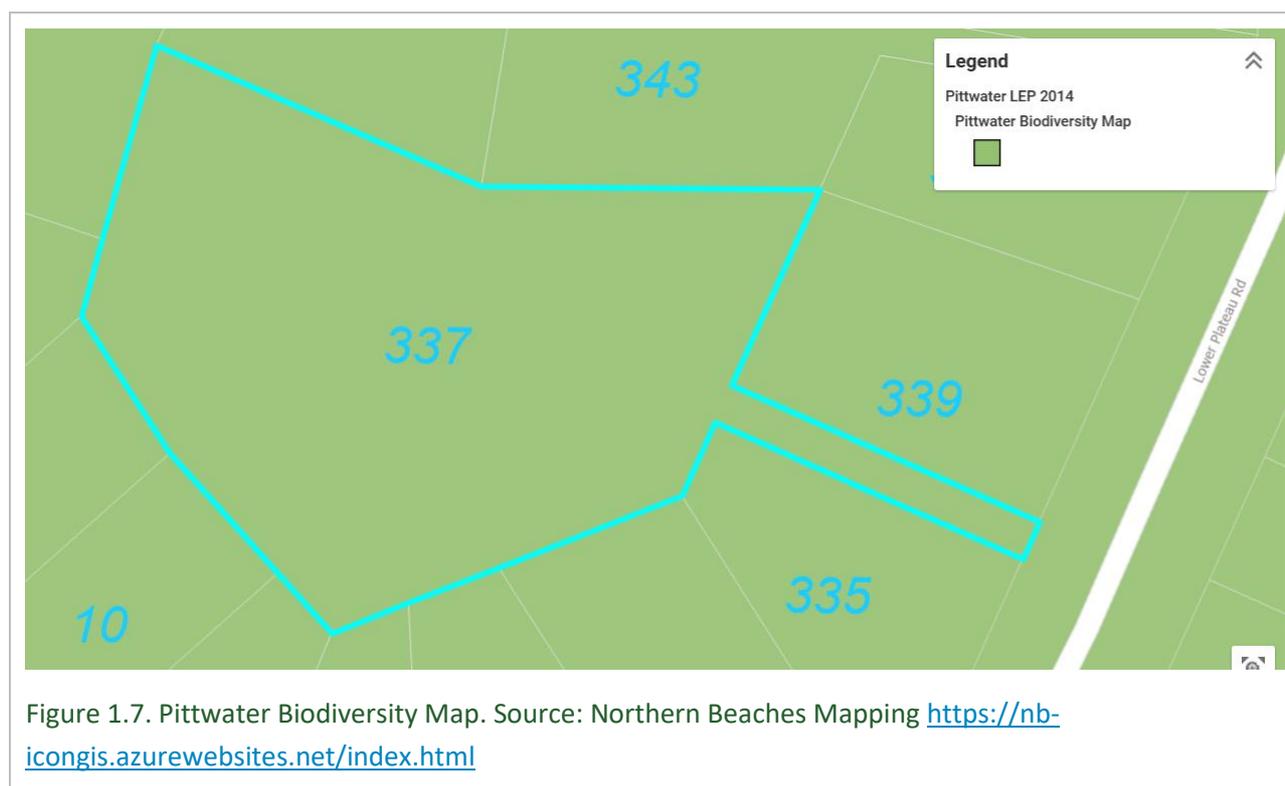


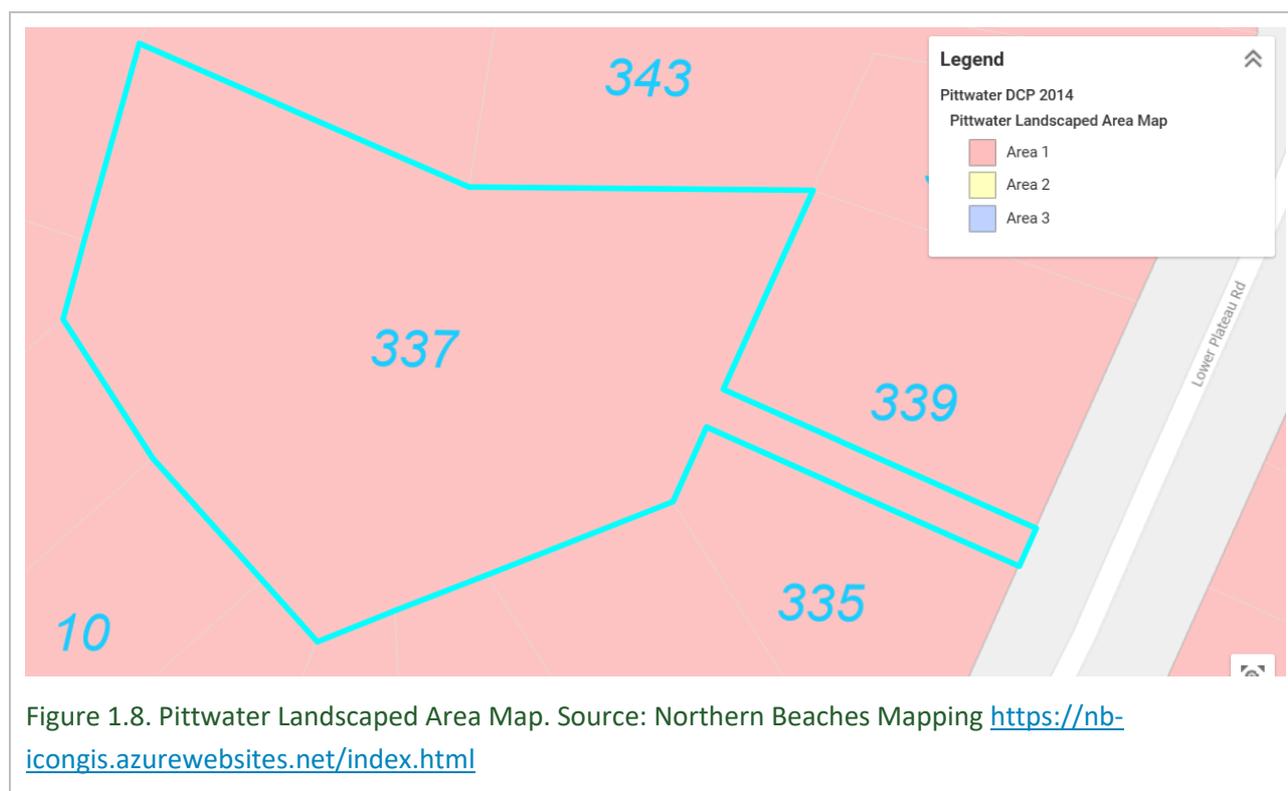
Figure 1.7. Pittwater Biodiversity Map. Source: Northern Beaches Mapping <https://nb-icongis.azurewebsites.net/index.html>

1.6.7 Pittwater 21 Development Control Plan

The site is classified as “Area 1” on the Pittwater Landscaped Area Map (Figure 1.7) and therefore subject to Control D4.10 of the Pittwater 21 Development Control Plan (DCP).

Controls

- *The total landscaped area on land zoned R2 Low Density Residential or E4 Environmental Living shall be 60% of the site area.*
- *The use of porous materials and finishes is encouraged where appropriate.*
- *Any alterations or additions to an existing dwelling shall provide a minimum 60% of the site area as landscaped area.*



The relevant environmental (B4) DCP Controls are provided in the following (combined) Outcomes and Controls. For outcomes and controls for each one – see DCP or links provided. The Controls and Outcomes can be achieved with the propose work and the on-going weed management and habitat retention of the lower portion of the site.

[B4.2 Flora and Fauna Conservation Category 1 and Wildlife Corridor](#)

[B4.4 Flora and Fauna Habitat Enhancement Category 2 and Wildlife Corridor](#)

[B4.22 Preservation of Trees and Bushland Vegetation](#)

Outcomes

The long-term viability of locally native flora and fauna and their habitats and the retention and enhancement of wildlife corridors in the Pittwater LGA. (En)

Conservation, enhancement and/or creation of habitats for locally native flora and fauna to ensure the long-term viability of locally native flora and fauna and their habitats. (En)

Controls

1. Development shall retain and enhance habitat for threatened species, endangered populations, endangered ecological communities and other locally native species.
2. Development shall provide wildlife corridors via creation, restoration, and / or regeneration of habitat.
3. Development shall result in no significant onsite loss of canopy cover and no net loss in native canopy trees.
4. Development shall ensure that at least 80% of any new planting incorporates native vegetation (as per species listed in *Native Plants for Your Garden* available on the Council website or the Plant Community Type (PCT)).
5. Landscaping is to be outside areas of existing bushland and should not include environmental weeds.
6. Planting is to maximise linkage to the wildlife corridor.
7. Development shall not negatively impact on threatened species, endangered populations or endangered ecological communities.
8. Development shall provide an adequate buffer to wildlife corridors.
9. Caretakers of domestic animals shall prevent them from entering wildlife habitat areas.
10. Fencing, where permitted, shall be passable by native wildlife.

1.7 Aboriginal Heritage AHIMS

Aboriginal Heritage is not part of a Flora and Fauna however the principles are considered to ensure recommendations in the FF are in keeping with appropriate care for country. Aboriginal Heritage has been included in the WIS in relation to the Waterway. Impact Permits (AHIP) application and determination process requires an assessment (by the proponent) and evaluation of the Aboriginal heritage values of Aboriginal object(s) and place(s) potentially harmed by an activity. The *Due Diligence Code of Practice for the Protection of Aboriginal Objectives in NSW* (the Code) explains and provides practical guidance about what due diligence means <http://www.environment.nsw.gov.au/legislation/NPWamendmentAct2010>.

The Code provides practical steps which individuals and organisations who own, manage or use land need to take in order to:

- *Identify whether or not Aboriginal objects are, or are likely to be, present in an area;*
- *Determine whether or not their activities are likely to harm Aboriginal objects; and*
- *Determine whether an Aboriginal Heritage Impact Permit (AHIP) is required.*

There are several benefits to having a due diligence process for assessing potential harm to Aboriginal objects:

- *Assists in avoiding unintended harm to Aboriginal objects;*
- *Provides certainty to land managers and developers about appropriate measures for them to take;*
- *Encourages a precautionary approach;*
- *Provides a defence against prosecution if the process is followed; and*
- *Results in more effective conservation outcomes for Aboriginal cultural heritage.*

Due diligence obliges people whose actions may affect Aboriginal cultural heritage to take reasonable steps to consider if Aboriginal objects may be present and avoid harm to that heritage. If harm cannot be avoided, they are required to apply for an AHIP.

The *Aboriginal Heritage Information Management System* (AHIMS) was used to search for Aboriginal Places, objects and other significant sites <https://www.environment.nsw.gov.au/topics/heritage/search-heritage-databases/aboriginal-heritage-information-management-system>.

The 'AHIMS Basic Search' indicated that there three (3) Aboriginal Places, objects or other significant sites occur on or within 200 m of 337 Lower Plateau Rd, Bilgola Plateau. See Figure 1.9.

Given that there are Aboriginal Places, objects or other significant sites occur on or within 200 m of the site, an extensive search has been included in the Heritage report.

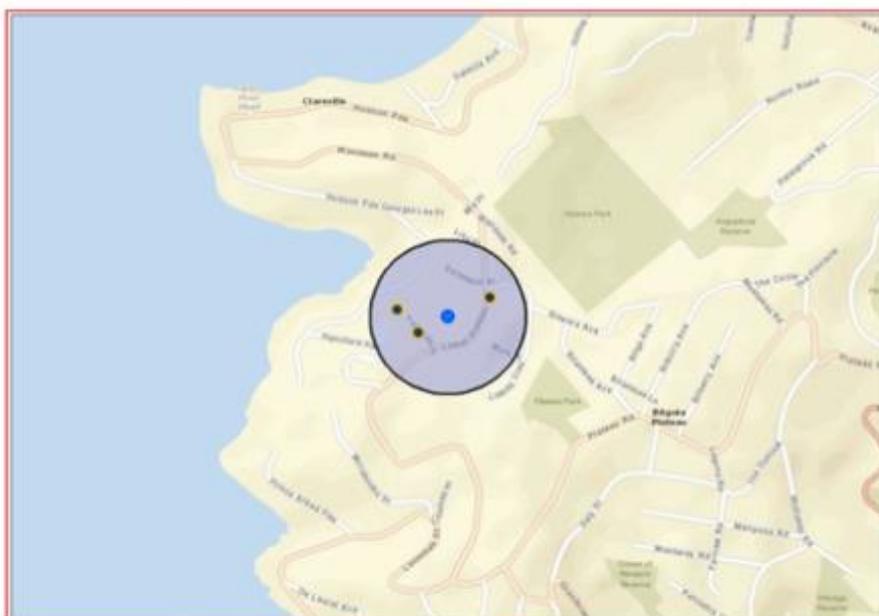
Ecological Consultants Australia
 30 palmgrove road Avalon
 Avalon Beach New South Wales 2107
 Attention: Geraldene Dalby-Ball
 Email: gm@dragonflyenv.com.au

Date: 04 July 2023

Dear Sir or Madam:

AHIMS Web Service search for the following area at Address : 337 LOWER PLATEAU ROAD BILGOLA PLATEAU 2107 with a Buffer of 200 meters, conducted by Geraldene Dalby-Ball on 04 July 2023.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

3	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette](https://www.legislation.nsw.gov.au/gazette) (<https://www.legislation.nsw.gov.au/gazette>) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Figure 1.9. Extract from AHIMS for 337 Lower Plateau Rd, Bilgola Plateau. Source: AHIMS 2023.

2 Methods

2.1 Site survey

On-ground site inspection took place in July and September 2023 by Ecologist Geraldene Dalby-Ball. During this time, weather conditions were overcast and temperate with rain in previous days. Flora and fauna surveys were opportunistic in nature and were conducted as a random meander across the site and surrounding areas. The full site was inspected. During the surveys, notes and photos were taken of the vegetation types, flora and fauna present. Noted the author is very familiar with the area and ecology having lived in Bilgola and Avalon for over 40years. This includes knowing the location of the Powerful and other owls, microbats, bandicoots etc along with key habitat areas.

Flora surveys included identification of native and exotic species and observation of vegetation in surrounding areas. Fauna surveys included diurnal bird and fauna observations and assessment of suitable habitat resources including the following:

- Hollow bearing trees;
- Roosting and/or foraging trees;
- Fruiting and flowering plants;
- Rocks;
- Burrows;
- Scats;
- Tree scratchings;
- Loose bark;
- Scrapes or diggings;
- Dead trees and logs;
- Long grass and leaf litter; and
- Waterbodies.

Powerful Owls are expected in the area, though it is not used as often as other areas near Palmgrove road or Ruskin Row or Trappers Way. Specific searches were made for threatened species with a likelihood of occurring within or adjacent to the site. See Appendix III for Likelihood of Occurrence for threatened species recorded within a 10 km radius of the site.

2.2 Site photos

The following photos were taken during the July and September 2023 site inspection.



Plate 1. Existing house and lawn.

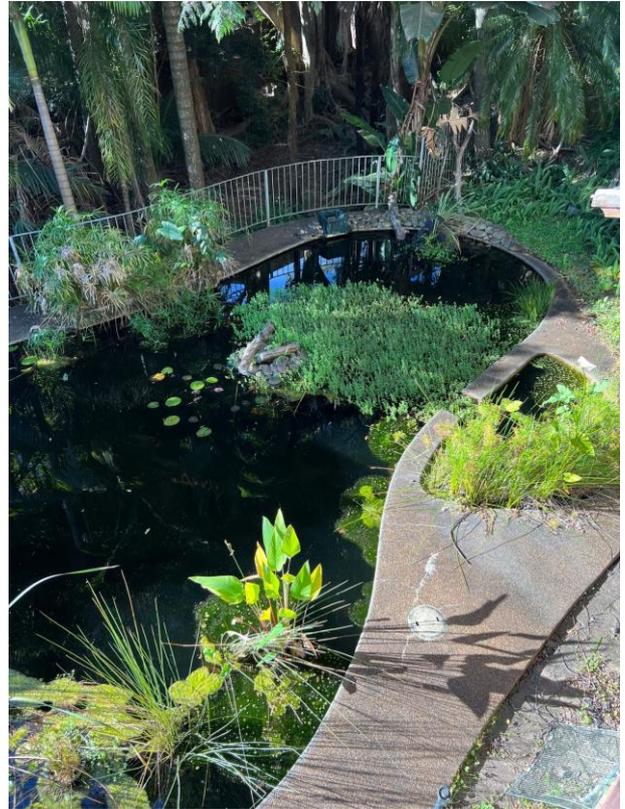


Plate 2. Existing small freshwater pond created by the current owners. Note any native plants are to be rehomed and locals with freshwater ponds have already requested these. No noxious aquatic plants are present.

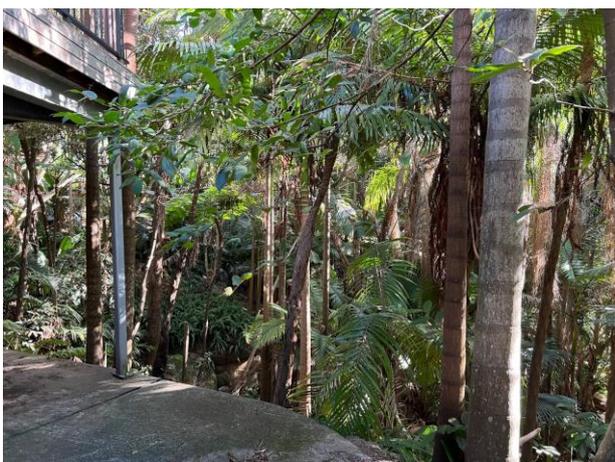


Plate 3. On the low side of the existing house at the edge of the concrete structure are native palms though not locally native. Also locally native tree ferns *Cyathia australis* and exotic invasive plants such as Fishbone Fern.



Plate 4. Small area of impact along this edge. Tree ferns can be transplanted from this location to anywhere else on site, or nearby in suitable areas, such as, if Council approves, the lower end of Palmgrove Reserve. Nonlocal palm trees may be relocated however, this is not required and there is no immediate

biodiversity value to doing so. There are no trees with hollows or other particular habitat features in the proposed footprint or disturbance area. Most of the proposed works (Lots 1 and 2) are within the footprint of the existing house.



Plate 5. Existing drainage line with hard surface, concrete and rock lined in this upper section. Area covered by Waterway Impact Statement. This is marked as a first order creek on the NSW hydroline.



Plate 6. Along the edge of the existing, constructed freshwater pond looking down into the ephemeral Creek line. It is noted that during the super heavy rains of 2021, water stayed within the channel. See additional photos.



Plate 7. Existing waterway on the right hand side of the existing house.



Plate 8. Existing constructed pond that is constructed within 2m of the ephemeral watercourse.

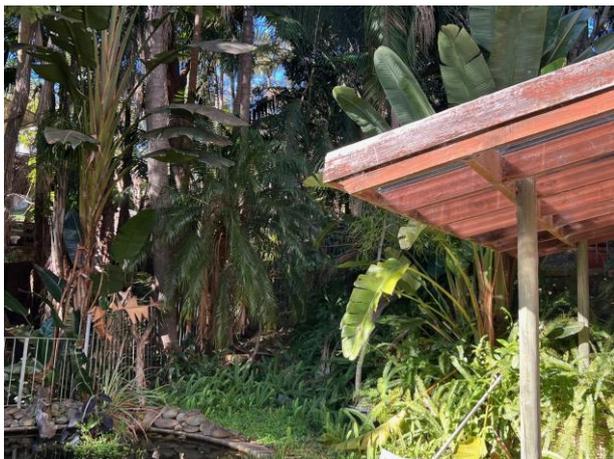


Plate 9. Location of pond relative to ephemeral watercourse. With the water course being on the other side of the railing fence.



Plate 10. To the left-hand side of the existing dwelling is a gully that occasionally has rainwater during very high events. A wooden bridge currently connect the existing dwelling to this area of the property. This is not recognised as a waterway on the NSW hydroline mapping.



Plate 11. This area of the property to the left of the existing dwelling has expose sandstone boulders, and is dominated by exotic species. Weeds, including fishbone, fern, Crofton weed, and morning glory, dominate the ground and mid story. Exotic plants, including Strelitzia's and common palms that are native to New South Wales, but not locally native. Locally native tree ferns are present. Native trees in this area include Cheese Trees and a small Grey Gum. The arborist report has details on these.

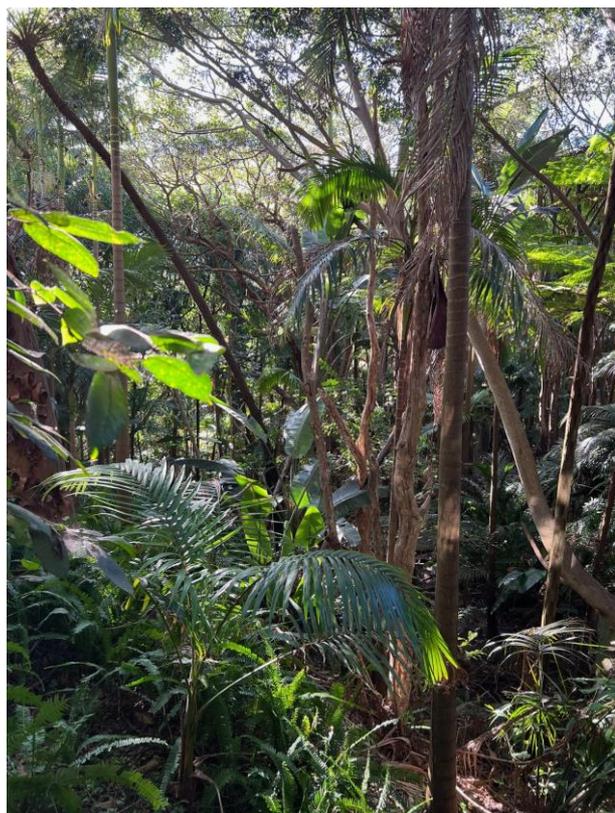


Plate 12. Native sandpaper figs are present. Cabbage Tree Palms are also present though not in the proposed building envelope or disturbance areas. Exotic Phoenix palms are present in these areas closer to the existing dwelling, including in the building footprint.



Plate 13. Example of a large clump of Strelitzia.

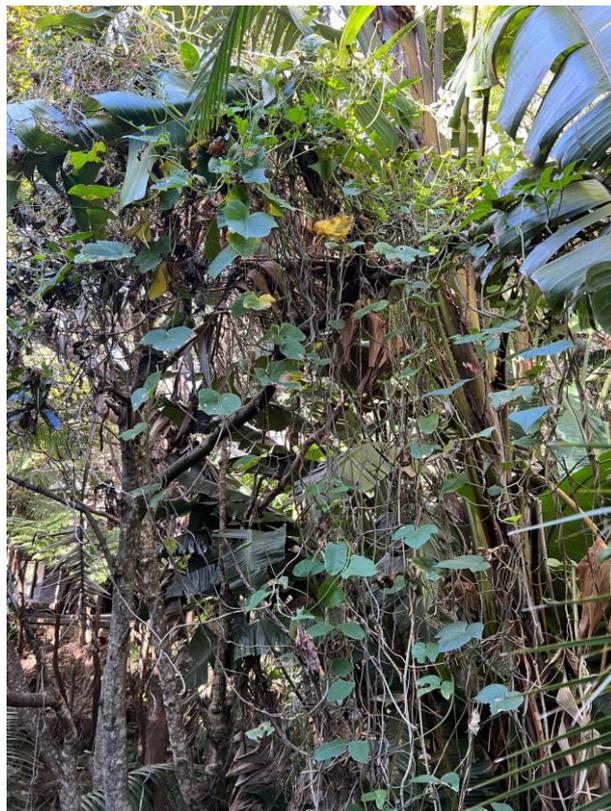


Plate 14. Morning glory, Strelitzia, the edge of the Phoenix Palm and Palm trees native to Ntherrn New South Wales but not locally.

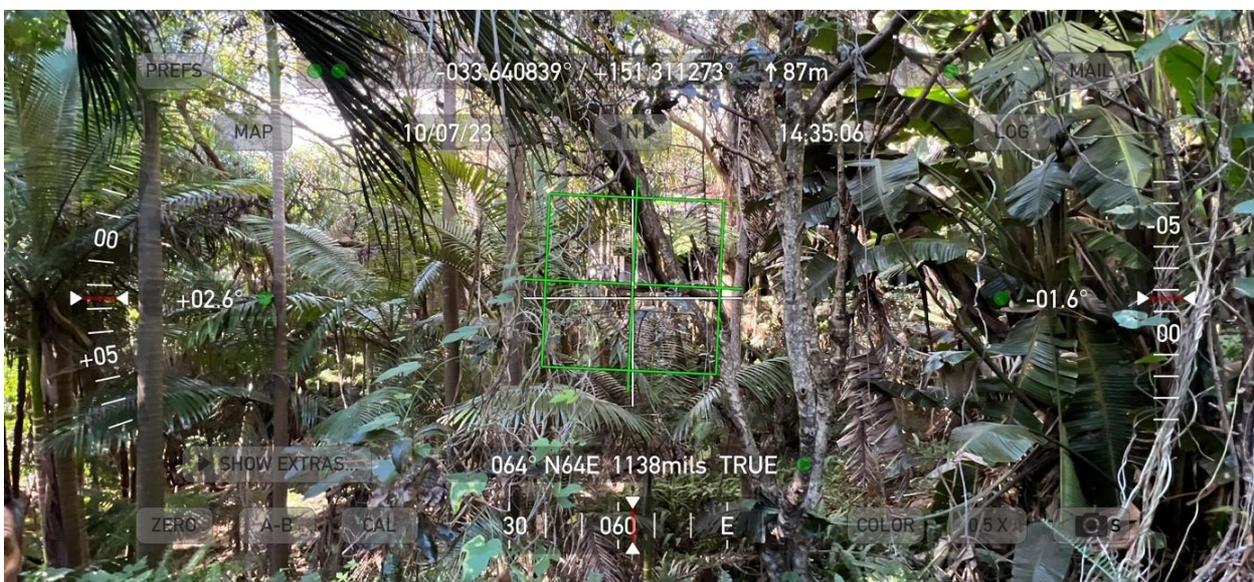


Plate 15. Typical view into the left-hand side of the site.



Plate 16. The area down slope of the existing dwellings will not be disturbed. This includes the exposed rock boulders and the gully and all associated vegetation.

A vegetation management plan has been recommended, and this will detail the weed management works and translocation of tree ferns at which ever time in future, the subdivision becomes request for specific development of lots.

3 Site Assessment

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

A review of the most complete and consistent representation of the distribution of Plant Community Types (PCTs) across NSW, NSW State Vegetation Type Map 2022, identified **no PCT within the property** (Figure 3.1). The property is located approximately 10 m from the nearest PCT, Pittwater and Wagstaffe Spotted Gum Forest (Figure 3.1 and Table 3.1). Field investigation showed consistency with the desktop – the site is not PSG EEC. Closest vegetation types (pre planting with NSW Palm trees) is Sydney Sandstone Gully Forest possibly with Cabbage Tree or Lily illy gully (not present now).

Table 3.1. Closest PCT synonyms as per NSW and Commonwealth legislation.

PCT Code	PCT Name	NSW BC Act 2016
3234	Hunter Coast Lowland Spotted Gum Moist Forest	Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion NSW Status: Endangered

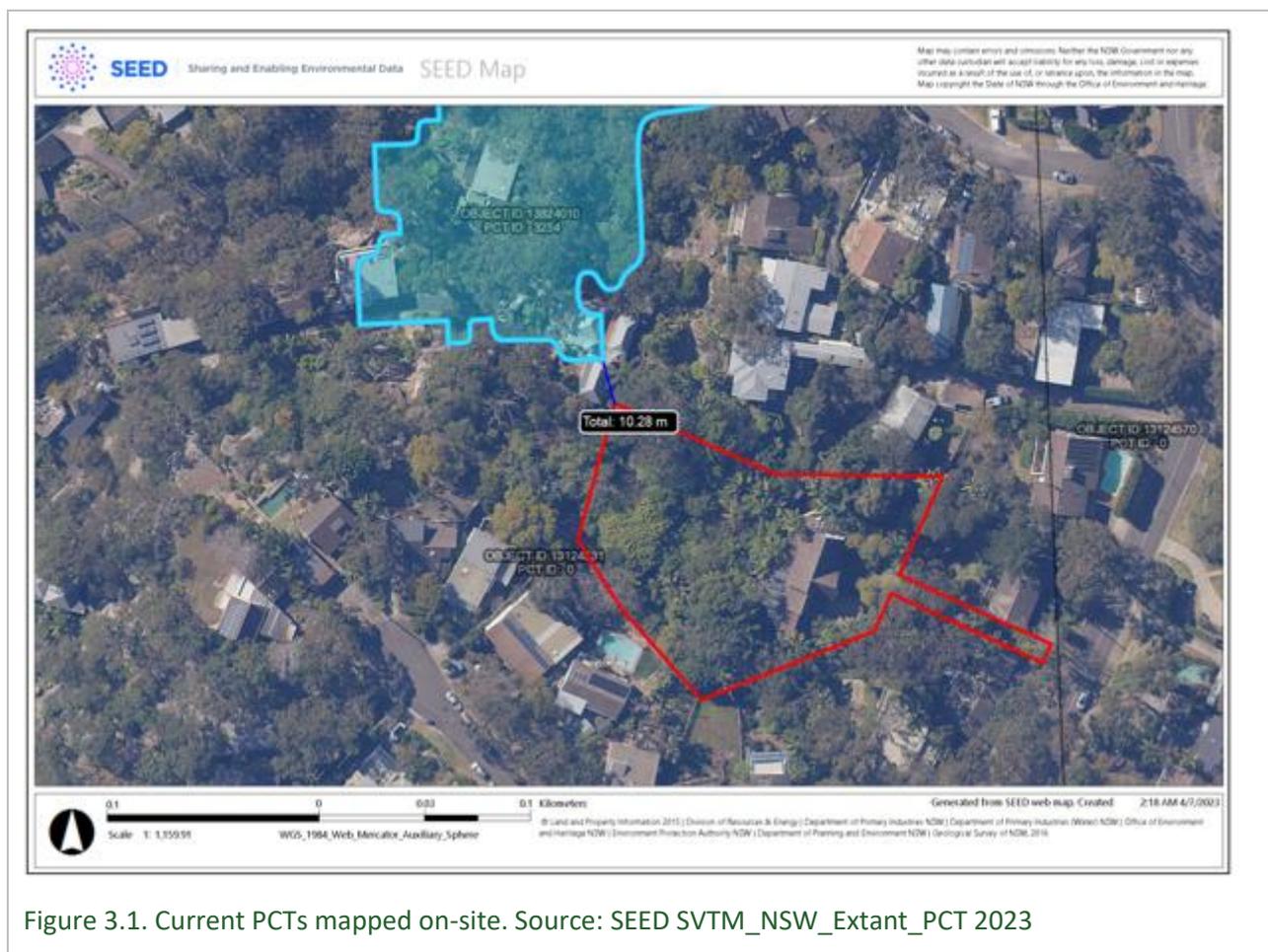


Figure 3.1. Current PCTs mapped on-site. Source: SEED SVTM_NSW_Extant_PCT 2023

3.2 Weeds

The following weeds of significant importance were identified within the site during the site inspection. Weeds must be controlled as required under the *Biosecurity Act 2015*. See Table 3.2

Table 3.2. Weeds present on or within close proximity to the site with the potential to spread.

Scientific Name	Common Name
<i>Asparagus aethiopicus</i>	Asparagus Fern
<i>Asparagus asparagoides</i>	Bridal Creeper
<i>Lantana camara</i>	Lantana
<i>Ipomea indica</i>	Morning Glory

Weeds are being actively managed currently and a VMP would be required at the time of any DA for building. This would include the long-term weed management of the site. Weeds can not be removed over a short time as they provide stability and habitat.

3.3 Fauna sightings and habitat

Fauna sightings

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

- Noisy Minor (*Manorina melanocephala*);
- Rainbow Lorikeet (*Trichoglossus moluccanus*);
- Laughing Kookaburra (*Dacelo novaeguineae*); and
- Eastern Whipbird (*Psophodes olivaceus*).
- Pobblebonk (*Limnodynastes peronii* (Tadpoles seen).
- Damselflies and Dragonflies

No reptiles or mammals were identified during the site assessment. No threatened fauna listed under the BC Act 2016 or EPBC Act 1999 were identified during the site assessment. Green Tree Snakes are expected as are Diamond Pythons. The owner recalls seeing a Diamond Python in the area being retained.

Known from close by (pers obs) and assumed on-site at times Powerful Owls, Microbats (various species) and Flying Foxes. See also Figure 3.2.

Fauna habitat

Specific habitat features were identified during the site assessment including:

- Sandstone boulders and ephemeral watercourse (Water Dragons expected).
- Constructed Pond (frog habitat NB: not for threatened species RCT or GGBF or GBF)
- Palms – fruit for Rose Crown Fruit Dove and other fruit eating birds and Flying Foxes.
- Trees with potential microbat habitat (no obvious hollows, no caves for microbats)
- Possible Ring-tail possum habitats in dense areas though no dreys observed.

3.4 Threatened Flora – Desktop

BioNet records within a 10 km radius of the subject site returned a total of 17 threatened flora currently listed as vulnerable, endangered, or critically endangered under state and/or Commonwealth legislation. Table 3.2 identifies the vulnerable, endangered and critically endangered flora species.

An assessment of the likelihood of occurrence of threatened flora species within the subject site is provided in Appendix I and was used to guide the site survey. The threatened flora that was identified as having a potential, to occurrence on the site anywhere are highlighted in bold (Table 3.2). NB none were seen during inspections.

Table 3.2. Threatened flora recorded within a 10 km radius of the subject site. Source: NSW BioNet 2023.

Family	Scientific Name	Common Name	NSW Status	Comm. Status	Records
Elaeocarpaceae	<i>Tetratheca glandulosa</i>		V		17
Euphorbiaceae	<i>Chamaesyce psammogeton</i>	Sand Spurge	E		7
Malvaceae	<i>Lasiopetalum joyceae</i>		V	V	1
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		4
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield’s Stringybark	V	V	7
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	4
Myrtaceae	<i>Kunzea rupestris</i>		V	V	1
Myrtaceae	<i>Melaleuca deanei</i>	Deane’s Paperbark	V	V	1
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE	32
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	18
Orchidaceae	<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	1
Orchidaceae	<i>Genoplesium baueri</i>	Bauer’s Midge Orchid	E	E	1
Orchidaceae	<i>Microtis angusii</i>	Angus’s Onion Orchid	E	E	50
Proteaceae	<i>Grevillea caleyi</i>	Caley’s Grevillea	CE	CE	51
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	5
Rutaceae	<i>Boronia umbellata</i>	Orara Boronia	V	V	1
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	1

Critically Endangered (CE), Endangered (E), Vulnerable (V)

3.5 Threatened Fauna – Desktop

BioNet records within a 10 km radius of the subject site returned a total of 44 threatened fauna currently listed as vulnerable, endangered, or critically endangered under state and/or Commonwealth legislation. Table 3.3 identifies the vulnerable, endangered and critically endangered fauna species.

An assessment of the likelihood of occurrence of threatened fauna species within the subject site is provided in Appendix I and was used to guide the site survey. The threatened fauna that was identified as having a potential, likely or known occurrence on the site are highlighted in bold (Table 3.3). NB many microbat species have been highlighted. The site is potential foraging however for most species highlighted it's very low likelihood. Bent-winged bats are likely.

Note: Marine species including Turtles (Cheloniidae, Dermochelyidae), Dugongs (Dugongidae), Marine Birds (Diomedidae, Procellariidae), Fur-seals (Otariidae) and Whales (Otariidae, Balaenidae, Balaenopteridae, Physeteridae) have been omitted from this list.

Table 3.3. Threatened fauna recorded within a 10 km radius of the subject site. Source: NSW BioNet 2023.

Class	Scientific Name	Common Name	NSW Status	Comm. Status	Records
Amphibia	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		61
Amphibia	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	26
Amphibia	<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	2
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		22
Aves	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V		3
Aves	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V		2
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	V		1
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V		46
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V		4
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	V		3
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V		9
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E		50
Aves	<i>Esacus magnirostris</i>	Beach Stone-curlew	CE		1
Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V		7
Aves	<i>Onychoprion fuscata</i>	Sooty Tern	V		1
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	E	1
Aves	<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V	V	81
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V		8
Aves	<i>Lathamus discolor</i>	Swift Parrot	E	CE	16
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V		1
Aves	<i>Ninox connivens</i>	Barking Owl	V		21
Aves	<i>Ninox strenua</i>	Powerful Owl	V		462
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V		4

Aves	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	1
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	37
Aves	<i>Melithreptus gularis</i>	Black-chinned Honeyeater	V		1
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		2
Aves	<i>Petroica boodang</i>	Scarlet Robin	V		1
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	7
Mammalia	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E	E	31
Mammalia	<i>Phascolarctos cinereus</i>	Koala	E	E	78
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		382
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V		5
Mammalia	<i>Petauroides volans</i>	Southern Greater Glider	E	E	1
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	123
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		1
Mammalia	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V		12
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	16
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		2
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V		17
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		7
Mammalia	<i>Vespadelus trougtoni</i>	Eastern Cave Bat	V		1
Mammalia	<i>Miniopterus australis</i>	Little Bent-winged Bat	V		43
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		70

Critically Endangered (CE), Endangered (E), Vulnerable (V)

3.6 Endangered populations

One endangered population has been recorded to occur within a 10 km radius of the subject site according to BioNet records since 1993. Table 3.4 identifies the population.

Table 3.4. Endangered populations within a 10 km radius of the subject site. Source: NSW BioNet 2023.

Class	Scientific Name	Common Name	NSW	Comm.	Records
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1

Endangered Population (E2), Vulnerable (V), Protected (P)

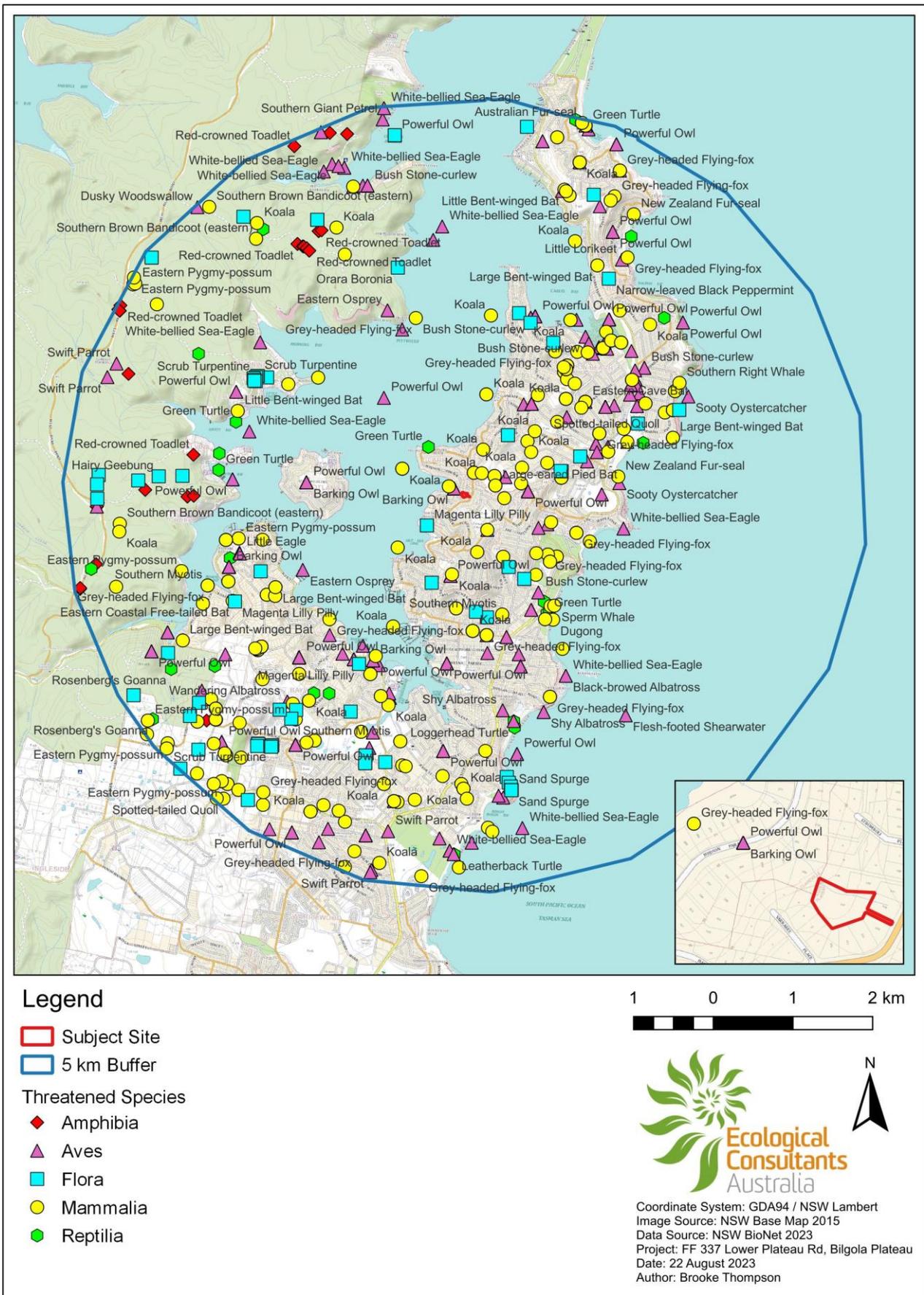


Figure 3.2. Threatened species recorded within a 5 km radius of the subject site.

4 Impact Assessment

4.1 Direct impacts

4.1.1 Clearing and modification of vegetation

287 trees (prescribed and non-prescribed trees were assessed in the Arboricultural Impact Assessment (AIA) prepared by Urban Forestry Australia (December 2023). Of the 287 assessed trees, 26 are on adjoining properties a total of 261 trees on the site. Most trees on-site are none locally native palms.

- Palms have been included in the ‘tree count’ and the majority of ‘trees’ proposed to be removed are exempt from protection under the PDCP and do not require authority approval to remove. These include Cocos palms. Table 4.1 is coloured coded of trees/palms proposed for removal with red being exotics, orange native to NSW but not locally and green being native to the site.
- Tree/palms native to the site proposed for removal are summarised below:

96	Cheese tree, <i>Glochidion ferdinandi</i>	Common and abundant on-site
97	<i>Angophora costata</i>	Los and requires seed collection, replanting, nesting boxes. NB this tree has no obvious hollows.
#	15 Rough Tree Ferns <i>Cyathea cooperii</i>	Proposed for relocation (on or off site)
101A	Cabbage Tree Palm <i>Livistona australis</i>	Proposed for relocation (on site)
113	<i>Pittosporum undulatum</i>	Very common and no habitat loss

Table 4.1. Summary of trees proposed for removal.

Tree No.	Scientific Name	Common Name
1, 2, 3, 5, 6, 7, 8, 16, 34, 35, 43, 103, 104, 105, 106, 141, 146, 147, 158	<i>Syagrus romanzoffiana</i>	Cocos Palm
24, 58	<i>Dyopsis decaryi</i>	Triangle Palm
27, 32, 45, 46, 71, 98, 100, 102, 109, 110, 126, 127, 128, 130, 148, 149, 150, 208, 209, 246, 247, 248, 249, 250, 252, 253, 254, 258, 259, 269	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm^
33	<i>Grevillea robusta</i>	Silky Oak^
49	<i>Stenocarpus sinuatus</i>	Fire Wheel Tree^
50	<i>Rhododendron</i> sp.	Rhododendron
51, 262, 265, 267	<i>Jacaranda mimosifolia</i>	Jacaranda
96	<i>Glochidion ferdinandi</i>	Cheese Tree^
97	<i>Angophora costata</i>	Smooth-barked Apple^
99, 101, 103A, 111, 112, 129, 131, 132, 133, 138, 139, 140, 210, 211, 257	<i>Cyathea cooperii</i>	Rough Tree Fern^ (relocate)
101A	<i>Livistona australis</i>	Cabbage-tree Palm^ (relocate)
107, 242, 268	<i>Ficus macrocarpa</i> var. <i>hillii</i>	Hills Weeping Fig
108	<i>Agonis flexuosa</i>	Willow Myrtle/Peppermint^
113	<i>Pittosporum undulatum</i>	Sweet Pittosporum^
241	<i>Araucaria bidwillii</i>	Bunya Pine^
255, 256	<i>Schefflera actinophylla</i>	Umbrella Tree
260, 261	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark^
263	<i>Strelitzia nicolai</i>	Giant White Bird of Paradise
264	<i>Phoenix canariensis</i>	Canary Island Date Palm
266	Unknown – ID to be confirmed	Unknown – ID to be confirmed

Red = exotic. Orange = Naïve to NSW and not the local area. Green = ^native to the site

Transplanting

The Cabbage Tree Palms *Livistona australis* and local Tree Ferns are being transplanted (on-site) or to approved other local locations. This may include (if approved) the lower section of Palmgrove Reserve Avalon under supervision of the ecologist.

	EXEMPT (site only)	LOW RV (site only)	MEDIUM RV (site only)	HIGH RV (site only)
Tree No.	1, 2, 3, 5, 6, 7, 8, 16, 24, 27, 32, 33, 34, 35, 43, 45, 46, 51, 58, 71, 72, 73, 74, 75, 98, 100, 102, 103, 104, 105, 106, 107, 109, 110, 126, 127, 128, 130, 141, 146, 147, 148, 149, 150, 158, 208, 209, 241, 242, 246, 247, 248, 249, 250, 252, 253, 254, 255, 256, 258, 259, 262, 264, 265, 267, 268, 269	50, 263	49, 96, 99, 101, 101A, 103A, 108, 111, 112, 113, 129, 131, 132, 133, 138, 139, 140, 210, 211, 257, 260, 261, 266	97
Total (93)	67	2	23	1

Figure 4.1. Proposed Tree Removal. Source: Arboricultural Impact Assessment (Urban Forestry Australia December 2023).

	EXEMPT (site only)	LOW RV (site only)	MEDIUM RV (site only)	HIGH RV (site only)
Tree No.	9, 10, 11, 12, 13, 20, 21, 22, 23, 25, 26, 28, 29, 30, 31, 38, 39, 40, 41, 42, 47, 48, 52, 53, 54, 56, 57, 59, 60, 61, 62, 63, 65, 77, 78, 88, 89, 91, 92, 93, 95, 118, 119, 120, 122, 123, 124, 125, 134, 135, 136, 137, 142, 145, 153, 155, 156, 159, 160, 161, 162, 163, 164, 165, 166, 167, 170, 171, 172, 173, 174, 184, 188, 191, 192, 193, 195, 196, 197, 198, 200, 201, 202, 203, 204, 205, 206, 207, 212, 224, 234, 235, 239, 240, 244, 245, 251, 271, 273, 278	4, 15, 186, 223, 230,	55, 56A, 57A, 69, 76, 90A, 94, 114, 115, 117, 143, 152, 154, 157, 168, 169, 175, 176, 177, 178, 180, 181, 182, 183, 185, 187, 189, 190, 199, 217, 220, 226, 227, 231, 232, 233, 243, 270, 272, 275, 277	14, 64, 66, 67, 68, 70, 90, 116, 121, 144, 151, 179, 194, 213, 225, 228, 236, 237, 238, 274, 276, 279
Total (168)	100	5	41	22

Figure 4.2. Proposed Tree Retention. Source: Arboricultural Impact Assessment (Urban Forestry Australia December 2023).



Figure 4.3a. Tree Location Plan. Sheet 1 of 3. Source: Arboricultural Impact Assessment (Urban Forestry Australia, December 2022).

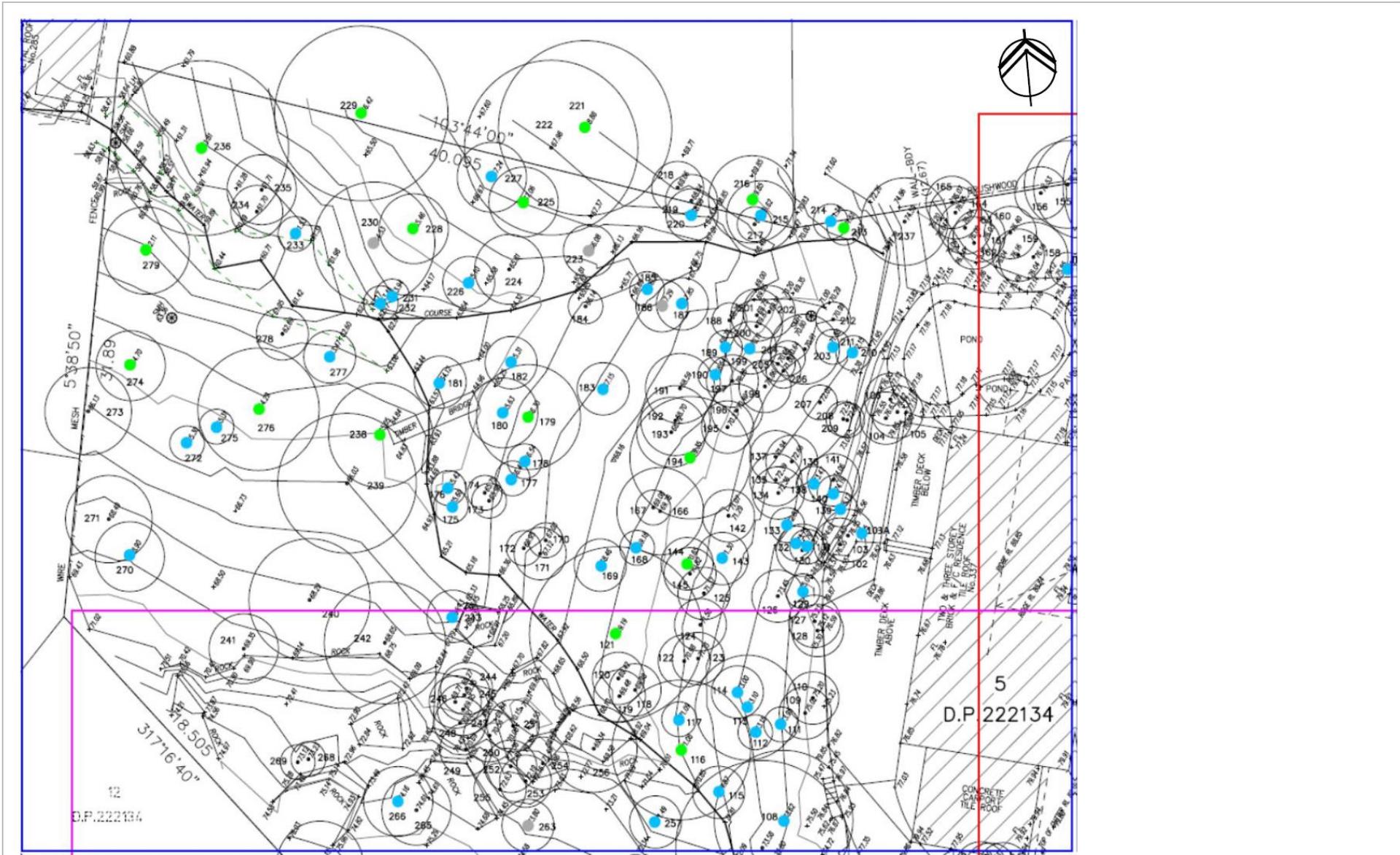


Figure 4.3b. Tree Location Plan. Sheet 2 of 3. Source: Arboricultural Impact Assessment (Urban Forestry Australia, December 2022).

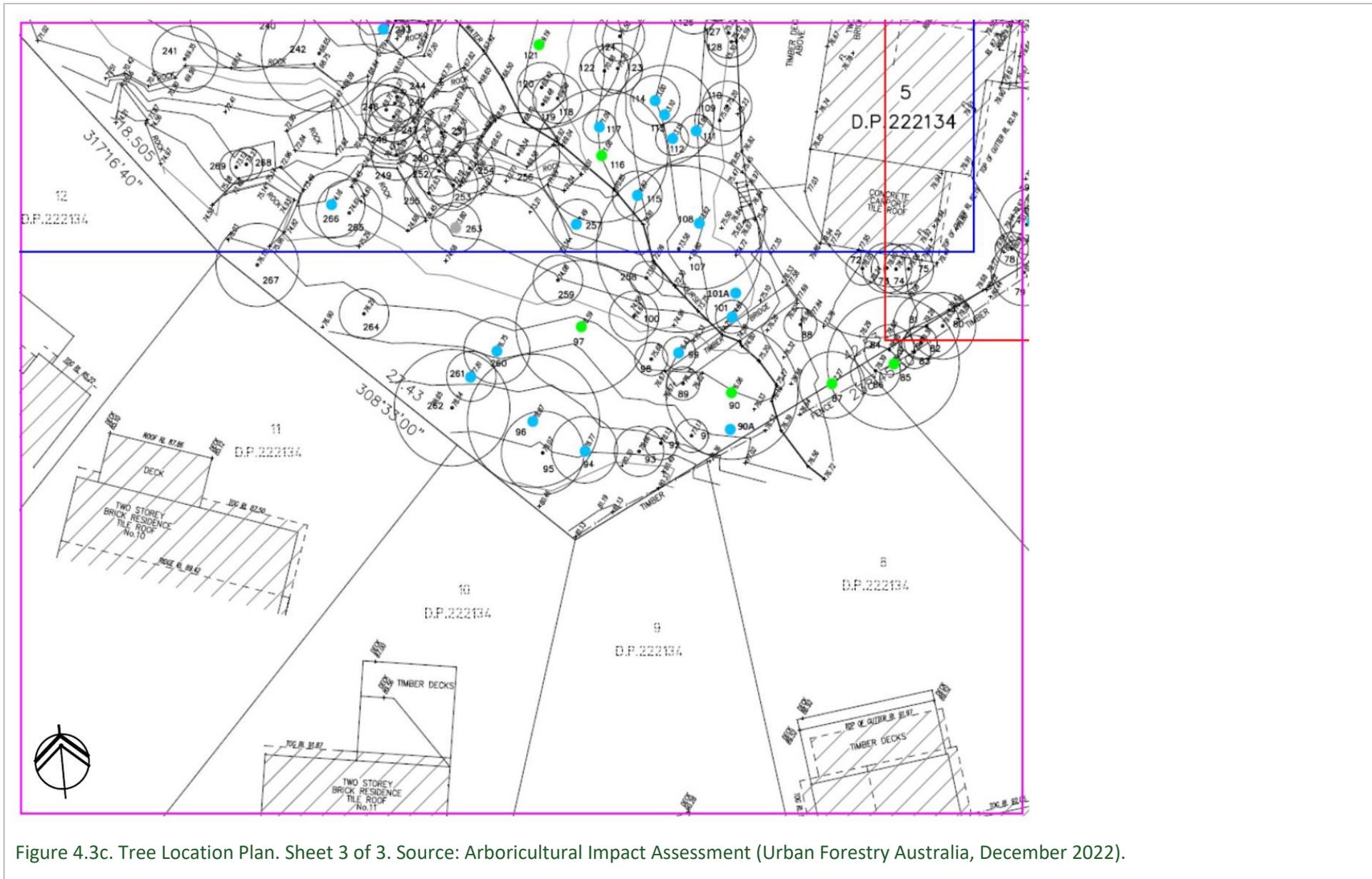


Figure 4.3c. Tree Location Plan. Sheet 3 of 3. Source: Arboricultural Impact Assessment (Urban Forestry Australia, December 2022).

4.2 Indirect impacts

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

4.2.1 Loss of breeding opportunities for frogs in constructed pond

Temporary reduced breeding opportunities for locally occurring native species including amphibians, and invertebrates. The constructed pond will be recreated on another property within 3km (already requested). Thus there will be no net loss of habitat pond habitat in the area. There will be a temporary loss of the habitat provided by the constructed pond. Temporary reduced breeding opportunities for locally occurring native species including amphibians, reptiles, birds, mammals, and invertebrate through the production of construction noise.

4.2.2 Soil disturbance and compaction

This will be minimal as works will be on existing built areas, with the exception of Lot 3. Lot 3 will include vegetation removal and The removal of vegetation may result in soil disturbance and compaction through machinery and trampling during works.

4.2.3 Weed growth and invasion

Weed species are in the direct works zone and surrounding areas. Excessive or biosecurity weeds must be managed to stop the spread into other areas and maximise the opportunities for soil re-use in other areas.

4.2.4 Introduction of pathogens

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

4.2.5 Increased noise

The proposed actions may result in temporary noise which may cause minor disturbance to sensitive fauna in the local canopy. Construction noise may also result in fewer aerial fauna species frequenting the site for the duration of works.

4.2.6 Run-off and sedimentation

The proposed actions may result in the transport of sediment from the work zones off-site. Effective sediment management is essential.

5 Conclusions and Recommendations

5.1 Management tasks

5.1.1 Delineation of work areas

During the development, impacts to the site and the vegetation to be retained should be minimised by the delineation of work areas. Access to the site would be best restricted to the development footprint only. An exclusion zone will be established for the vegetation outside the work areas.

5.1.2 Wildlife corridor and revegetation

Planting is one of several best practice measures to retain and support the long-term survival of the vegetation community on site. Species plantings should aim to restore maximum diversity at the site. This will provide greater foraging and breeding habitat for native species and could deliver greater biodiversity gain outcomes in the area whilst adhering to bushfire protection requirements. Shrub and ground covers will also increase the habitat for other wildlife including small insectivorous birds.

Planting of tube stock across the site should be selected from locally native shrub and ground cover species and this is to be in accordance a qualified bush regeneration contractor or ecologist.

5.1.3 Tree protection

Tree protection is to be consistent with the Arborist Report.

5.1.4 Preservation of Habitat Features

The project should salvage and reuse any existing logs on the ground. Any trees that are to be removed must be checked for hollows. Hollows (greater than 20-30cm in diameter and 2-3m in length) and tree trunks can be reused and placed on the ground in the bushland to the west. NB hollows yet identified.

5.1.5 Native species landscaping (none proposed as part of this stage – to be revisited at DA for homes stage0

The landscape planting schedule must be reviewed by a qualified bush regenerator or ecologist. The schedule must use a diversity of local provenance native species from the relevant native vegetation community (or communities) that occur, or once occurred on site (rather than using exotic species or non-local native species).

5.1.6 Erosion and sediment control

Where required, erosion and sediment control measures are to be implemented. These include, but are not limited to, sediment fencing, jute matting, crushed sandstone, or coir logs. Erosion and sediment controls measures are to be revised during site inspections and/or after significant rainfall (more than 10mm in 24 hours resulting in site runoff). Control measures must ensure that no settlement of sediment or silt occurs within areas of vegetation to be retained. Sediment fencing should be retained for as long as practicable. If removed, then monitoring is required to ensure flows do not concentrate and cause further erosion. If concentrated flows do occur and/or erosion gullies develop then coir log baffles are required.

5.1.7 Weed control

Weeds must be managed to prevent further spread. There must be continuous maintenance of the vegetation on-site otherwise increase weed growth may result. Weeds will colonize and pioneer on any cleared grounds, therefore must be managed during works as well as ongoing post-works.

It is recommended to seek advice from a qualified bush regenerator or ecologist prior to conducting weed removal works.

All bush regeneration activities requiring the use of chemicals must be performed in accordance with the NSW *Pesticides Act 1999*. Herbicides must not be applied whilst exotic plants are setting seed. The weed removal program aims to be broad in approach and sustained in application to provide the best possible conditions for natural regeneration and to control weeds within the site.

5.1.8 Installing a nest box

Although not critical, the installation of a single nest box designed for microbats should be added to the site to increase habitat opportunities for threatened microbats. This will encourage threatened microbats to utilise the area.

Image from: nestboxes.com.au



6 Appendices

6.1 Appendix I – Likelihood of Occurrence Assessment for Threatened Species

The following assessment identifies the list of threatened flora and fauna species recorded from a 10 km radius of the subject site and compares the habitat requirements of these species with the habitats identified in the subject site to assess the likelihood of the species being present in the subject site using the criteria detailed in Table 6.1.

Table 6.1. Likelihood of occurrence includes one or more of the following criteria.

Likelihood of Occurrence	Criteria
Unlikely	<ul style="list-style-type: none"> Species highly restricted to certain geographical areas not within the proposal footprint Species that have specific habitat requirements are not present on the subject site
Low	<ul style="list-style-type: none"> Have not been recorded previously on the subject site/surrounds and for which the study area is beyond the current distribution range Use specific habitats or resources not present on the subject site Are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded
Moderate	<ul style="list-style-type: none"> Have infrequently been recorded previously on the subject site/surrounds Use specific habitats or resources present on the subject site but in a poor or modified condition Are unlikely to maintain sedentary populations, however may seasonally use resources within the subject site opportunistically or during migration Are cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded
High	<ul style="list-style-type: none"> Have frequently been recorded previously on the subject site/surrounds Use habitat types or resources that are present in the subject site that are abundant and/or in good condition within the subject site Are known or likely to maintain resident populations surrounding the subject site Are known or likely to visit the site during regular seasonal movements or migration

Table 6.2. Threatened flora likelihood of occurrence.

Scientific Name Common Name	Distribution, Habitat and Ecology	Records	Likelihood of Occurrence
<i>Tetradlea glandulosa</i>	<p>Restricted to the following Local Government Areas: The Hills Shire, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Northern Beaches, Ryde and Wyong. There are approximately 150 populations of this plant ranging from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Northern Beaches LGA) and the western limit is at East Kurrajong (Wollemi NP). There are historical collections of this species south to Manly, Willoughby and Mosman, however these populations are now extinct. The current north-south range is approximately 65km.</p> <p>Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Flowers July-November however residual flowers may persist until late December. Flowering influenced by seasonal weather conditions and/or the microclimate effects (e.g. exposure) of each particular site.</p>	17	No habitat on site
<i>Chamaesyce psammogeton</i> Sand Spurge	<p>Sand Spurge is found sparsely along the coast from south of Jervis Bay (at Currarong, Culburra and Seven Mile Beach National Park) to Queensland (and Lord Howe Island). Populations have been recorded in Wamberal Lagoon Nature Reserve, Myall Lakes National Park, Moonee Beach Nature Reserve and Bundjalung National Park.</p> <p>Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (<i>Spinifex sericeus</i>) and Prickly Couch (<i>Zoysia macrantha</i>). Flowering recorded in spring and summer. Plant growth occurs in spring and summer.</p>	7	No habitat on site
<i>Lasiopetalum joyceae</i>	<p>Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved.</p> <p>Grows in heath on sandstone.</p>	1	No habitat on site
<i>Callistemon linearifolius</i>	<p>Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to</p>	4	No habitat on site

Netted Bottle Brush	<p>the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park.</p> <p>Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer.</p>		
<p><i>Eucalyptus camfieldii</i></p> <p>Camfield's Stringybark</p>	<p>Restricted distribution in a narrow band with the most northerly records in the the Raymond Terrace area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park.</p> <p>Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of Narrow-leaved Stringybark, Brown Stringybark and Scribbly Gum. Population sizes are difficult to estimate because its extensive lignotubers may be 20 m across. A number of stems arise from these lignotubers giving the impression of individual plants. Flowering period is irregular, flowers recorded throughout the year. Poor response to too frequent fires.</p>	7	No habitat on site
<p><i>Eucalyptus nicholii</i></p> <p>Narrow-leaved Black Peppermint</p>	<p>This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors.</p> <p>Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire. Tends to grow on lower slopes in the landscape.</p>	4	No habitat on site
<i>Kunzea rupestris</i>	<p>Restricted, with most locations in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park, all within the Central Coast botanical subdivision of NSW. Currently known to exist in 20 populations, 6 of which are reserved.</p> <p>Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland. Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so</p>	1	No habitat on site

	may disperse many metres per week. Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.		
<i>Melaleuca deanei</i> Deane's Paperbark	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	1	No habitat on site
<i>Rhodamnia rubescens</i> 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 <i>R. rubescens</i> 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 and sedimentary soils.	32	Habitat is present though through searches indicated the species is not present.
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	18	Habitat is present though through searches indicated the species is not present.
<i>Cryptostylis hunteriana</i> Leafless Tongue Orchid	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wye, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in	1	No habitat on site

	<p>association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site. On the Central Coast of NSW, populations have been recorded in woodland dominated by Scribbly Gum (<i>Eucalyptus haemastoma</i>), Brown Stringybark (<i>Eucalyptus capitellata</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and also associated with Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).</p>		
<p><i>Genoplesium baueri</i> Bauer's Midge Orchid</p>	<p>The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.</p> <p>Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.</p>	1	No habitat on site
<p><i>Microtis angusii</i> Angus's Onion Orchid</p>	<p>All currently known records of the species are located within Northern Beaches LGA.</p> <p>All confirmed records of the species are from disturbed areas, with most individuals recorded in road verges. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys Forest - Terrey Hills - Ingleside and Belrose areas. These soils support a specific and distinct vegetation type, the Duffys Forest Vegetation Community which is listed as an endangered ecological community under the TSC Act and ranges from open forest to low open forest and rarely woodland. Exists as subterranean tubers during most of the year. Produces leaves and then flowering stems in late winter and spring and flowers from May to October. By summer, the above ground parts have withered leaving no parts above ground. Most <i>Microtis</i> species reproduce vegetatively by the formation of "daughter" tubers from the main tuber.</p>	50	No habitat on site
<p><i>Grevillea caleyi</i> Caley's Grevillea</p>	<p>Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas.</p>	51	No habitat on site

	All natural remnant sites occur within a habitat that is both characteristic and consistent between sites. All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by <i>Eucalyptus sieberi</i> and <i>E. gummifera</i> . Commonly found in the endangered Duffys Forest ecological community.		
<i>Persoonia hirsuta</i> Hairy Geebung	<p><i>Persoonia hirsuta</i> has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west. <i>Persoonia hirsuta</i> has a large area of occurrence, but occurs in small populations or isolated individuals, increasing the species' fragmentation in the landscape.</p> <p>The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone. It is usually present as isolated individuals or very small populations. Plants are generally killed by all but the lowest intensity fire or partial burning. Fire may promote germination of soil-stored seed, although it may also kill some of the seedbank if it is of high severity. Extreme wet-dry weather cycles may also promote germination of soil-stored seed.</p>	5	No habitat on site
<i>Boronia umbellata</i> Orara Boronia	<p>Found at only a few locations between Glenreagh and Lower Bucca, north of Coffs Harbour, but it is locally common in the restricted area where it occurs.</p> <p>This <i>Boronia</i> grows as an understorey shrub in and around gullies in wet open forest. It appears to regenerate well after disturbance, but it is not known whether prolonged or repeated disturbance affects long-term persistence.</p>	1	No habitat on site
<i>Pimelea curviflora</i> <i>var. curviflora</i>	<p>Confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the north-west. New population discovered at Croom Reserve near Albion Park in Shellharbour LGA in August 2011. Formerly recorded around the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly.</p> <p>Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots. Likely to be fire</p>	1	No habitat on site

	tolerant species capable of resprouting following fire due to the presence of a tap root. Seedlings have been observed following fire.		
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Table 6.3. Threatened fauna likelihood of occurrence.

Scientific Name	Distribution, Habitat and Ecology	Records	Likelihood of Occurrence
<p><i>Pseudophryne australis</i> Red-crowned Toadlet</p>	<p>The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains.</p> <p>Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site.</p>	61	Sandstone on site and low water availability make it unlikely. Searches after rain did not indicate RCT presence.
<p><i>Heleioporus australiacus</i> Giant Burrowing Frog</p>	<p>The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria.</p> <p>Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. The Giant Burrowing Frog has a generalist diet and studies to date indicate that they eat mainly invertebrates including ants, beetles, cockroaches, spiders, centipedes and scorpions. When breeding, frogs will call from open spaces, under</p>	26	No habitat on site

	<p>vegetation or rocks or from within burrows in the creek bank. Males show strong territoriality at breeding sites. This species breeds mainly in autumn, but has been recorded calling throughout the year. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.</p>		
<p><i>Litoria aurea</i> Green and Golden Bell Frog</p>	<p>Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands.</p> <p>Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.</p>	2	No habitat on site
<p><i>Varanus rosenbergi</i> Rosenberg's Goanna</p>	<p>Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia.</p> <p>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. Runs along the ground when pursued (as opposed to the Lace Monitor, which climbs trees). Lays up to 14 eggs in a termite mound; the hatchlings dig themselves out of the mounds. Generally slow moving; on the tablelands likely only to be seen on the hottest days.</p>	22	No habitat on site
<p><i>Ptilinopus regina</i> Rose-crowned Fruit-Dove</p>	<p>Coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria.</p> <p>Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are</p>	3	Could feed on palm fruit. Will not be impacted as majority of possibly

	thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.		food plans being retained.
<i>Ptilinopus superbus</i> Superb Fruit-Dove	<p>The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania.</p> <p>Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn. Breeding takes place from July and September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species. The male incubates the single egg by day, the female incubates at night.</p>	2	Could feed on palm fruit. Will not be impacted as majority of possibly food plans being retained.
<i>Ixobrychus flavicollis</i> Black Bittern	<p>The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland.</p> <p>Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again.</p>	1	No habitat on site
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	<p>The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways.</p> <p>Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and</p>	46	No habitat on site

	swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.		
<i>Hieraetus morphnoides</i> Little Eagle	<p>The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.</p> <p>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.</p>	4	No habitat on site
<i>Lophoictinia isura</i> Square-tailed Kite	<p>The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in July and September and leaving by March.</p> <p>Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 square km. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.</p>	3	No habitat on site
<i>Pandion cristatus</i> Eastern Osprey	<p>The Osprey has a global distribution with four subspecies previously recognised throughout its range. However, recent studies have identified that there are two species of Osprey - the Western Osprey (<i>P. halietus</i>) with three subspecies occurring in Europe, Asia and the Americas and the Eastern Osprey (<i>P. cristatus</i>) occurring between Sulawesi (in Indonesia), Australia and New Caledonia. Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas.</p>	9	No habitat on site

	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to July and 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.		
<i>Burhinus grallarius</i> Bush Stone-curlew	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	50	No habitat on site
<i>Esacus magnirostris</i> Beach Stone-curlew	In NSW, the species occurs regularly to about the Manning River, but recent records show a breeding pair is known from the Port Stephens area (Dowadee Island and Soldiers Point [mid-north coast]) and more recently the species has been recorded at Whale Beach in Twofold Bay near Eden. Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	1	No habitat on site
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	7	No habitat on site
<i>Onychoprion fuscata</i> Sooty Tern	The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones.	1	No habitat on site

	Large flocks can be seen soaring, skimming and dipping but seldom plunging in offshore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.		
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	<p>The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.</p> <p>In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (<i>Eucalyptus pauciflora</i>) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.</p>	1	No key food trees to be impacted and no recent recordings in the area.
<i>Calyptorhynchus lathami lathami</i> South-eastern Glossy Black-Cockatoo	<p>The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia.</p> <p>Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i>, and <i>A. gymnathera</i>. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.</p>	81	No key food trees to be impacted and Forest She-Oaks in the impact area or immediate surrounds.
<i>Glossopsitta pusilla</i> Little Lorikeet	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food	8	Can feed on blossom of Gums. The Angophora

	<p>availability, although some areas retain residents for much of the year and ‘locally nomadic’ movements are suspected of breeding pairs.</p> <p>Forages primarily in the canopy of open <i>Eucalyptus</i> forest and woodland, yet also finds food in <i>Angophora</i>, <i>Melaleuca</i> and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like <i>Allocasuarina</i>. Nesting season extends from May to July and September.</p>		proposed for removal is low habitat value.
<i>Lathamus discolor</i> Swift Parrot	<p>Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.</p> <p>Migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i>, Spotted Gum <i>Corymbia maculata</i>, Red Bloodwood <i>C. gummifera</i>, Forest Red Gum <i>E. tereticornis</i>, Mugga Ironbark <i>E. sideroxylon</i>, and White Box <i>E. albens</i>. Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i>, Grey Box <i>E. moluccana</i>, Blackbutt <i>E. pilularis</i>, and Yellow Box <i>E. melliodora</i>. Return to some foraging sites on a cyclic basis depending on food availability.</p>	16	No habitat on site
<i>Neophema pulchella</i> Turquoise Parrot	<p>The Turquoise Parrot’s range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range.</p> <p>Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.</p>	1	No habitat on site

<p><i>Ninox connivens</i> Barking Owl</p>	<p>The Barking Owl is found throughout continental Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests.</p> <p>Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils.</p> <p>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.</p> <p>Preferentially hunts small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Can catch bats and moths on the wing, but typically hunts by sallying from a tall perch.</p> <p>Nesting occurs during mid-winter and spring, being variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. Young are dependent on their parents for several months.</p>	<p>21</p>	<p>Unlikely, Low, habitat value – too fragmented.</p> <p>Nearest pers Obs Jamison Park 2017</p>
<p><i>Ninox strenua</i> Powerful Owl</p>	<p>The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing.</p> <p>The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine, Black She-oak, Blackwood, Rough-barked Apple, Cherry Ballart and a number of eucalypt species.</p>	<p>462</p>	<p>Is present in vicinity (refuge cove, palmgrove reserve, ruskin rowe, trappers way. No particular habitat on-site for breeding – could feed on Ring-tails.</p>

<p><i>Tyto novaehollandiae</i> Masked Owl</p>	<p>Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution.</p> <p>Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 1000 hectares or more, depending on prey availability. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.</p>	<p>4</p>	<p>Unlikely, Low, habitat value – too fragmented.</p>
<p><i>Dasyornis brachypterus</i> Eastern Bristlebird</p>	<p>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. Nests are elliptical domes constructed on or near the ground amongst dense vegetation.</p>	<p>1</p>	<p>No habitat on site</p>
<p><i>Anthochaera phrygia</i> Regent Honeyeater</p>	<p>The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.</p> <p>The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany.</p>	<p>37</p>	<p>No habitat on site</p>
<p><i>Melithreptus gularis gularis</i></p>	<p>The Black-chinned Honeyeater has two subspecies, with only the nominate (<i>gularis</i>) occurring in NSW.</p> <p>Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.</p>	<p>1</p>	<p>No habitat on site</p>

<p>Black-chinned Honeyeater (eastern subspecies)</p>	<p>Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage. Breeds solitarily or co-operatively, with up to five or six adults, from June to December. The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest.</p>		
<p><i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow</p>	<p>Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range.</p> <p>Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed. Nest is an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage.</p>	<p>2</p>	<p>Unlikely, Low, habitat value – too fragmented.</p>
<p><i>Petroica boodang</i> Scarlet Robin</p>	<p>The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.</p> <p>The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is</p>	<p>1</p>	<p>No habitat on site</p>

	<p>occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer. This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.</p>		
<p><i>Dasyurus maculatus</i> Spotted-tailed Quoll</p>	<p>The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.</p> <p>Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals.</p>	7	<p>No Quolls in the area for 15 years</p> <p>Unlikely, Low, habitat value – too fragmented.</p>
<p><i>Isodon obesulus obesulus</i> Southern Brown Bandicoot (eastern)</p>	<p>The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland.</p> <p>Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.</p>	31	<p>No habitat on site</p>

<p><i>Phascolarctos cinereus</i> Koala</p>	<p>The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.</p> <p>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.</p>	<p>78</p>	<p>No habitat on site</p>
<p><i>Cercartetus nanus</i> Eastern Pygmy-possum</p>	<p>The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes.</p> <p>Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.</p>	<p>382</p>	<p>No habitat on site</p>
<p><i>Petaurus norfolcensis</i> Squirrel Glider</p>	<p>The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria.</p> <p>Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.</p>	<p>5</p>	<p>Unlikely, Low, habitat value – too fragmented.</p>

<p><i>Pteropus poliocephalus</i> Grey-headed Flying-fox</p>	<p>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.</p> <p>Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.</p>	1	Food trees/plans (palms) can feed on fruits. Not significant impact.
<p><i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat</p>	<p>The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.</p> <p>Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.</p>	123	May feed in the area. No particular habitat. No particular habitat removal.
<p><i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat</p>	<p>The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW.</p> <p>Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.</p>	1	May feed in the area. No particular habitat. No particular habitat removal.
<p><i>Chalinolobus dwyeri</i> Large-eared Pied Bat</p>	<p>Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.</p> <p>Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland</p>	12	May feed in the area. No particular habitat. No particular habitat removal.

	close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.		
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.	16	May feed in the area. No particular habitat. No particular habitat removal.
<i>Myotis macropus</i> Southern Myotis	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	2	No habitat on site for roosting or feeding
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	17	May feed in the area. No particular habitat. No particular habitat removal.
<i>Vespadelus troughtoni</i> 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. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine	7	May feed in the area. No particular habitat. No particular habitat removal. No caves onsite

	workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.		
<i>Miniopterus australis</i> Little Bent-winged Bat	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	1	May feed in the area. No particular habitat. No particular habitat removal.
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	43	U May feed in the area. No particular habitat. No particular habitat removal.

6.2 Appendix II – Key Weed Removal Methods

Technique	Method	Equipment
<p>Hand Removal</p> 	<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 Weed Bags</p>
<p>Crowning</p> 	<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>
<p>Cut and Paint Stems</p> 	<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>Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.</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>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 ¾ of the plant 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>Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>

	Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	
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>

6.3 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.
- 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.
- 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.

6.4 Appendix IV – Species Suitable for Landscape Plans

Tree

Allocasuarina littoralis
Allocasuarina torulosa
Angophora costata
Eucalyptus botryoides
Eucalyptus paniculata
Eucalyptus umbra
Glochidion ferdinandi
Notelaea longifolia
Livistona australis (Cabbage Tree Palm)

Shrub

Breynia oblongifolia
Dodonaea triquetra
Elaeocarpus reticulatus
Myrsine variabilis
Pittosporum revolutum
Pittosporum undulatum
Platylobium formosum
Podolobium ilicifolium
Polyscias sambucifolia
Pultenaea flexilis
Hibbertia empetrifolia subsp. *empetrifolia*

Grass & grasslike

Digitaria parviflora
Entolasia marginata
Entolasia stricta
Lomandra confertifolia
Lomandra filiformis
Lomandra longifolia
Lomandra multiflora subsp. *multiflora*
Microlaena stipoides
Oplismenus imbecillis
Panicum simile
Poa affinis
Imperata cylindrica
Lepidosperma laterale
Themeda australis

Forb

Caesia parviflora
Desmodium rhytidophyllum
Dianella caerulea
Pomax umbellata
Pratia purpurascens
Pseuderanthemum variabile
Schelhammera undulata

Fern

Adiantum aethiopicum
Pteridium esculentum
Cyathea australis (Tree Fern)
Calochlaena dubia

Vines

Billardiera scandens
Cissus hypoglauca
Clematis aristata
Desmodium varians
Eustrephus latifolius
Glycine clandestina
Morinda jasminoides
Pandorea pandorana
Hardenbergia violacea
Smilax glyciophylla

Ground plants

Xanthorrhoea macronema
Macrozamia communis
Geitonoplesium cymosum
Marsdenia rostrata

6.1 Appendix V – Tests of Significance (5-part tests)

Microbats and Flying Foxes (to be added in final)

7 Expertise of authors

Brooke is a passionate and dedicated ecologist with valuable on ground experience working on bush regeneration projects throughout the Sydney Region. She has worked with various stakeholders across both public and private sectors to deliver sustainable and achievable environmental outcomes. She has worked on major construction contractors as well as smaller contractors to deliver tailored environmental solutions on time and within budget.

Brooke completed her Bachelor of Science at the University of Wollongong and is currently expanding her skills and knowledge undertaking Cert III in Conservation and Ecosystem Management at TAFE.

Brooke has experience conducting fieldwork and preparing a range of reports including the Flora and Fauna Assessment, Vegetation Management Plan (VMP), Biodiversity Development Assessment Report (BDAR), Certification Certification, Construction Environmental Management Plan (CEMP), Review of Environmental Factors (REF), and Environmental Impact Assessment (EIA).

Brooke has exceptional communication and customer service skills and can deliver professional ecological assessments.

Key Projects:

- Threatened species surveys.
- Flora and fauna surveys.
- Fauna spotter and handler.
- Aquatic fauna relocation.

Brooke Thompson ECOLOGIST



SPECIALISATIONS

- GIS mapping
- Fauna spotting
- Aquatic fauna relocation and handling
- Habitat tree assessment, marking and mapping
- Floristic plot surveys
- Flora and fauna field surveys

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. June 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. January 2022-*present*
- **Volunteer**, Microplastic Surveying, University of Wollongong 2021
- **Volunteer**, Frog Surveying, Chad Beranek B EnvSc (Hons) UTS 2016

QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- Currently undertaking Cert III Conservation and Ecosystem Management.
- WHS General Induction of Construction Industry NSW White Card.
- **Early Career Ecologist Consultant**, Ecological Consultants Association of NSW.

With over 25 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 Southeast Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

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

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

Geraldene Dalby-Ball (Elaway) DIRECTOR



SPECIALISATIONS

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

CAREER SUMMARY

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

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Professional member** Ecological Consultants Association of NSW
- Accredited Biobank Assessor (in renewal)