Flora and Fauna Assessment

49 Blackbutts Rd & 21A Warili Rd, Frenchs Forest

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

April 2024 updated July and September 2024





About this document

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Statement of Authorship

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Limitations Statement

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

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

Summary

Ecological Consultants Australia Pty Ltd trading as Kingfisher Urban Ecology and Wetlands has been engaged by Sekisui House to prepare a **Flora and Fauna Assessment** (FFA) to accompany a development application for a 13-lot subdivision at 49 Blackbutts Road and 21A Warili Road, Frenchs Forest NSW 2086, legally known as Lot 1 in DP 1298188 and Lot 1 in DP 524083 in the Northern Beaches LGA.

July 2024 update

This report has been updated in response to the Natural Environment Referral Response – Biodiversity issued by Northern Beaches Council on 31/05/2024. Specifically, this update addresses:

A Flora and Fauna Assessment (Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands, April 2024) has been submitted with the application and concluded that the application would not trigger entry into the Biodiversity Offsets Scheme (BOS) as the proposal does not exceed the clearing threshold (0.2 ha). However:

- No map including these calculations has been provided and the inclusion of *Figure 7.2 Trees* retained after demolition would allow for consideration that the total impact of demolition works and subdivision works have been considered separately in the calculation of the clearing thresholds.
- The report considers in its results that a total of 88 prescribed trees, 45 exotic trees and a grouping of an additional 18 trees are proposed for removal (total of 151 trees). These numbers are inconsistent with those presented in the AIA.
- The report has also failed to adequately address and discuss the Avoidance and Minimisation strategies explored by the development as required in Council's Biodiversity Requirements for Development Applications: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://files-preprod-d9.northernbeaches.nsw.gov.au/nbc-prod-files/media/files/2024-05/Biodiversity%20Requirements%20for%20Development%20Applications%20-%202024.pdf? 1715582608

Figure 7.1 provides a map showing the trees the calculations were based on. The list below it int eh direct impacts section has the area of each canopy and the total.

Section 7.1 has been updated to be consistent with the AIA.

Section 7.3 addresses avoidance and minimisation strategies – noting there the overall design is similar to that previously submitted.

Methods

- On-ground surveys were conducted on the 21st of February by Ecologist Elaway (G. Dalby-Ball).
- Flora and fauna surveys were conducted as a random meander across the subject site and surrounds, whilst recording all visible flora and fauna species and their habitats.
- BioNet searches were performed to identify threatened flora, fauna and endangered populations observed during previous ecological surveys within a 10 km radius surrounding the subject site.
- The proposed development was evaluated for actual and potential ecological impacts.
- An assessment of the Biodiversity Offsets Scheme (BOS) threshold triggers was undertaken and found that the proposal does not trigger the area clearing or Biodiversity Values Map threshold. The proposal will see approximately 0.2 ha (overestimate based on full canopy cover and areas between) of vegetation cleared which is under the 0.25 ha threshold for entry into the BOS.

Results

- The site contains no mapped plant community type (PCT). The closest PCT to the subject site is ٠ Sydney Coastal Shale-Sandstone Forest (PCT 3259) located on the northern side of Blackbutts Road. PCT 3259 has an associated TEC – Duffys Forest Ecological Community in the Sydney Basin Bioregion (Bionet vegetation classification database).
- No threatened flora or fauna have been previously recorded on-site (Bionet 2024). Records for the local area include the Grey-headed flying-fox, Large and little bent-winged bat, Powerful owl, Swift parrot, White-bellied sea-eagle, Red-crowned toadlet, Caley's grevillea, Bynoe's wattle, Magenta lilly pilly, etc. (see Section 5 of this report). None of the above threatened species were observed or recorded on-site during the survey.
- On-ground findings are that native canopy is present including locally native species, Spotted Gums (young), Iron Bark. Native trees are in two clusters and on the road reserve. The remainder of the site is built on or disturbed exotic plantings. Jacaranda and similar.
- No original native midstory will be removed. Native trees are proposed for removal.

The number of native trees proposed for removal for subdivision is 69 that are not already exempt of approved for removal under separate DA.

Trees 15, 17, 18 (x3), 19, 20, 21, 22, 25, 27, 29, 30, 31, 34, 35, 38, 39, 41 (x 18), 42, 43, 44, 45, 46, 47, 52 (x7), 53, 54, 57 (native to Norfolk Island external territory of Australia), 58, 59, 67, 83, 84, 85, 86, 88, 89, 91, 96, 99, 100, 103, 104, 105 and 106 proposed for removal in subdivision not including exempt trees.

Total equates to 69 native trees (not approved for removal under separate approved demolition DA).

Sixteen native trees proposed are proposed for retention

Trees 2, 4, 5, 8, 9, 11, 12, 13, 14, 16, 24, 48, 49, 50, 55, 98 are native trees onsite. Not including trees on neighbouring properties to be retained as shown in the plans.

Tree 97 is an Acacia – species not identified and so has been included in the native tree count.

The process of Avoid, Minimize and Mitigate was applied to the proposal. The development does not avoid two main groups of native trees on the site. It has retained those on Blackbutt street via pulling dwellings back from the road. To be able to keep the cluster of trees near Blackbutt Rd only 2 Lots could fit (currently 3). The second cluster is where Lots 7, 8, 9 are and retaining them would also require removing a lot as there is not sufficient room to be clear of root zones. The dwelling yield is under that proposed for the site. Other alternatives such as increase height do not fit with the planning requirements. Cut and fill plans are within the area of impact on the central tree group.

The Avoid and Minimise has then gone to the next layer of impact to see where the design layout can change to retain trees with the existing proposed Lot numbers. To retain trees changes were made to the road lay out and the location of the indicative building envelopes. Other options suggested could not be implemented without impacting other Planning requirements, such as visitor parking. Pathways near tee roots are crush stone rather than concrete.

Mitigation Measures

If the proposal is approved the following mitigation measures are to be implemented.

Delineation of work areas

- Preservation of trees and the sandstone rock (relocation). Implement all Arborists requirements.
- Ecologist on-site during tree removals. Collection of seed (give to a native plant nursery).
- Native species landscaping (as in Landscape Plan) and planting of native canopy (and ideally mid and ground around each tree planted) in an approved (by Council) location and maintenance to establishment.
- Installation of 2x nest boxes (hardwood or equivalent must be hung >3+ m, not nailed to tree)
- Pathogen prevention see Appendix on not spreading phytophthora or myrtle rust.

See the recommendation section for a detailed explanation as to how these measures improve biodiversity values.

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),
- Biodiversity Conservation Act 2016 (BC Act),
- National Parks & Wildlife Act 1974 (NP&W Act), and
- Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).

Table of Contents

About this document
Summary3
1 Introduction7
1.1 Purpose of report
1.2 Site description
1.3 Proposed development
1.4 Legislative framework
1.5 Biodiversity Offsets Scheme
1.6 Information sources
2 Methods
2.1 Database search
2.2 On-ground survey
2.2.1 Flora
2.2.2 Fauna and their habitat
2.3 Limitations of the study
3 Waterways23
4 Native vegetation
4.1 Plant community types
5 Threatened species
5.1 Threatened flora
5.2 Threatened fauna

	5.3	En	dangered populations	
6	On	n-gr	ound survey	
	6.1	Na	tive vegetation	
	6.2	W	eeds	
	6.3	Fa	una and their habitat	
	6.4	Ph	otos	
7	Im	pac	t assessment	
	7.1	Diı	rect impacts	
	7.1	.1	Tree removal	
	7.2	Inc	lirect impacts	
	7.3	Av	oid and minimise impacts	
	7.3	.1	Proposal location	Error! Bookmark not defined.
	7.3	.2	Tree retention	
	7.3	.3	Habitat for native fauna	Error! Bookmark not defined.
	7.3	.4	Exclusion zones	Error! Bookmark not defined.
	7.3	.5	Landscaping	Error! Bookmark not defined.
8	Со	ncl	usions and Recommendations	
	8.1	Ma	anagement actions	
	8.1	.1	Delineation of work areas	
	8.1	.2	Preservation of habitat features	
	8.1	.3	Native species landscaping	
	8.1	.4	Erosion and sediment control	Error! Bookmark not defined.
	8.1	.5	Weed control	
	8.1	.6	Installing a nest box	
	8.1	.7	Pathogen prevention	
9	Ар	per	ndices	
	9.1	Ар	pendix I – Likelihood of Occurrence	
	9.2	Ap	pendix II – Test of Significance	
	9.2	.1	Grev-headed Flying-fox (Pteropus poliocephalus)	58
	9.2	.2	Duffys Forest Ecological Community in the Sydney Basin Bioregion	
	9.3	An	pendix III – Key Weed Removal Methods	Error! Bookmark not defined
	9.4	Δn	nendix IV - Bushland Hygiene Protocols for Phytophthora	67
	95	Δn	nendiv $V = Native species list suitable for landscaping$	
	5.5	γh		
E	xpert	ise	of authors	

1 Introduction

1.1 Purpose of report

Ecological Consultants Australia Pty Ltd trading as Kingfisher Urban Ecology and Wetlands has been engaged by Sekisui House to prepare a **Flora and Fauna Assessment** (FFA) to accompany a development application for a 13-lot subdivision at 49 Blackbutts Road and 21A Warili Road, Frenchs Forest NSW 2086, legally know as Lot 1 in DP 1298188 and Lot 1 in DP 524083 in the Northern Beaches LGA.

The site has been assessed as a FFA as the Biodiversity Offsets Scheme (BOS) under the NSW *Biodiversity Conservation Act 2016* (BC Act) is not triggered, given:

- 1. The proposed development does not trigger the area clearing threshold.
- 2. The proposed development does not require the clearing of native vegetation or other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the Biodiversity Values (BV) Map and therefore, the BV Map threshold is not triggered.

This FFA assesses the potential impacts of the proposed development, including direct and indirect impacts on threatened species, populations, ecological communities and their habitats, according to Section 5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Where applicable, the 'test of significance' has been undertaken to determine whether the proposed development is likely to significantly affect threatened species or ecological communities, or their habitats.

The test of significance is set out in s. 7.3 of the BC Act.

1.2 Site description

The site which is the subject of this report is located at 49 Blackbutts Road and 21A Warili Road, Frenchs Forest NSW 2086, legally know as Lot 1 in DP 1298188 and Lot 1 in DP 524083 in the Northern Beaches LGA (see Figures 1.1 and 1.2). The study area includes the site, as well as any additional land traversed during the site survey.

Lot/DP	1/DP1298188	1/DP524083
Address	49 Blackbutts Road Frenchs Forest NSW 2086	21A Warili Road Frenchs Forest NSW 2086
Area	10,112 m ²	216 m ²
LGA	Northern Beaches	Northern Beaches
Land Zoning	R2 – Low Density Residential	R2 – Low Density Residential

Table 1.1. Site informati	on.
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Figure 1.1. Subject site. Source: SEED NSW Imagery.

1.3 Proposed development

The proposal is for a community title residential subdivision located at 49 Blackbutts Road (see Figures 1.2 to 1.7).

The development, subject to this development application includes:

- Establishment of a community title road and stormwater system to facilitate subdivision for 12 residential lots
- Construction of one (1) on-site stormwater detention tank with an inbuilt water quality chamber
- Connection to Warili Road
- Construction of footpaths (including crushed stone not concrete where near tree roots.
- Construction and commissioning of essential utilities.

Works associated with this application include:

- Implementation of erosion and sediment controls
- Earthworks for proposed lots and community title road
- Stormwater management
- Road construction
- Retaining wall construction

See Civil Engineering and Stormwater Report prepared by Enspire (8 March 2024) for further details.



Figure 1.2a. General Arrangement Plan.

Flora and Fauna Assessment 49 Blackbutts Rd & 21A Warili Rd, Frenchs Forest | July 2024 and September 2024 Page 9



Figure 1.3b. Detailed Arrangement Plan. Tree Plan to assist with seeing the proposed ecological impacts.

This plan has been prepared specifically to assist with ecological reporting and is not to be lodged in contradiction of Arboricultural Impact Assessment Report dated 15/8/24 version 2.0

Existing buildings have already been approved for demolition see Figure 1.3



Figure 1.4. Demolition Plan.

Flora and Fauna Assessment 49 Blackbutts Rd & 21A Warili Rd, Frenchs Forest | July 2024 and September 2024 Page 11



Figure 1.5. Erosion and Sedimentation Control Plan.



Figure 1.6. Earthworks Cut and Fill Plan.



Figure 1.7. Siteworks and Stormwater Management Plan Sheet 01.



Figure 1.8. Siteworks and Stormwater Management Plan Sheet 02.

1.4 Legislative framework

Commonwealth and State legislation and policies, and local policies apply to the assessment, planning and management of the environment within the study area. Table 1.2 outlines the relevant legislation, policy and guidelines related to the proposed development.

Table 1.2. Legislative context.

Instrument	Relevance to the proposal		
Commonwealth			
Environment Protection and Biodiversity Conservation (EPBC) Act 1999	Under the EPBC Act an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.		
State			
Environmental Planning and Assessment (EP&A) Act 1979	Part 5 of the EP&A Act sets out the environmental assessment scheme that applies to "activities" undertaken by or on behalf of a public authority (including local councils) or which requires the approval of such an authority.		
<i>Biodiversity Conservation</i> (BC) Act 2016	Part 7.3 of the BC Act sets of the test for determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.		
Biosecurity Act 2015	Under the Act, all landholders have a general biosecurity duty to manage any biosecurity risk posed or likely to be posed by priority weeds. Any person who deals with a plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevent, eliminated or minimised.		
Local			
Warringah Local Environmental Plan 2011	The proposal must comply with land uses set out in the zoning provisions of the LEP. The site is zoned R2 low density residential. The objectives of this zone are to:		
	• To provide for the housing needs of the community within a low-density residential environment.		
	• To enable other land uses that provide facilities or services to meet the day to day needs of residents.		
	 To ensure that low density residential environments are characterised by landscaped settings that are in harmony with the natural environment of Warringah. 		
	The proposal is keeping within the objectives of the zone.		
Warringah DCP	The site is located within the DCP Map – Landscaped Open Space and Bushland Setting in which the requirement is a minimum of 40% landscaped open space.		

Clause E2 Prescribed Vegetation
<u>Objectives</u>
 To preserve and enhance the area's amenity, whilst protecting human life and property.
 To improve air quality, prevent soil erosion, assist in improving water quality, carbon sequestration, storm water retention, energy conservation and noise reduction.
 To provide habitat for local wildlife, generate shade for residents and provide psychological & social benefits.
• To protect and promote the recovery of threatened species, populations and endangered ecological communities.
 To protect and enhance the habitat of plants, animals and vegetation communities with high conservation significance.
 To retain and enhance native vegetation communities and the ecological functions of wildlife corridors.
• To reconstruct habitat in non vegetated areas of wildlife corridors that will sustain the ecological functions of a wildlife corridor and that, as far as possible, represents the combination of plant species and vegetation structure of the original 1750 community.
 Promote the retention of native vegetation in parcels of a size, condition and configuration which will as far as possible enable plant and animal communities to survive in the long- term.
Requirements
 The following is prescribed for the purposes of clause 5.9(2) of Part 2 of the Vegetation SEPP:
All native vegetation identified on:
 a) DCP Map Threatened and High Conservation Habitat: not shown
b) DCP Map Wildlife Corridors: not shown
c) DCP Map Native Vegetation: nto shown
d) known or potential habitat for threatened species, populations or ecological communities as listed under the NSW Threatened Species Conservation Act 1995 (repealed and replaced by the NSW Biodiversity Conservation Act 2016) and/or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. None shown
 Development is to be situated and designed to minimise the impact on prescribed vegetation, including remnant canopy trees, understorey vegetation, and ground cover species.

The proposal retains 42 native trees. Native understorey vegetation and ground cover species are primarily absent.
Clause E6 Retaining unqiue environmental features
<u>Objectives</u>
 To conserve those parts of land which distinguish it from its surroundings.
Requirements
 Development is to be designed to address any distinctive environmental features of the site and on adjoining nearby land.
 Development should respond to these features through location of structures, outlook, design and materials.
Mature canopy trees are the significant environmental features. Other features such as caves, rock features, hollow-bearing trees, nests, burrows wre not onsite at the tiem of survey.
Other required documentation:
• The proposal should follow the principles of avoidance and minimisation of impacts to biodiversity and look for alternatives to maximise retention of prescribed vegetation and unique environmental features. Development is to be designed to avoid and minimise impacts to the natural environment, and for any residual impacts to then be assessed. The residual impact is the impact remaining after measures to avoid and minimise impacts to biodiversity have been applied.
1) number of native trees proposed for removal for subdivision
Trees 15, 17, 18 (x3), 19, 20, 21 (x6), 22, 25, 27, 29, 30, 31, 34, 35, 38, 39, 41 (x 18), 42, 43, 44, 45, 46, 47, 52 (x7), 53, 54, 57 (native to Norfolk Island external territory of Australia), 58, 59, 67, 83, 84, 85, 86, 88, 89, 91, 96, 99, 100, 103, 104, 105 and 106 proposed for removal in subdivision not including exempt trees.
Total equates to 74 native trees not already exempt of approved for removal under separate D.A's
The number of native trees proposed for retention are
Trees 2, 4, 5, 8, 9, 11, 12, 13, 14, 16, 24, 48, 49, 50, 55, 98 are native trees onsite and not including trees on neighbouring properties to be retained.
16 trees in total.
Tree 97 is an Acacia the species could not be identified and so it is native origin is unknown.

Those recommended for retention are to be protected in accordance with the Australian Standards AS4970:2009 – Protection of Trees on Development Sites, Section 8.3 Site Specific Protection Measures & Appendix B: Tree Protection (Generic) of the Arboricultural Impact Assessment Report prepared by The Tree Guardian Arboricultural Consultancy (21 March 2024).
 If works are to be undertaken within 5 metres of an existing tree an Arboricultural Impact Assessment prepared by an AQF5+ arborist is required to determine whether impacts from the proposed works are acceptable or not.
See the Arboricultural Impact Assessment Report prepared by The Tree Guardian Arboricultural Consultancy (21 March 2024) and updates.
• If more than 4 prescribed trees are to be impacted by the proposed development, the application is to be accompanied by a Flora and Fauna Assessment (FFA) prepared by a suitably qualified ecologist. The ecologist will have to demonstrate whether the proposal triggers entry into the Biodiversity Offsets Scheme (BOS) or not based on the clearing thresholds established in the Biodiversity Offsets Method (BOM). If the BOS is triggered by the proposal, a Biodiversity Development Assessment Report (BDAR) will be required.
This FFA has been prepared. A demonstration of whether the proposal triggers entry into the BOS is provided in Section 1.5 of this report.
 If prescribed (protected) trees are to be removed for the purposes of the proposed works, like for like replacement plantings will have to be considered and a landscape plan with a selection of the species and number of plants for replacement is to be provided.
Suitable like for like replacement species for plantings have been are requred through landscaping andoff-site planting – see also Appendix V of this report (see Trees).
• For the purposes of the subdivision and resulting lots, a concept landscape plan should be provided including the, location, numbers and species of flora to be planted. Any new landscaping is to incorporate a minimum 80% locally native vegetation species as a proportion of the total number of plants. Locally native species are to be consistent with the relevant section of the Native Planting Guide available on Council's website.
See recommended native species list for plantings in Appendix V of this report. This list is consistent with the Council's native tree planting guide.

1.5 Biodiversity Offsets Scheme

The Biodiversity Conservation Act 2016 (BC Act 2016) is the key legislation that enables the conservation of biodiversity within the state of NSW. 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 Biodiversity Conservation Regulation 2017 (BC Reg.) sets out the threshold level for when the Biodiversity Offsets Scheme (BOS) will be triggered. The threshold has two elements:

1. Whether the amount of native vegetation being cleared exceeds an area threshold

The proposal does not trigger the area clearing threshold as per the BOS entry requirements as the impact area (\sim 0.2 ha) does not exceed the threshold for clearing, above which BAM and offsets scheme apply (0.25 ha or more) (Table 1.2).

Table 1.2. Minimum lot size and threshold trigger.

Minimum lot size	600 m ²
Threshold for clearing, above which the BAM and offsets scheme apply	0.25 ha or more
Clearing area	2080m ² (or 0.21ha)

2. Whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head

The BV Map identifies land of high biodiversity value, as defined by clause 7.3(3) of the BC Reg. The BOS applies to the clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the BC Reg. on land identified on the BV Map. See direct impact section for the clearing area calculation.

The proposed development footprint is located on land identified on the BV Map and therefore does trigger the BV Map threshold (Figure 1.8).



Figure 1.9. Biodiversity Values Map.

Source: Biodiversity Values Map and Threshold (BMAT) Tool https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

1.6 Information sources

Databases reviewed in the assessment:

- BioNet Vegetation Classification
- BioNet Threatened Biodiversity Data Collection
- NSW BioNet Atlas
- Directory of Important Wetlands in Australia
- Biodiversity Values Map and Threshold tool
- Protected Matters Search Tool
- NSW Planning Portal Spatial Viewer
- SEED
- eSPADE v2.2

Reports and plans related to the proposal:

- Arboricultural Impact Assessment Report prepared by The Tree Guardian Arboricultural Consultancy (21 March 2024)
- Civil Engineering and Stormwater Report prepared by Enspire (8 March 2024)

DRAWING SCHEDULE

DRAWING NUMBER	DESCRIPTION
230057-00-DA-C01.01	COVER SHEET AND DRAWING SCHEDULE
230057-00-DA-C01.21	SPECIFICATION NOTES - SHEET 01
230057-00-DA-C01.22	SPECIFICATION NOTES - SHEET 02
230057-00-DA-C01.41	GENERAL ARRANGEMENT PLAN
230057-00-DA-C02.01	DEMOLITION PLAN
230057-00-DA-C03.01	EROSION AND SEDIMENTATION CONTROL PLAN
230057-00-DA-C03.21	EROSION AND SEDIMENTATION CONTROL DETAILS
230057-00-DA-C04.01	EARTHWORKS CUT AND FILL PLAN
230057-00-DA-C04.21	EARTHWORKS CUT AND FILL SECTIONS
230057-00-DA-C05.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN SHEET 01
230057-00-DA-C05.02	SITEWORKS AND STORMWATER MANAGEMENT PLAN SHEET 02
230057-00-DA-C06.01	ROAD TYPICAL CROSS SECTIONS
230057-00-DA-C07.01	ROAD LONGITUDINAL SECTION
230057-00-DA-C11.01	PAVEMENT, SIGNAGE AND LINEMARKING PLAN - SHEET 01
230057-00-DA-C11.02	PAVEMENT, SIGNAGE AND LINEMARKING PLAN - SHEET 02
230057-00-DA-C14.01	SITEWORKS DETAILS
230057-00-DA-C17.01	OSD TANK PLAN AND SECTION
230057-00-DA-C18.01	STORMWATER DETAILS
230057-00-DA-C20.01	PRE-DEVELOPMENT CATCHMENT PLAN
230057-00-DA-C20.21	POST-DEVELOPMENT CATCHMENT PLAN
230057-00-DA-C22.01	TURNING PATH PLAN

2 Methods

2.1 Database search

A site-specific database search was conducted prior to undertaking on-ground surveys and the preparation of this report, which included the following sources:

Threatened species database search tools:

• Atlas of NSW Wildlife (Bionet/SEED) 10 km search radius (Accessed March, 2024).

Previous vegetation mapping: NSW State Vegetation Type Map (SVTM) C2.0M2.0 (DPE 2023).

Hydroline mapping: Water Management (General) Regulation 2018 Hydro Line spatial data https://www.dpie.nsw.gov.au/water/licensing-and-trade/controlled-activity-approvals/waterfront-land-e-tool/hydro-line-spatial-data

2.2 On-ground survey

On-ground surveys were conducted on the 21st Feb 2024 by Ecologist Elaway (G. Dalby-Ball).

2.2.1 Flora

Flora surveys were conducted as a random meander across the subject site and surrounding areas, whilst recording all visible flora species. Habitat searches for threatened flora species were conducted during flora surveys. Flora surveys included the identification of both native and exotic species and the validation of existing vegetation mapping.

2.2.2 Fauna and their habitat

Opportunistic fauna surveys were conducted for amphibians, aves, reptiles and mammals, and included searches of direct and indirect evidence of occupancy (i.e., scats, urine, scratchings, fur, bones, etc.). Fauna habitat searches were conducted and included searches for hollow-bearing trees, bush rock and rocky outcrops, caves (onsite none however research included covering 2km), crevices and overhangs, burrows, nests, food trees (e.g., *Allocasuarina* sp.), permanent soaks and seepages, and refuge habitats of human-made structures (e.g., evidence of micro-bats in the abandoned buildings).

2.3 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean 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 and the Ecologists deep knowledge of the general area over 20yrs we are confident that this survey is representative of the likely species and vegetation community and that future studies at other times would not change the conclusions in this report.

3 Waterways

The site does not contain any hydrological features. The closest watercourse is Carroll Creek to the southwest (see Figure 3.1).

No natural or created soaks that would be suitable for frogs were observed. Damper areas on-site are those beneath trees near Blackbutts Road. If there were ponds in nearby private gardens then frogs may shelter in this small grassed area as part of a larger habitat area; however, it is unlikely.



Figure 3.1. Catchment context. Source: Water Management (General) Regulation 2018 hydroline spatial data 1.0.

4 Native vegetation

4.1 Plant community types

A search of the NSW State Vegetation Type Map (SVTM) (DPE 2023) showed no mapped plant community type (PCT) on the site. The closest mapped PCT is Sydney Coastal Shale-Sandstone Forest (PCT 3259) located on the northern side of Blackbutts Road (Figure 3.2).



Figure 4.1. PCT mapping.

Sydney Coastal Shale-Sandstone Forest is the most likely PCT to have originally occurred on-site. Remnant trees on-site include *Corymbia gummifera*, *Angophora costata*, *Eucalyptus pilularis* and *E. botryoides*.

Sydney Coastal Shale-Sandstone Forest relates to the endangered ecological community Duffys Forest Ecological Community in the Sydney Basin Bioregion (Bionet vegetation classification database). A 5-part test of significance for this community has been provided in Appendix II.

5 Threatened species

5.1 Threatened flora

Bionet records (2024) within a 10-kilometre radius of the subject site returned a total of 26 threatened flora species records. These species are currently listed as critically endangered, endangered or vulnerable under NSW and/or Commonwealth legislation (Table 3.1). No threatened flora have been recorded to occur on the site.

The likelihood of occurrence assessment for threatened flora occurring on the subject site is presented in Appendix I.

In summary all species, except the orchids would be identifiable on-site if present. The Orchids (3 species) habitat and present was surveyed for.

Onion Orchid would not be present (habitat is not correct) and the author knows this species and where it's located.

The Bauer's Midge Orchid were surveyed (at the optimal time Feb-March) in the only possibly place (under the trees) and were not present. Its known habitat is dry sclerophyll forest and moss gardens over sandstone and the site is not this.

Thick Lip Spider Orchid (Sept-Nov flowering) doesn't have habitat on the site and it's noted that this area has been mown and whipper snipped for years. Habitat is low, dry sclerophyll woodland (for example open Kunzea woodland) with a heathy or sometimes grassy understorey on clay loams or sandy soils (Bernhardt 1993; Bishop 2000; Cross 1995; Fitzgerald 1876).

Syzygium paniculatum	Magenta Lilly Pilly
Caladenia tessellata	Thick Lip Spider Orchid
Genoplesium baueri	Bauer's Midge Orchid
Microtis angusii	Angus's Onion Orchid
Sarcochilus hartmannii	Hartman's Sarcochilus
Grevillea caleyi	Caley's Grevillea

Table 5.1	Threatened flou	a recorded with	nin a 10-kilometre	e radius of the	subject site.
Table 5.1.	inicaterica noi				Subject Site.

Family	Scientific name	Common name	Status		Records
			NSW	Cth	
Campanulaceae	Isotoma fluviatilis subsp. fluviatilis			х	1
Dilleniaceae	Hibbertia puberula		E		1
Dilleniaceae	Hibbertia superans		E		1
Elaeocarpaceae	Tetratheca glandulosa		V		159
Ericaceae	Epacris purpurascens var. purpurascens		V		16

Family	Scientific name Common name		Sta	Records	
			NSW	Cth	
Euphorbiaceae	Chamaesyce psammogeton	Sand Spurge	E		2
Fabaceae (Mimosoideae)	Acacia bynoeana	Bynoe's Wattle	E	V	8
Fabaceae (Mimosoideae)	Acacia terminalis subsp. Eastern Sydney	Sunshine wattle	E	E	3
Haloragaceae	Haloragodendron lucasii		E	E	12
Lamiaceae	Prostanthera marifolia	Seaforth Mintbush	CE	CE	870
Malvaceae	Lasiopetalum joyceae		V	V	1
Myrtaceae	Callistemon linearifolius	Netted Bottle Brush	V		12
Myrtaceae	Darwinia biflora		V	V	2
Myrtaceae	Eucalyptus camfieldii	Camfield's Stringybark	V	V	70
Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	2
Myrtaceae	Leptospermum deanei		v	v	35
Myrtaceae	Melaleuca deanei	Deane's Paperbark	V	V	10
Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	E	V	15
Orchidaceae	Caladenia tessellata	Thick Lip Spider Orchid	E,P	V	3
Orchidaceae	Genoplesium baueri	Bauer's Midge Orchid	E,P	E	74
Orchidaceae	Microtis angusii	Angus's Onion Orchid	E,P	E	9
Orchidaceae	Sarcochilus hartmannii	Hartman's Sarcochilus	V,P	V	1
Proteaceae	Grevillea caleyi	Caley's Grevillea	CE	CE	378
Proteaceae	Macadamia integrifolia	Macadamia Nut		V	8
Thymelaeaceae	Pimelea curviflora var. curviflora		V	V	37

CE = Critically Endangered, E = Endangered, V = Vulnerable, P = Protected, X = Extinct

5.2 Threatened fauna

Bionet records (2024) within a 10-kilometre radius of the subject site returned a total of 50 threatened fauna species records. These species are currently listed as critically endangered, endangered or vulnerable under NSW and/or Commonwealth legislation (Table 3.2). No threatened fauna have been recorded to occur on the site.

The likelihood of occurrence assessment for threatened flora occurring on the subject site is presented in Appendix I.

Class	Scientific name	Common name	Status		Records	
			NSW	Cth		
Myobatrachidae	Pseudophryne australis	Red-crowned Toadlet	V,P		624	
Limnodynastidae	Heleioporus australiacus	Giant Burrowing Frog	V,P	v	17	
Cheloniidae	Caretta caretta	Loggerhead Turtle	E1,P	E	7	
Varanidae	Varanus rosenbergi	Rosenberg's Goanna	V,P		126	
Columbidae	Ptilinopus regina	Rose-crowned Fruit-Dove	V,P		1	
Columbidae	Ptilinopus superbus	Superb Fruit-Dove	V,P		5	
Apodidae	Apus pacificus	Fork-tailed Swift	Р	м	1	
Apodidae	Hirundapus caudacutus	White-throated Needletail	Ρ	м	21	
Diomedeidae	Diomedea exulans	Wandering Albatross	E,P	v	1	
Procellariidae	Ardenna carneipes	Flesh-footed Shearwater	V,P	м	1	
Procellariidae	Ardenna pacifica	Wedge-tailed Shearwater	Р	м	1	
Procellariidae	Ardenna tenuirostris	Short-tailed Shearwater	Р	м	1	
Ardeidae	Ixobrychus flavicollis	Black Bittern	V,P		7	
Accipitridae	Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P		44	
Accipitridae	Hieraaetus morphnoides	Little Eagle	V,P		3	
Accipitridae	Lophoictinia isura	Square-tailed Kite	V,P		10	
Accipitridae	Pandion cristatus	Eastern Osprey	V,P		8	
Burhinidae	Esacus magnirostris	Beach Stone-curlew	CE,P		1	
Charadriidae	Pluvialis squatarola	Grey Plover	Р	м	2	
Laridae	Sterna hirundo	Common Tern	Р	м	1	
Laridae	Thalasseus bergii	Crested Tern	Р	м	7	
Cacatuidae	Callocephalon fimbriatum	Gang-gang Cockatoo	V,P	E	3	
Cacatuidae	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V,P	v	97	

Table 5.2. Threatened fauna recorded within a 10-kilometre radius of the subject site.

Psittacidae	Glossopsitta pusilla	Little Lorikeet	V,P		8
Psittacidae	Lathamus discolor	Swift Parrot	E,P	CE	15
Psittacidae	Neophema pulchella	Turquoise Parrot	V,P		1
Strigidae	Ninox connivens	Barking Owl	V,P		8
Strigidae	Ninox strenua	Powerful Owl	V,P		507
Tytonidae	Tyto novaehollandiae	Masked Owl	V,P		2
Tytonidae	Tyto tenebricosa	Sooty Owl	V,P		4
Meliphagidae	Anthochaera phrygia	Regent Honeyeater	CE,P	CE	1
Neosittidae	Daphoenositta chrysoptera	Varied Sittella	V,P		2
Artamidae	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P		6
Petroicidae	Petroica boodang	Scarlet Robin	V,P		2
Dasyuridae	Dasyurus maculatus	Spotted-tailed Quoll	V,P	Е	19
Peramelidae	Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E,P	E	111
Phascolarctidae	Phascolarctos cinereus	Koala	E,P	Е	18
Burramyidae	Cercartetus nanus	Eastern Pygmy-possum	V,P		352
Pteropodidae	Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	361
Emballonuridae	Saccolaimus flaviventris	Yellow-bellied Sheathtail- bat	V,P		7

CE = Critically Endangered, E = Endangered, V = Vulnerable, P = Protected, M = Migratory

5.3 Endangered populations

Bionet records (2024) show no endangered populations have been recorded within a 10 km radius of the subject site.



Figure 5.1. Bionet threatened species records within proximity to the subject site. Source: Bionet species sightings 2024.

6 On-ground survey

6.1 Native vegetation

The site contains native canopy in the form of *Corymbia maculata, C. gummifera, Eucalyptus saligna, E. resinifera, E. botryoides, E. microcorys* and *E. pilularis.*

Smaller trees/shrubs include Backhousia myrtifolia, Callistemon viminalis, Leptospermum petersonii, Syzygium australe, S. smithii, Banksia spinulosa, B. integrifolia, Glochidion ferdinandi, Backhousia citriodora and Acacia decurrens.

Cyathea australis (Tree ferns) and Livistona australis (Cabbage palms) are also present.

A small patch of *Microlaena stipoides* (20cm x 20cm) was observed; however, all other grassed areas are exotic.

6.2 Weeds

Table 6.1 lists the weeds observed within the study area and surrounds and whether they are a Weeds of National Significance (WoNS) and the landholders duty under the *Biosecurity Act 2015*.

Scientific name	Common name	WoNS	Duty
Ochna serrulata	Mickey Mouse Plant	No	This plant should not be sold in parts of NSW
Asparagus aethiopicus	Asparagus Fern	Yes	This plant must not be sold anywhere NSW
Senna pendula	Cassia	No	This plant should not be sold in parts of NSW
Ehrharta erecta	Panic Veldt Grass	No	This plant should not be sold in parts of NSW
Agapanthus africanus	Agapanthus	No	This plant should not be sold in parts of NSW
Bidens pilosa	Cobbler's Pegs	No	This plant should not be sold in parts of NSW
Solanum nigrum	Black Nightshade	No	This plant should not be sold in parts of NSW

Table 6 1	Weeds	observed	within	the	study	area	and	surrou	nds
	vveeus	Observeu	VVILIIII	uie	study	area	anu	Surroui	ius

6.3 Fauna and their habitat

Habitat is limited to exotic and planted native shrubs, low in number and density. Native birds and pollinators could use these for food sources. No threatened species or high reliance due to the low number of plants and previous long-term proximity to people/buildings etc.

Native canopy: Canopy in flower will be providing food for nectivorous birds and bats as well as insects. Insects that will then be fed on by insectivorous birds and microbats. The high diversity of canopy species will be resulting in long local availability as the species flower at different times.

No obvious hollows were observed. It is possible that deep furrows or upper dead wood could have places/hollows large enough for microbats. It is noted that some species have been found under folded bark.

No ponds or pools or damp soaks for frogs.

No areas of primary Lizard/snake habitat. Habitat is present for Common Garden skinks and 'Wall Skinks' on buildings. No weeds with specific features for habitat including nothing particular for Butterflies.

6.4 Photos



Canopy trees along main road and inside boundary



Hollows not present, or not obvious from ground level.



Paved side with exotic turf and exotic mid-story.



Canopy on street - no hollows.



Rear of the property - Jacaranda lined.



Approximately 100m from the property are Blue Gums in the road reserve



Within the property: mown turn and exotic plantings. Caggabge trees are native in NSW, those onsite are nto the local variety though the same species. This is not characteristically where they would grow.



Lomandras are mown / whipper snipped or mulched bewteen. Turf is maintained under the trees resulting in low habitat value for fauna. A high level of maintenace is expected to remove any areas for ground Orchids.



Spotted Gums on the site are young. Older trees present are the Blackbutts and on the street Blue Gums.



A few large rocks are in this area. While not habitat for fauna it is best that are retained and used in landscaping or transloacted to a nearby reserve, with Councils permission.



Jacarandas and Lomandras and hard surface

Turf, exotic plants and hard surface.



Largest canopy tree on-site. The smaller trees around this are proposed for removal.

Mid-size trees close to the existing builling

7 Impact assessment

This section outlines the anticipated direct and indirect impacts of the proposal on flora and fauna.

7.1 Direct impacts

7.1.1 Tree removal

As per the AIA prepared by The Tree Guardian This plan has been **prepared specifically to assist with** ecological reporting and is not to be lodged in contradiction of Arboricultural Impact Assessment Report dated 15/8/24 version 2.0

The list of trees proposed for removal is below.

The area if impact was gained for detailed data from the Arborist (see included in the Tabel below). This area of impact is based on the trees in this current DA – as per Figure 1.2b.



Repeat of Figure 7.1b. Detailed Arrangement Plan. Tree Plan to assist with seeing the proposed ecological impacts.

Following are details on the trees proposed to be removed and the calculation of area used to determine BDAR trigger or not. Source: Arborist September 2024

Tree No.	Species Name	Height (m)	Spread (m)	Canopy Area M2
15	Angophora costata	5	3	7.069
17	Corymbia gummifera	18	10	78.54
18	Corymbia maculata x3	10	3	7.069
19	Corymbia maculata	17	5	19.635
20	Corymbia maculata	14	5	19.635
21	Corymbia maculata x 6	5 - 10	1-2	3.142
22	Corymbia maculata	13	5	19.635
25	Corymbia gummifera	5	3	7.069
27	Banksia spinulosa	6	4	12.566
29	Corymbia maculata	9	2	3.142

Tree No.	Species Name	Height (m)	Spread (m)	Canopy Area M2
30	Corymbia maculata	9	2	3.142
31	Corymbia maculata	13	5	19.635
34	Eucalyptus saligna	6	4	12.566
35	Eucalyptus resinifera	9	3	7.069
38	Cyathea australis	5	2	3.142
39	Glochidion ferdinandi	5	3	7.069
41	Grouping of 18 Trees	5 – 18	2 – 7	38.485
42	Eucalyptus botryoides	25	22	380.13
43	Glochidion ferdinandi	5	3	7.069
44	Eucalyptus botryoides	17	14	153.94

Tree No.	Species Name	Height (m)	Spread (m)	Canopy Area M2
45	Eucalyptus botryoides	6	2	3.142
46	Eucalyptus botryoides	18	8	50.265
47	Eucalyptus microcorys	9	5	19.635
52	Corymbia maculata grouping x 7	2 – 12	1-4	12.566
53	Eucalyptus saligna	10	5	19.635
54	Banksia integrifolia	5	3	7.069
57	Auracaria heterophylla	5	3	7.069
58	Cyathea sp.	3	2	3.142
59	Eucalyptus botryoides	15	14	153.94
67	Corymbia maculata	14	7	38.485
Tree		Height	Spread	
	Species Name			Canony Area M2
No.	Species Name	(m)	(m)	Canopy Area M2
No. 83	Species Name Eucalyptus botryoides	(m) 25	(m) 25	Canopy Area M2 490.87
No. 83 84	Species Name Eucalyptus botryoides Eucalyptus botryoides	(m) 25 15	(m) 25 12	Canopy Area M2 490.87 113.1
No. 83 84 85	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia	(m) 25 15 7	(m) 25 12 4	Canopy Area M2 490.87 113.1 12.566
No. 83 84 85 86	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides	(m) 25 15 7 12	(m) 25 12 4 10	Canopy Area M2 490.87 113.1 12.566 78.54
No. 83 84 85 86 88	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia	(m) 25 15 7 12 6	(m) 25 12 4 10 6	Canopy Area M2 490.87 113.1 12.566 78.54 28.274
No. 83 84 85 86 88 89	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia Callicoma serratifolia Callicoma serratifolia Callicoma serratifolia	(m) 25 15 7 12 6 5	(m) 25 12 4 10 6 4	Canopy Area M2 490.87 113.1 12.566 78.54 28.274 12.566
No. 83 84 85 86 88 89 91	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia Callistemon viminalis	(m) 25 15 7 12 6 5 5	(m) 25 12 4 10 6 4 4 4	Canopy Area M2 490.87 113.1 12.566 78.54 28.274 12.566 12.566
No. 83 84 85 86 88 89 91 96	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia Callistemon viminalis Callistemon viminalis Eucalyptus pilularis	(m) 25 15 7 12 6 5 5 5 18	(m) 25 12 4 10 6 4 4 11	Canopy Area M2 490.87 113.1 12.566 78.54 28.274 12.566 12.566 95.033
No. 83 84 85 86 88 89 91 96 99	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia Callistemon viminalis Callistemon viminalis Eucalyptus pilularis Livistona australis	(m) 25 15 7 12 6 5 5 18 5 5	(m) 25 12 4 10 6 4 11 3	Canopy Area M2 490.87 113.1 12.566 78.54 28.274 12.566 12.566 95.033 7.069
No. 83 84 85 86 88 89 91 96 99 100	Species Name Eucalyptus botryoides Eucalyptus botryoides Callicoma serratifolia Eucalyptus botryoides Callicoma serratifolia Callicoma serratifolia Callistemon viminalis Callistemon viminalis Eucalyptus pilularis Livistona australis Eucalyptus botryoides	(m) 25 15 7 12 6 5 5 5 18 5 18 5 16	(m) 25 12 4 10 6 4 11 3 7	Canopy Area M2 490.87 113.1 12.566 78.54 28.274 28.274 12.566 12.566 95.033 7.069 38.485

Tree No.	Species Name	Height (m)	Spread (m)	Canopy Area M2
104	Syzygium smithii	9	4	12.566
105	Syzygium smithii	10	5	19.635
106	Syzygium smithii	8	4	12.566
		Total		2078.168 m2

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Flora and Fauna Assessment 49 Blackbutts Rd & 21A Warili Rd, Frenchs Forest | July 2024 and September 2024 Page **37**

7.2 Indirect impacts

Table 7.4 identifies indirect impacts that may affect species and communities.

Table 7	7.1. In	direct	impacts.
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Indirect impact	Duration	Consequence on biodiversity values
Noise	Short term during construction and long-term during operation	 Short-term: All works to be undertaken during standard construction hours, that is: Mon to Fri, 7am to 6pm; Saturday 8am to 1pm; and No work on Sundays or public holidays. Construction works will be temporary in nature and the risk of consequence is considered low. Long-term: The proposal will not result in a significant increase in noise levels above that which already exists; Resident fauna within the vicinity of the proposed development would already be accustomed to residential noise. The consequence of increased noise impacts is considered a low risk.
Light spill	Long-term during operation	The proposal will not result in a significant increase in light levels above that which already exists. Dark Sky lighting should be considered to focus light on areas where needed whilst reducing light spill. This form of light provides the required 'safe lighting' of areas whilst greatly reducing upward escaping light.
Transport of weeds and pathogens to and from the subject land	Construction and operation	Construction activities have the potential to introduce and spread weeds and pathogens on machinery, equipment and clothing (e.g., boots). The condition of retained and neighbouring trees needs to be protected.
Increased erosion and sedimentation	Short term during construction	Tree removal and earthworks can expose soils and subsoils, which following rainfall may erode and mobilise soils in runoff, potentially smothering ground layer vegetation (in turn affecting health through a decrease in photosynthesis).

7.3 Avoid and minimise impacts

The design has been though iterations to reduce environmental impacts while achieving other objectives. At the stage of the ecological involvement there had already been a number of plans done and a demolition plan approved.

For this stage of the proposed development the native trees remaining were identified and set as the basis for avoiding impact.

Due to the dwelling yield and development type there has been little flexibility in retaining the two tree clusters and delivering on the planning outcomes.

The current subdivision layout is proposed as follows (Figure A1) and shows that most of the native trees proposed for removal are in two of the lots. Layouts to reduce impact, stay as individual residential homes, and keep the yield, have not resulted in trees being saved.

Options looked at included moving the road to the other side of the site. Changing the housing type such as having attached duel occupancy (up and downstairs) rather than side by side and so not needing to build on the 2 lots with the greatest native tree density. Options explored resulting in outcomes that are not compliant with local planning restrictions.

The key environmental impact on this site is loss of native trees. The ground and mid layer are exotic. The currently position is shown below in Figures 1A. Green are native trees for retention, red is exotic trees for removal and purple is native trees for removal.



Figure A1 Tree Plan to assist with seeing the proposed ecological impacts.

This plan has been prepared specifically to assist with ecological reporting and is not to be lodged in contradiction of Arboricultural Impact Assessment Report dated 15/8/24 version 2.0

7.3.1 Native tree loss and retention

Tree's 1, 2, 3, 4, 5, 8, 9, 11, 12, 13, 14, 18, 19, 20, 21, 24, 39, 47, 48, 49, 50, 55, 81, 82, 120, 140, 141, 142, 143, 144, 145, 146, 147, 148 & 149 are proposed for retention and are to be protected in accordance with the Australian Standards AS4970:2009 – Protection of Trees on Development Sites as per Section 8.3 Site Specific Protection Measures & Appendix B: Tree Protection (Generic) of the AIA report.

Tree's 4 and 55 are high retention value trees.

Tree's 1, 2, 3, 5, 8, 9, 11, 12, 14, 19, 20, 39, 47, 49, 140, 141, 142, 145 and 147 are medium retention value trees.

Tree's 13, 18, 21, 24, 48, 50, 81, 82, 143, 144, 146, 148 and 149 are low retention value trees.

Avoiding Impacts

Plans presented at Pre-DA would have result in the removal of the native trees in the north-western corner (trees 4, 5, 6, 7, 8, 9 and 10) and therefore the proposal was redesigned to retain those trees with the exception of trees 7 and 10 which have been approved for removal in DA2024/0492 and DA2024/0081.

The initial proposal had the main accessway through the site, linking both roads. This is shown in plan 1. While it resulted in native trees on the edge of the site being retained it resulted in losses of those on the Blackbutt Road Frontage. In addition to this, access to Blackbutt road has been not approved to date – noting there is current access in/out of this road around the major trees.

A new road route with a termination turning circle has been put on the northern side of the site – as can be seen in plan 2. This has resulted in the retention of the Native Trees 4, 5, 6, 8 and 9 within the site. The lack of a through road though has required a turning circle. The current requirements of minimum road width, turning circle and visitor parking result in impacts on native trees in the north, and central location (north side is number 67 1 x *Corymbia maculata*). The remaining native tree cluster in the centre are shown removed due to building envelopes around and including 7, 8, 9.



Figure 1.1 Plan 1 through the centre of the site with impacts on trees on Blackbutt road.



Figure 1.3 Plan 2 Rd terminating in turning circle.

Opportunities for retaining the tree on the northern boundary (tree numbers 67) was investigated with the following options/outcomes:

• 1) road moved southward (towards centre of site) and through to Blackbutt so no turning circle needed.

Outcome: not permitted to have a through road

- 2) turning circle move east away from the native tree cluster.
- Outcome: if the turned circle was pulled east it would be in the building envelopes lots 8,9,10. Also the purpose of the cu-de-sac is to service lots 2, 3, and 4.
- 3) changing the to the shape of the turning area form a round to a T section.

Outcome: didn't save any trees so retained as circle

• 4) Reducing the width of the road to bring it away from native trees on the nth boundary.

Outcome: not permitted to reduce width in Council planning standards.

• 5) Council planning regulations includes requirements for visitor parking, to fit these in on site the parks have to be on the opposite side from driveways. This adds to the width of the road curb to curb and stops the retention of trees in this cluster.

Outcome: *Tree 67 could be retained if road cut into Lot's 7 & 8 footprint to avoid T67's TPZ.* The visitor parking bay is currently wide and if not present in this location the road could shift to retain trees number 67. Tree 67 would be impacted anyway by road footprint or the cut and fill (eg bulk earth works) so could not be retained.

Other options to reduce tree impacts were moving the road so it swings into the centre of the site and away from this tree cluster. This road re-routing would impact the number and size of the lots in this central section such that they would not meet the council minimum lot sizes for this area.

Attempts to retain Tree 119 Eucalyptus sp.

• The original scheme provided a winding road to avoid impacts to Tree 119 and attempt to retain that tree. Tree 119 however is within 1.5m of an existing building that is approved for removal (pg.

33 of the Arborist report states retention is problematic due close proximity of demolition) and this tree is 1.5m away from the existing building.

The main impact to the trees in this area is the need for the turning circle in the required location and the lots through the centre of the site. Some of the trees included here have already been approved for removal with the exception of T67 under separate D.A. They have been included as data to use in determining area of native vegetation (trees) impacted.

Avoid impact through building envelope placement

• The location of indicative foot prints for dwelling houses (subject to a separate approval) are have been sited to retain of as many trees as possible. Specialty the two envelopes on Lot 4 have been pulled away from the trees (numbers 24 & 55).

Minimise

• The pedestrian pathway through the trees was originally designed to be concrete and has been change to a porous rock that can be laid in the surface and not impact roots.

Mitigation

- Mitigation is proposed with the planting of locally native trees in the lots (see landscape plan).
- The Applicant is also proposing for a suitable number of trees, at least 40, to be planted in a nearby council reserve at the applicant's cost and/or a contribution paid to council for further tree planting off site. This is being updated and reflected in the Landscape plan as well.

8 Conclusions and Recommendations

8.1 Management actions if approved in current status

8.1.1 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.

8.1.2 Preservation of habitat features

A condition of consent can included that the landholder consults with the local community restoration and rehabilitation groups, Landcare group or other relevant authorities including local councils or Greater Sydney Local Land Services prior to tree removals to determine if the trees removed can be reused by others for habitat enhancement and rehabilitation works. Any consultation with community groups and their responses should be documented.

8.1.3 Native species landscaping

Landscape plan to include more tree plantings, on and off site, with a diversity of locally native species. Appendix V provides a list of locally native species suitable for landscaping. Trees all to be planted with native ground and mid story at the base.

8.1.4 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.

8.1.5 Installing a nest box

Two nest boxes to be installed. One for microbats and a standard mid-size general fauna /bird one. TO be over 3m from ground and hung not nailed. To have expanding wire attachments and be made of all weather materials.

Image from: nestboxes.com.au

8.1.6 Pathogen prevention

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



Phytopritriora intected vegetation, (image by kasbak, licensed under the Creative Commons Attribution-Share Alike

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



9 Appendices

9.1 Appendix I – Likelihood of Occurrence

The following assessment identifies the list of threatened flora and fauna species recorded within a 10 km radius of the subject site and compares the habitat, ecology and distribution of these species with the habitats identified on the subject site to assess the likelihood of the species occurring on the subject site using the following criteria:

- UNLIKELY = species highly restricted to certain geographical areas not within the proposal footprint OR species that have specific habitat requirements that are not present on the subject site
- LOW = have not been recorded previously on the subject site/surrounds and for which the study area is beyond the current distribution range OR use specific habitats or resources are not present on the subject site OR are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded
- MODERATE = have infrequently been recorded previously on the subject site/surrounds OR use specific habitats or resources present on the subject site but in a poor or modified condition OR area unlikely to maintain sedentary populations, however may seasonally use resources within the subject site opportunistically or during migration OR are cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded
- HIGH = have frequently been recorded previously on the subject site/surrounds OR use habitat types or resources that are present on the subject site that are abundant and/or in good condition OR are known or likely to maintain resident populations surrounding the subject site OR are known or likely to visit the site during regular seasonal movements or migration

Table 9.1. Threatened flora.

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Hibbertia puberula		Recent work on this species (Toelken & Miller 2012) and its relatives have shown it to be widespread, but never common. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath (Toelken & Miller 2012). Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Hibbertia superans		 Habitat: The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides. Distribution: Occurs from Baulkham Hills to South Maroota in the northern outskirts of Sydney, where there are currently 16 known sites, and at one locality at Mount Boss, inland from Kempsey. No populations are known from a formal conservation reserve. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Tetratheca glandulosa		 Habitat: 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. Distribution: Restricted to the following Local Government Areas: The Hills Shire, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Northern Beaches, Ryde and Wyong. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Epacris purpurascens var. purpurascens		Habitat: Occurs in sclerophyll forest, scrubs and swamps, from Gosford and Sydney districts in the Central Coast botanical subdivision.	Unlikely. Not recorded on the site via Bionet (2024) or

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		Distribution : The species is currently known from about 30 locations. The size of populations, where known, varies from very small (1-5 plants) to greater than 1000 individuals.	observed during the on- ground survey (2024).
Chamaesyce psammogeton	Sand Spurge	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. Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (<i>Spinifex</i> <i>sericeus</i>) and Prickly Couch (<i>Zoysia macrantha</i>).	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Acacia bynoeana	Bynoe's Wattle	 Habitat: Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Distribution: Central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Acacia terminalis subsp. Eastern Sydney	Sunshine wattle	Very limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay, with most records from the Port Jackson area and the eastern suburbs of Sydney. Recorded from North Head, Middle Head, Dover Heights, Parsely Bay, Nielsen Park, Cooper Park, Chifley, Watsons Bays, Wollstonecraft and Waverley. Coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated. Most sites are highly modified or disturbed due to surrounding urban development.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Haloragodendron lucasii		 Habitat: Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels. Distribution: The known locations of this species are confined to a very narrow distribution on the north shore of Sydney. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Prostanthera marifolia	Seaforth Mintbush	 Prostanthera marifolia is currently only known from the northern Sydney suburb of Seaforth and has a very highly restricted distribution within the Sydney Basin Bioregion. The single population is fragmented by urbanisation into three small sites. All known sites are within an area of 2x2 km. The sites are within the local government area of Northern Beaches Council. Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Lasiopetalum joyceae		Habitat: Grows in heath on sandstone. Distribution: 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.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Callistemon linearifolius	Netted Bottle Brush	Habitat: Grows in dry sclerophyll forest on the coast and adjacent ranges. Distribution: Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Darwinia biflora		 Habitat: Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma, Corymbia</i> <i>gummifera</i> and/or <i>E. squamosa</i>. The vegetation structure is usually woodland, open forest or scrub-heath. Distribution: Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas. The northern, southern, eastern and western limits of the range are at Maroota, North Ryde, Cowan and Kellyville, respectively. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Eucalyptus camfieldii	Camfield's Stringybark	Habitat: 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	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		species frequently include stunted species of <i>E. oblonga</i> Narrow-leaved Stringybark, <i>E. capitellata</i> Brown Stringybark and <i>E. haemastoma</i> Scribbly Gum. Distribution : Restricted distribution in a narrow band with the most northerly records in the the Raymond Terrace area south to Waterfall.	
Eucalyptus nicholii	Narrow-leaved Black Peppermint	 Habitat: Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Distribution: 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. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Leptospermum deanei		Occurs in Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. Occurs in Riparian Scrub - e.g. <i>Tristaniopsis laurina, Baechea myrtifolia</i> ; Woodland - e.g. <i>Eucalyptus haemstoma</i> ; and Open Forest - e.g. <i>Angophora costata, Leptospermum trinervium,</i> <i>Banksia ericifolia</i> . Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Melaleuca deanei	Deane's Paperbark	 Habitat: The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Distribution: Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Syzygium paniculatum	Magenta Lilly Pilly	 Habitat: 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. Distribution: The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).
Caladenia tessellata	Thick Lip Spider Orchid	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on-

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	ground survey (2024). Note flowerin is Sept – Oct so not flowering time – not habitat either.
Genoplesium baueri	Bauer's Midge Orchid	Habitat: Grows in dry sclerophyll forest and moss gardens over sandstone. Distribution: The species has been recorded from locations between Ulladulla and Port Stephens.	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024). – not habitat either.
Microtis angusii	Angus's Onion Orchid	All currently known records of the species are located within Northern Beaches LGA. 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 Microtis species reproduce vegetatively by the formation of "daughter" tubers from the main tuber.	No habitat
Sarcochilus hartmannii	Hartman's Sarcochilus	From the Richmond River in northern NSW to Gympie in south-east Queensland. Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000 m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees.	No habitat
Grevillea caleyi	Caley's Grevillea	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. 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	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		laterite soils and a vegetation community of open forest, generally dominated by Eucalyptus sieberi and E. gummifera. Commonly found in the endangered Duffys Forest ecological community.	
Pimelea curviflora var. curviflora		 Habitat: Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawaraa coastal plain. Distribution: Confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the north-west. 	Unlikely. Not recorded on the site via Bionet (2024) or observed during the on- ground survey (2024).

Table 9.2. Threatened fauna.

Please note that species whose habitat does not occur on the site have been omitted from the list. Full list included in Section 5 of this report.

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Pseudophryne australis	Red-crowned Toadlet	 Habitat: 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. Distribution: 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. 	Unlikely
Heleioporus australiacus	Giant Burrowing Frog	 Habitat: Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. 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. Distribution: Southeastern 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. 	Unlikely

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Varanus rosenbergi	Rosenberg's Goanna	Habitat: 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.	None – too disconnected
		Distribution : 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.	
Ptilinopus regina	Rose-crowned Fruit-Dove	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	None – no habitat
		They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen.	
		They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.	
		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.	
Ptilinopus superbus	Superb Fruit-Dove	Habitat: 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.	None – no habitat
		Distribution : 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.	
Ixobrychus flavicollis	Black Bittern	Habitat: 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.	None – no habitat
		Distribution : Southern NSW north to Cape York and along the north coast to the Kimberley region. Also occurs in the south-west of Western Australia.	
Haliaeetus leucogaster	White-bellied Sea- Eagle	Habitat: 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	Low

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		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 swamp sclerophyll forest close to foraging habitat. Distribution : Distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin.	
Hieraaetus morphnoides	Little Eagle	 Habitat: 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. Distribution: Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. 	Low
Lophoictinia isura	Square-tailed Kite	 Habitat: Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. 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. Distribution: Along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. 	Low
Callocephalon fimbriatum	Gang-gang Cockatoo	Habitat: In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands,particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.	Low
		Distribution : 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.	

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Calyptorhynchus lathami lathami	South-eastern Glossy Black- Cockatoo	 Habitat: 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. Distribution: 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. 	Low
Glossopsitta pusilla	Little Lorikeet	 Habitat: Forages primarily in the canopy of open <i>Eucalyptus</i> forest and woodland, yet also finds food in <i>Angophora, Melaleuca</i> and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Distribution: 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. 	Low may feed on canopy blossum
Lathamus discolor	Swift Parrot	 Habitat: 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>. Distribution: 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. 	Low may feed on canopy blossum
Neophema pulchella	Turquoise Parrot	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.	Low Not habitat

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		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.	
Ninox connivens	Barking Owl	 Habitat: Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Distribution: Throughout continental Australia except for the central arid regions. 	None – too disturbed
Ninox strenua	Powerful Owl	 Habitat: 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. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. Distribution: 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. 	Low In the general area though and may forage over he site for Ring tail possums
Tyto novaehollandiae	Masked Owl	Habitat: 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. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	None – too disturbed

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		Distribution : 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 northwestern corner. There is no seasonal variation in its distribution.	
Tyto tenebricosa	Sooty Owl	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps). Nests in very large tree-hollows.	None – too disturbed
Anthochaera phrygia	Regent Honeyeater	 Habitat: The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Distribution: The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. 	Low Possible feeding on blossums
Daphoenositta chrysoptera	Varied Sittella	 Habitat: Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland. Distribution: The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. 	None – too disturbed
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and 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.	Low

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
Petroica boodang	Scarlet Robin	 Habitat: 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. Distribution: 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. 	None – too disturbed
Dasyurus maculatus	Spotted-tailed Quoll	 Habitat: 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. Distribution: 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. 	None – too disturbed
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	 Habitat: They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. Distribution: 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. 	None – too disturbed
Phascolarctos cinereus	Koala	Habitat: Inhabit eucalypt woodlands and forests. Distribution: 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,	None – too disturbed

Scientific name	Common name	Habitat requirements	Likelihood of occurrence
		Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.	
Cercartetus nanus	Eastern Pygmy- possum	 Habitat: 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. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts). Distribution: In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. 	None – too disturbed
Pteropus poliocephalus	Grey-headed Flying-fox	 Habitat: 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. Distribution: 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. 	Moderate
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	 Habitat: 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. Distribution: The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. 	Low

9.2 Appendix II – Test of Significance

9.2.1 Grey-headed Flying-fox (Pteropus poliocephalus)

While no Grey-headed Flying Fox were recorded in the study area during the on-ground survey, this species is considered moderately likely to occur based on the presence of suitable foraging habitat and nearby records. The Grey-headed Flying-fox is likely to forage in the trees within the study area.

The factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened species or their habitats are outlined below:

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

The Grey-headed Flying-fox (Pteropus poliocephalus) occurs 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 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.

No flying-fox camps occur near site and the proposal would not impact on any camp (see image below). As such, the impacts of the proposal to the Grey-headed Flying-fox would be limited to loss of foraging habitat caused by direct clearing or damage to street during the construction phase. Flowering tree resources would be impacted.



Source: https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf

The proposal would remove approximately 100 trees of potential foraging habitat. The proposal will would not act alone in causing impacts to biodiversity, as very large areas of vegetation within the locality have already been removed, predominately for urban and industrial development in the recent past. The proposal would add to the loss of trees in the locality. Foraging habitat mainly comprises nectar resources from planted native trees and shrubs as well as fruit resources from some exotic trees. The affected area of foraging habitat would represent a small percentage of the total extent of foraging vegetation types present within the locality. The study area is not considered an important habitat for this species.

Given the relatively widespread nature of similar planted vegetation in the locality and abundance of higher quality foraging habitat within the feeding range of the camps located near the study area, the project is not expected to significantly affect the life cycle of the species.

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

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

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

Not applicable.

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

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

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

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

The potential habitat of the Grey-headed Flying-fox within the study area is limited to foraging habitat and includes all native flowering trees and shrubs. The extent of habitat for the Grey-headed Flying-fox would be reduced by approximately 80 (50 native) trees.

Importantly, the proposal would not result in fragmentation of habitat for the Grey-headed Flying-fox. This species is highly mobile and would freely fly long distances (up to 50 kilometres) over open areas including urbanised city centres to move between roost camps and foraging sites. The proposal would not affect the movement of the Grey-headed Flying-fox between habitat patches.

The proposal would not impact on the most important habitats for Grey-headed Flying- fox within the locality. The most important habitats for the local Grey-headed Flying Fox sub- populations are the remnant areas of native vegetation in larger reserves. The foraging habitat within the study area is not of critical importance for the survival of the Grey-headed Flying-fox within the locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly), There will be no impact on any declared area of outstanding biodiversity value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process. The proposal involves clearing of native vegetation which is listed as a Key Threatening Process under the BC Act.

Conclusion: The Grey-headed Flying-fox would suffer a small reduction in extent of suitable foraging habitat from the proposal. No camps or other important habitat would be impacted. The proposal is unlikely to reduce the population size of the Grey-headed Flying-fox or decrease the reproductive success of this species. The proposal will remove potential foraging habitat. After consideration of the factors above the proposal is unlikely to result in a significant effect to the Grey-headed Flying-fox.

9.2.2 Duffys Forest Ecological Community in the Sydney Basin Bioregion

While the site does not contain any mapped PCT, Sydney Coastal Shale-Sandstone Forest is the most likely PCT to have originally occurred on-site. Remnant trees on-site include *Corymbia gummifera*, *Angophora costata*, *Eucalyptus pilularis* and *E. botryoides*. Sydney Coastal Shale-Sandstone Forest relates to the endangered ecological community Duffys Forest Ecological Community in the Sydney Basin Bioregion (Bionet vegetation classification database) and thus, a test of significance has been conducted.

The factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened species or their habitats are outlined below:

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

Not applicable.

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

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

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

Some native trees and shrubs, that represent highly disturbed patches of the Duffys Forest endangered ecological community would be impacted. The extent of this impact is small including 49 locally native trees (some of which could be planted). This small impact will not have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction. The site is already significantly modified and mid/ground storey of the community is primarily absent.

The proposal is not likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction. The composition of the Duffys Forest to be impacted is already heavily impacted by edge effects and past disturbance which has substantially modified the condition, structure and function of the community and no further impact is expected form the proposal.

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

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

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

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

Some native trees and a few shrubs, that represent small highly disturbed patches of the Duffys Forest would be impacted. The extent of this impact is small.

The proposal does not involve breaking apart large high-quality blocks of Duffys Forest, so no further fragmentation or isolation is expected. Quality remnants of this community are mainly located along Mona Vale Road and at St lves Showground.

These trees and scattered shrubs are not considered to be of importance to the long-term survival of the species or ecological community in the locality. These trees and shrubs are poor quality remnants of vegetation that once was present in the area and provide little value in terms of habitat. There is no recovery potential for the vegetation.

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

There will be no impact on any declared area of outstanding biodiversity value.

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

The proposal involves clearing of native vegetation which is listed as a Key Threatening Process under the BC Act.

Conclusion: Due to the very small impact on the Duffys Forest endangered ecological community and the poor quality of the vegetation to be removed there is unlikely to be a significant impact.

9.3 Appendix IV – Bushland Hygiene Protocols for Phytophthora

- All plant and equipment to be clean (free from soil/mud).
- 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.
- Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
 Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap

Facts about Phytophthora

water, 1 bottle methylated spirits.

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

Symptoms including Dieback

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

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

Infection

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

9.4 Appendix V – Native species list suitable for landscaping

Trees

Corymbia gummifera	Eucalyptus umbra	
Angophora costata	Acacia decurrens	
Allocasuarina littoralis	Acacia elata	
Eucalyptus resinifera	Angophora bakeri	
Ceratopetalum gummiferum	Angophora crassifolia	
Eucalyptus globoidea	Eucalyptus punctata	Eucalyptus piperita
Eucalyptus capitellata	Lophostemon confertus	Notelaea longifolia
Eucalyptus sieberi	Acacia linearifolia	Acacia parramattensis
Banksia serrata	Alectryon tomentosus	Allocasuarina torulosa
Syncarpia glomulifera	Angophora floribunda	
Eucalyptus pilularis	Angophora hispida	Eucalyptus obioliga
Eucalyptus haemastoma	Brachychiton acerifolius	Eucalyptus sparsifolia
Glochidion ferdinandi	Callitris muelleri	Eucalyptus racemosa

Shrubs

Lomatia silaifolia	Polyscias sambucifolia	Persoonia pinifolia
Persoonia levis	roryselds sambdenona	Grevillea linearifolia
Banksia spinulosa	Leptospermum trinervium	Hibbertia bracteata
Phyllanthus hirtellus	Dodonaea triguetra	Pimelea linifolia
Acesia murtifolia		Pultenaea hispidula
	Persoonia laurina	Elaeocarpus reticulatus
Micrantheum ericoides	Hibbertia aspera	Pultenaea linophylla
Bossiaea obcordata		Leucopogon juniperinus
Hakea sericea	Platysace linearifolia	Boronia pinnata
Acacia linifolia	Pultenaea tuberculata	Hakea dactyloides
Epacris pulchella		Comesperma ericinum
Lasiopetalum ferrugineum	Platylobium formosum	Lambertia formosa
Pittosporum undulatum	Grevillea sericea	Leptospermum polygalifolium

Grasses

Entolasia stricta	Anisopogon avenaceus	Poa affinis
Lepidosperma laterale	Lomandra gracilis	Tetraria capillaris
Lomandra obliqua	Echinopogon caespitosus	Dichelachne rara
Austrostipa pubescens	Entolasia marginata	Gahnia radula
Lomandra multiflora subsp. multiflora	Rytidosperma pallidum	Lepyrodia scariosa
Microlaena stinoides	Tetrarrhena juncea	Oplismenus aemulus
	Caustis flexuosa	Poa labillardierei var. labillardierei
Cyathochaeta diandra	Lepidosperma filiforme	Austrostipa rudis
Themeda triandra	Lomandra cylindrica	Oplismenus imbecillis
Imperata cylindrica	Lomandra glauca	Ptilothrix deusta
Lomandra longifolia	Dichelachne micrantha	Schoenus melanostachys
Lomandra filiformis	Rytidosperma tenuius	Cynodon dactylon
Aristida vagans	Eragrostis brownii	Deyeuxia quadriseta
Panicum simile	Lomandra brevis	Echinopogon ovatus

Forbs

Dianella caerulea	Opercularia varia	Pomax umbellata
Patersonia glabrata	Hybanthus monopetalus	Pseuderanthemum variabile
Brunoniella pumilio	Lagenophora stipitata	Scaevola ramosissima
Xanthosia tridentata	Centella asiatica	Caesia parviflora
Dianella revoluta	Dampiera purpurea	Dianella prunina
Lobelia purpurascens	Drosera auriculata	Dipodium variegatum
Gonocarpus teucrioides	Acianthus fornicatus	Oxalis exilis
Goodenia hederacea	Actinotus minor	Thysanotus tuberosus
Dampiera stricta	Cryptostylis erecta	Xanthosia pilosa
Patersonia sericea	Dichondra repens	Coronidium scorpioides
Hovea linearis	Drosera peltata	Hydrocotyle sibthorpioides
Goodenia heterophylla	Goodenia bellidifolia	Logania pusilla
Cryptostylis subulata	Hypericum gramineum	Opercularia aspera

Other

Billardiera scandens

Xanthorrhoea media	
Cassytha pubescens	Desmodium varians
Glycine clandestina	Pandorea pandorana subsp. pandora
Smilax glyciphylla	Calochlaena dubia
Hardenbergia violacea	Glycine tabacina
Doryanthes excelsa	Macrozamia spiralis
Cassytha glabella	Cyathea cooperi
Glycine microphylla	Geitonoplesium cymosum
Clematis aristata	Gynochthodes jasminoides
Kennedia rubicunda	Hibbertia scandens
Xanthorrhoea arborea	Parsonsia straminea
Xanthorrhoea concava	Xanthorrhoea latifolia
Clematis alvcinoides	Xanthorrhoea resinosa

Ferns

Pteridium esculentum Lindsaea linearis Lindsaea microphylla Adiantum aethiopicum Adiantum formosum Asplenium flabellifolium Cheilanthes sieberi subsp. sieberi Doodia aspera Gleichenia dicarpa Gleichenia rupestris Nephrolepis cordifolia Schizaea bifida

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 2022present
- 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.

With over 25 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and onground 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 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.