Flora and Fauna Assessment

53A Warriewood Rd, Warriewood NSW 2102

By Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

July 2022 updated March 2025

About this document

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Statement of Authorship

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

Limitations Statement

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

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Summary

Introduction

- The site is in Garimaigal Country, with this area commonly known as Warriewood Valley.
- Two main creek lines, Narrabeen and Fern are within the main development area and Mullet is to the South and runs along the edge of Warriewood Wetlands.
- Land releases, green field development, has been occurring along the 2 main creekline in the valley for over 20 years.
- This site backs onto Narrabeen Creek.
- This Flora and Fauna was prepared for Willowtree Planning for the proposed development at 53A Warriewood Rd, Warriewood NSW 2102 (Lot 2 in DP 1115877), in the Northern Beaches Council LGA.
- The proposed development is for a multi-lot community title subdivision, associated infrastructure and Creek line works including ecological rehabilitation.
- The site is not on the Biodiversity Values Map and native vegetation removal is under the BOS trigger threshold.
- The site was cleared to the toe of the bank prior to or in 2009 (as per aerial imagery). Native trees near the creek were only in the lower western corner (images included in this report).
- Current (2025) native canopy is Swamp Oak and Swamp Mahogany. No native shrubs are present. Ground species are exotic over 98% of the site. Small wet patches (1m x0.5m) include native *Juncus usitatus.*
- Works include the reestablishment of a 50m creekline corridor with an inner 25m fully vegetated and the outer 25m integrated with the riparian vegetation and also having landscaped features and multi-use access. The creekline works are covered in the Vegetation management plan for the site and the outer 25 metre area is addressed in the landscape plan for the site.
- The site is upstream from a mapped coastal wetland (SEPP resilience and Hazards) and is within the 40 made a buffer of this wetland. The mapped wetlands is dominated by Swamp Oak [*Casuarina glauca*]. An assessment of potential impact on that wetland has being undertaken and is in a separate report of March 2025 addressing the State Environmental Planning Policy Resilience and Hazards.
- The Bushfire Plan has recommended an APZ of >16m (Ecological July 2024). In the Bushfire reports monitoring shows the modelled APZ in the outer buffer and an assumption that the inner 25m is a Coastal Swamp Forest. The inner 25m creekline corridor is not impacted by IPA requirements.
- Recommendations have been provided to reduce the likelihood of impact and mitigate impacts if the proposal is approved.

Methods

- On-ground survey took place on August 2022 by Senior Ecologist Geraldene Dalby-Ball (Elaway) and Field Ecologist Gabriel James and Elaway in February 2023 and December 2024.
- Flora and fauna observations were recorded on-site using binoculars. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- Review of proposed development was evaluated for potential environmental impacts and opportunities. This report focuses on the impacts and the vegetation management plan focuses on the opportunities.

Results

- Trees on site are a mix of *Eucalyptus robusta* and Casuarina species. High resolution aerial photography shows that all but those in the western corner have grown since 2013 or later. The on-site survey and comparison of summer and winter aerial photos show the high portion of Coral trees (deciduous) dominating the edge of the Creek line.
- Tree protection will be consistent with the Arborist report. NB: see final arborist report for details of works and tree numbers.
- While there are wet areas near the Creek after times of high rain, these do not constitute a wetland by way of hydrology or species.
- No significant habitat features will be impacted by the proposed development. It is acknowledged that coral trees are a food source for nectar eating birds come up their loss, however, is not a significant ecological impact and the replanting of 25 to 50 metres of the creek bank will see an increase in habitat values. The vegetation management plan also includes specifications for inclusion of colours for microbats and parrots.
- No threatened flora or fauna species were recorded on-site during survey or previously recorded via Bionet. Threatened species of microbats are known from the area an expected to continue using the Creek line corridor for foraging. No hollows or culverts or caves that could be used my microbats will be disturbed or removed during works. Habitat for microbats will be added as part of the creek line rehabilitation. See vegetation management plan for details.
- The proposal does not trigger entry into the BOS (not on BV map, below area clearing threshold and no significant impact likely on threatened species).
- Test of significance has been conducted for Swamp Mahogany/ Cabbage Tree Palm tall open forest, Large Forest Owls, Southern Myotis, Green and Golden Bell Frog and Glossy-black Cockatoos. While these resulted in a 'not significant' impact for this community recommendations have been made to assists the long-term sustainability of species.
- A number of iterations to manage the stormwater have occurred including designs for wetlands and rain gardens, however, due to other site constraints these have not been possible on the site. This has low environmental impact as there is no wetland being lost and there are other open water bodies in the vicinity. Both the proposed vegetated swale and the proposed headwalls have included provision for habitat enhancement for frogs and small reptiles.

Avoid Minimise and Mitigate Measures

If the development is approved, mitigation works will be required. Refer to VMP for specifications.

Avoid:

- The development team, particularly the engineers and landscape architect, will work with the ecologist in designing and placement of built form, excavation, stormwater facility design such that it will minimise the impact on native species and maximised habitat outcomes particularly from the stormwater.
- The Large Swamp Mahogany at the western end of the creekline has been worked around to ensure retention.
- A high level of effort has gone into retaining native trees, including Sheoak on the creekbank that has recently grown (under 10 years). Based on the 2009 and 2013 aerial imagery all regrowth.
- APZ is outside the inner 25m riparian zone.
- No canopy trees are required to be removed for the APZ. Implementation of the APZ on the southern boundary will take into account the SEPP Resilience Buffer Zone, and the existing canopy in that corner.
- Native species on-site in the development footprint are sparse and young. All are common fast-growing species, Acacias, Blueberry Ash and Swamp She Oaks. It is not possibly to avoid these.

Minimise:

To achieve the flood storage capacity required in the DCP creek bank works have to occur that will remove the Swamp Mahogany in the eastern corner of the creekline. Aerial imagery indicates the vegetation here to have grown since 2012. This end was the lower priority for retention and work has been designed to minimise impact on the high retention end. Engineers worked with the ecologist differing the design however to keep these relatively young trees will compromise the intended functionality of the Creek line for flood carriage, storage and ecological outcomes. Greater ecological outcomes will be realised from the dense planting proposed in the VMP.

Mitigate:

Before / Early works:

- Seed collection and order plants (see VMP)
- Tree protection as per Arborist report
- Removal of weeds to prevent spread of seed - separation of the coral trees from the native trees during removal.
- Native tree removal to include the salvage of suitable trunk sections that are over 25 centimetres in diameter and two to three metres in length. These will be used as habitat in the inner 25 metre zone. This is detailed in the Vegetation Management Plan (March 2025).
- Effective site management of silt/sediment/turbid water runoff.

During works:

- Tree protection and seed collection from any trees approved to be removed.
- Effective site management to minimise sediment runoff.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.
- Retention of topsoil moved as part of earth works for re-spreading on 'new' top surfaces that are to be vegetated. These will need on-going weed management prior to and after spreading.
- Effective site management of silt/sediment/turbid water runoff.
- Implementation of the VMP (See VMP March 2025) to maximise the restoration of native habitat and to replace native species removed as part of the development.
- The creek line can be in better condition due to the revegetation and on-going maintenance than it currently is.
- Installation of microbat nest boxes x2 to provide roosting structures and support their presence within the local area. Installation of Parrot box in the Swamp Mahogany.

Ongoing:

Maintenance of the inner and outer 25 metre zone is essential. Review of aerial imagery shows how other development sites have not kept up with the weed management including the site opposite.

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

Federal and state

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- *SEPP Resilience and Hazards*
- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Biodiversity Conservation Act 2016 (BC Act).*
- *Fisheries Management Act 1994 (FM Act).*
- *National Parks & Wildlife Act 1974 (NP&W Act).*
- *Biosecurity Act.*

Local

Local government plans policies and guidelines (LEP, DCPs) relating to this site and ecology have been reviewed. These are listed and addressed in more detail within the body of the Vegetation Management Plan.

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1 Introduction

1.1 Scope of works

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

This was first written in 2022 when the project was still in its initial phase, since then, the site has been surveyed 3 times, and this 2025 version is an update of the original (not a re-write). Legislative changes and mapping, particularly the Biodiversity Values Map (BV Map) have been reviewed again as it has threatened species records.

1.1 Limitations of the Study

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

Surveys have occurred over 3 years and covered most seasons. Surveys have been adequate to confidently provide information on Threatened Species likelihood.

While it is not possible to detect the presence of all species occurring, or likely to occur, in the study area, it's noted this site has low habitat quality – over 90% mown. 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. The surveys focused on threatened species searches in line with BOS and local knowledge.

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

1.2 Site information and general description

The subject site (the "Site") is the area of direct and likely indirect impacts and is defined as the whole of the property. The study area includes the subject site, as well as any additional surrounding land traversed during the field survey. The subject site (the "Site") is identified as Lot 2 in DP 1115877, in the local government area of Northern Beaches Council.

The site has an area of 9,251m^2 and contains cleared areas, an existing drive, house and sheds and an edge of native bushland on the south and west of the site.

Table 1.1 Site Administrative Information

Category	Details
Title Reference (Lot/DP)	2/DP1115877
Area (m^2)	9,251 m^2
Street Address	53A Warriewood Rd, Warriewood, NSW 2102
LGA	Northern Beaches Council
Land Zoning	R3 – Medium Density Residential

1.3 The Site – overview

The site is within Garimaigal Homelands, and this area is currently known as the Warriewood Valley. Two main creek lines, Narrabeen and Fern are within the main development area and Mullet is to the South and runs along the edge of Warriewood Wetlands (Figure 1.1). This site (red outline) backs onto Narrabeen Creek.

Figure 1.1 Site in surrounds

Source: NearMap

The site was completely cleared prior to 2009 (Figure 1.2). Creek bank works had already occurred (see sandstone riprap along toe. The site was still in a cleared state in 2013 (Figure 1.3).

Figure 1.2 Site location as of 2009

Source: NearMap Accessed March 2025

Figure 1.3 Site location as of 2013

Source: NearMap Accessed March 2025

Current (2025) native canopy is Swamp Oak and Swamp Mahogany. No native shrubs are present. Ground species are exotic over 98% of the site. Small wet patches (1m x0.5m) include native *Juncus usitatus.*

The dense vegetation seen in 2024 mapping is exotic grasses in the low areas (95% of the site) and Coral trees (Figure 1.4). See Summer/Winter comparison (Figure 1.5 and Figure 1.6) – noting Coral trees are deciduous. Other trees in this area are Swamp Mahogany and Sheoaks – though both are scattered (see summary later in this report Arborist Report for details).

Figure 1.4 Site location as of 2025

Source: NearMap Accessed March 2025.

Figure 1.5 Coral Trees Winter

Figure 1.6 Coral Trees Summer

1.4 The Proposal

The proposed development is for a multi-lot subdivision (Figure 1.7) with associated infrastructure and a 50m multi-use corridor made up of an inner 25m fully vegetated riparian corridor and an outer 25m mixed use native species landscape and access zone.

Figure 1.7 Proposed development is for a multi-lot subdivision

Works include the reestablishment of a 50m creekline corridor with an inner 25m fully vegetated and the outer 25m integrated with the riparian vegetation and also having landscaped features and multi-use access (Figure 5.7). The creekline works are covered in the Vegetation management plan for the site and the outer 25 metre area is addressed in the landscape plan for the site.

Figure 1.8 50m creekline corridor with inner 25m fully vegetated

Taylor Brammer Landscape Architects Pty Ltd, 21.03.2025, Rev C

A number of iterations to manage the stormwater have occurred including designs for wetlands and rain gardens however due to other site constraints these have not been possible on the site. This has low environmental impact as there is no wetland being lost and there are other open water bodies in the vicinity. Both the proposed vegetated swale and the proposed headwalls have included provision for habitat enhancement for frogs and small reptiles. The swale for the carriage of water to the creek will be fully vegetated with locally native species, mostly sedges and rushes. The close up is shown in Figure 1.9a and the over all location is shown in Figure 1.9b. Note the works designed to avoid tree impact.

Figure 1.9 Proposed vegetated swale. – detail.

Source: Taylor Brammer Landscape Architects Pty Ltd, 20.03.2025, Rev B

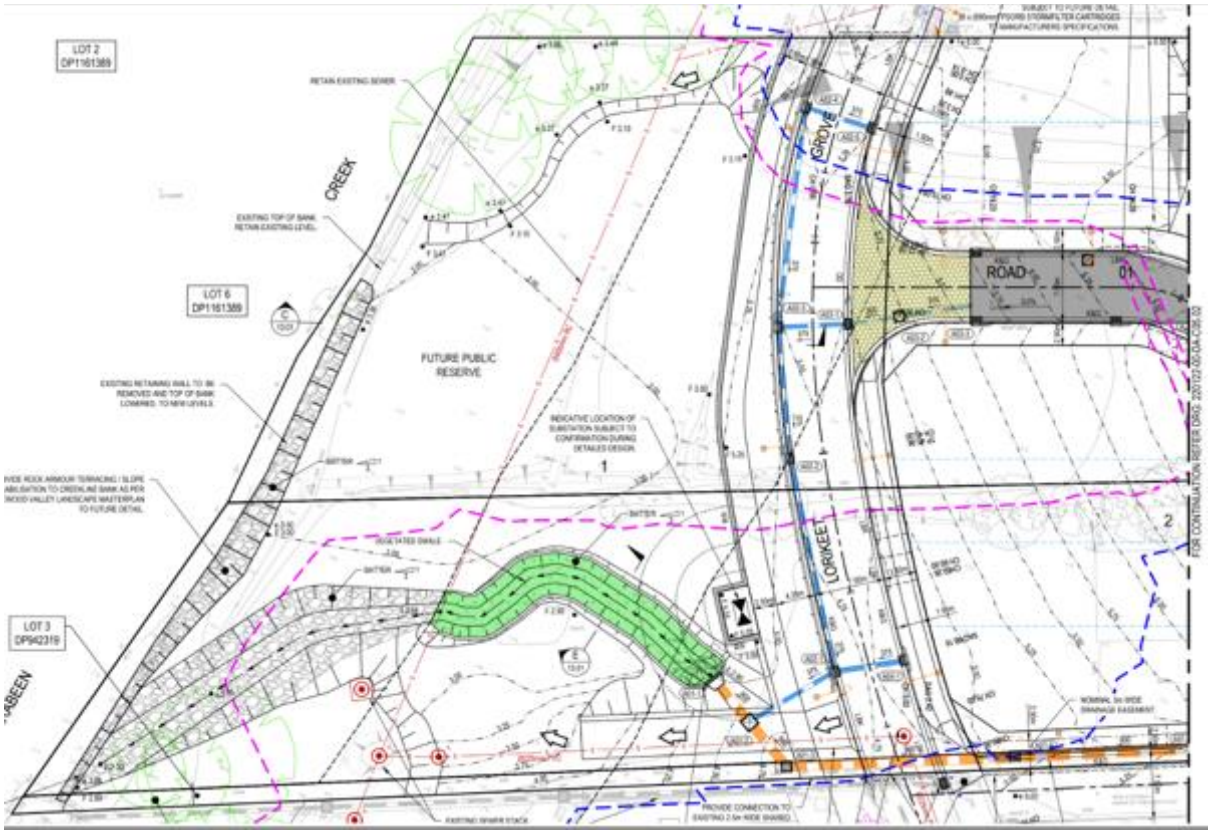


Figure 1.10 Proposed vegetated swale. Location on-site.

Source: Taylor Brammer Landscape Architects Pty Ltd, 20.03.2025, Rev B

1.4.1 Flooding, Levels

An existing retaining wall is located along the creek embankment, and this is to be removed, and levels lowered, to allow for additional flood storage through the inner and outer creekline corridor.

The creek embankment is proposed to be reinstated with a 1 in 3 batter and rock armoring as per WVLMDG. This is shown on the revised engineering set of plans.

Due to the lowering of levels within the inner and outer creek line corridors, some loss of native vegetation is expected. All proposed vegetation within the inner/outer Creekline corridors will be to Council's specifications.

Revised Civil Engineering Plans are provided in the DA package have amended the creek line embankment works. Specifically, it is proposed to reinstate the creek line embankment and provide rock armoring for a significant portion of the creek within the site. Further details of the works will be provided as part of the Subdivision Works Certificate. No retaining walls are proposed along the length of the creek.

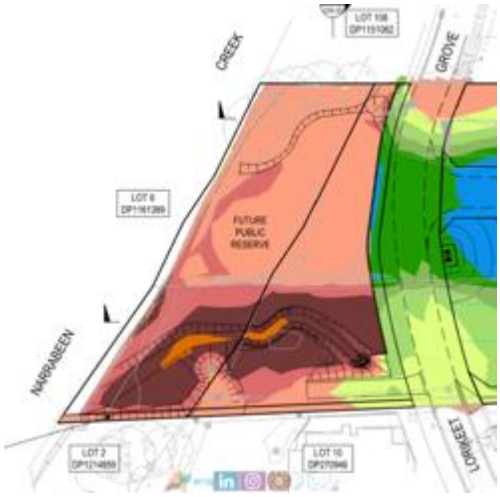


Figure 1.11 Riparian area showing areas of predicted flood storage. See Flood modelling for event sizes and frequency.

1.5 Tree Retention and Removal

Figure 1.12 also shows the tree retention/loss plan (Tree Guardian 2024) outcomes are summarised in the tables below, extracted from the Arborist report.

Avoid: The Engineering team have worked with the ecologist in an effort to retain native trees on the bank. Numerous iterations of designs have been trials to Avoid impact on all trees. The vegetated swale has been positioned to avoid the trees.

No design that avoids all tree removal fulfilled the flood storage capacity requirements. All priority native trees in the Creekline corridor are being retained.

Minimising impact has been applied throughout the 25m zone. Seed has been collected (and more will be). This local seed is being used to propagate trees to be planting back into this area. The seed collection and planting are part of the Mitigation measures. In the case of the creekline bank it has not been possibly to Avoid impact and remove the existing vertical wall or create the necessary change in levels. The process of Avoid, minimise, mitigate has been applied. Recommendations (mitigation works) are detailed in the VMP as this is the tool to have the diversity and abundance of native species returned.

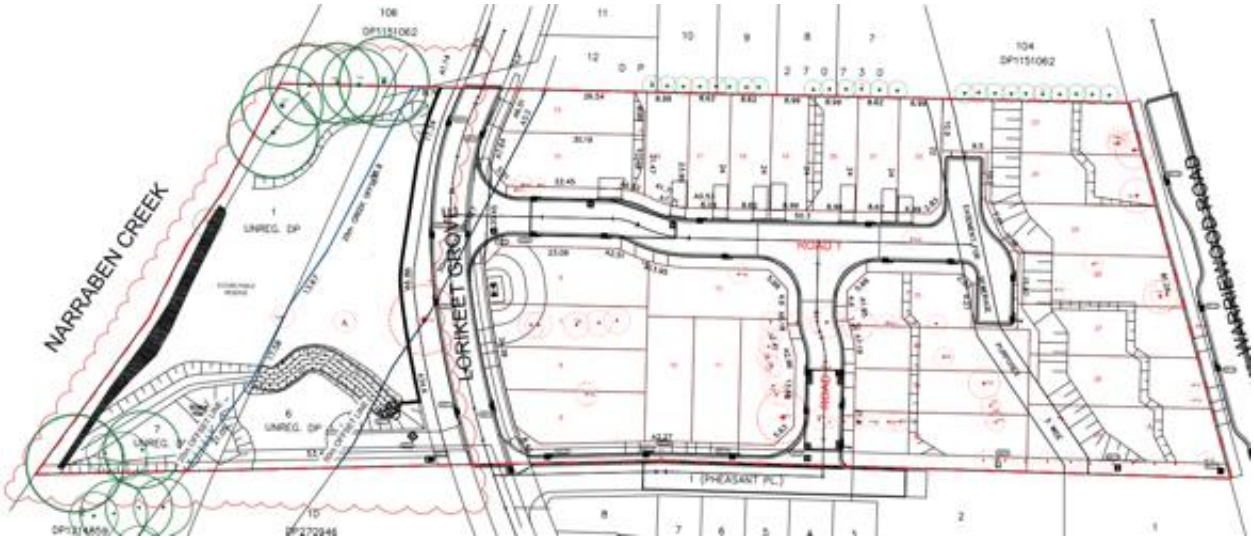


Figure 1.12 Proposed vegetated swale. Existing native trees being retained shown by green circles.

Source: Taylor Brammer Landscape Architects Pty Ltd, 20.03.2025, Rev B

Native trees proposed for removal are outside the 25m riparian area and in the building footprint and nature strip. The nature strip is where the larger native species are. The most ecologically significant tree proposed for removal is the *Angophora costata* (T11). Other natives include Sheoaks, a Blue Gum, Wattles, Bottle Brush and Blueberry Ash. All but the Sheoaks and some Blueberry Ash are planted. All were inspected for hollows or particularly habitat (Ring-tail Dreys) and none present at the time of surveys.

Table 1.2 Extract from Arborist Report (July 2024)

ID	BOTANICAL NAME	COMMON NAME	HEIGHT (m)	COMMENT
TREES RETAINED				
T1	*Row of small screening shrubs and vegetation*	n/a	4m	RETAINED
T34	*Eucalypius robusta*	Swamp Mahogany	17m	RETAINED
T44	Casuarira cunninghamiana	River Sheoak	6m	RETAINED
T45	*Ecalyptus robusta*	Swamp Mahogany	13m	RETAINED
T46	*Dense Bushland*	n/a	n/a	RETAINED
T47	*Allocasuarina littoralis*	Black Sheoak	6m	RETAINED
T48	*Ecalyptus robusta*	Swamp Mahogany	13m	RETAINED
T49	*Allocasuarina littoralis*	Black Sheoak	9m	RETAINED

TREES REMOVED			
T2 *Acacia sp.*	Wattle	7m	Remove to accommodate works
T3 *Acacia sp.*	Wattle	4m	Remove to accommodate works
T4 *Acacia sp.*	Wattle	6,	Remove to accommodate works
T5 *Acacia sp.*	Wattle	8m	Remove to accommodate works
T6 *Eucalypius saligna*	Sydney blue gum	11m	Remove to accommodate works
T7 *Syzygium hedge x 6*	Lilly Pilly	2m	Remove to accommodate works
T8 *Palm x 4*	n/a	3m	Remove to accommodate works
T9 *Rothmannia globosa*	Tree Gardenia	3m	Remove to accommodate works
T10 *Morus alba*	White Mulberry	3m	Remove to accommodate works
T11 *Angophora costata*	Smooth-barked Apple	15m	Remove to accommodate works
T12 *Hibicus sp.*	Hibiscus	2m	Remove to accommodate works
T13 *Yucca sp.*	Yucca	3m	Remove to accommodate works
T14 *Magnolia grandiflora*	Southern Magnolia	3m	Remove to accommodate works
T15 *Elaeocarpus reticulatus*	Blueberry Ash	4m	Remove to accommodate works
T16 *Brachychiton acerifolius*	Flame bottletree	11m	Remove to accommodate works
T17 *Hedge consisting of various species*	n/a	8m	Remove to accommodate works
T18 *Elaeocarpus reticulatus*	Blueberry Ash	5m	Remove to accommodate works
T19 *Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T20 *Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T21 *Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T22 *Yucca sp.*	Yucca	4m	Remove to accommodate works
T23 *Howea forsteriana x 4*	Kentia Palm	6m	Remove to accommodate works
T24 *Ficus benjamina*	Weeping Figs	11m	Remove to accommodate works
T25 *Hedge consisting of various species*		5m	Remove to accommodate works
T26 *Callistemon viminalis*	Weeping Bottlebrush	3m	Remove to accommodate works
T27 *Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T28 *Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T29 *Hedge consisting of various species*	n/a	3m	Remove to accommodate works
T30 *Cupressocyparis leylandii*	Leyland Cypress	10m	Remove to accommodate works
T31 *Butia capitata*	Jelly Palm	5m	Remove to accommodate works
T32 *Callistemon salignus x 5*	Willow Bottlebrush	8m	Remove to accommodate works
T33 *Casuarina glauca*	Swamp Oak	10m	Remove to accommodate works
T35 *Casuarina glauca*	Swamp Oak	8m	Remove to accommodate works
T36 *Howea forsteriana*	Kentia Palm	7m	Remove to accommodate works
T37 *Casuarina glauca*	Swamp Oak	15m	Remove to accommodate works
T38 *Casuarina glauca (Grouping of 12)*	Swamp Oak	13m	Remove to accommodate works
T39 *Morus alba*	White Mulberry	5m	Remove to accommodate works
T40 *Allocasuarina littoralis*	Black Sheoak	8m	Remove to accommodate works
T41 *Casuarina cunninghamiana*	River Sheoak	8m	Remove to accommodate works
T42 *Allocasuarina littoralis*	Black Sheoak	7m	Remove to accommodate works
T43 *Allocasuarina littoralis*	Black Sheoak	13m	Remove to accommodate works

*Refer to Arboricultural Impact Assessment Report prepared by The Tree Guardian, dated July 2024

1.6 Bushfire APZ Requirements

The bushfire report (EcoLogical Australia 2024) shows a required asset protection zone of 24-29 meters between the proposed development (dwellings) and the vegetated areas. The modelling of this has the APZ within the Landscape Buffer of the outer 25m creek-line corridor and not in the inner core. The APZ assumes the vegetation is Forest for its calculations and thus the weed removal and planting proposed is in keeping with the premise of the calculations. There is not direct impact of the APZ only indirect through future management of the outer 25m needing to be in a fuel reduced state as per the report extract Figure 1.13.

Transect #	Slope	PBP Vegetation Formation	Required APZ	Proposed APZ	Comments
T1, T2 & T3 West to south	1.5° downslope	Forest (Coastal Swamp Forest)*	29 m	≥16 m*	*APZ determined using SFR as per A1.11.2 of PBP and detail in Section 3.1.1 below. This modelling of the APZ results in a radiant heat level exposure to buildings not exceeding 29 kW/m². Modelling report is included in Appendix C.
T4 South-east	All upslope and flat land	Forest	24 m	≥24 m	APZ provided by residential development and public road infrastructure.
T5 East	>0° to 5° downslope	Grassland	12 m	≥12 m	APZ provided by residential development and public road infrastructure.

Figure 1.13 Extract from Bushfire Report Ecological 2024

Appendix A - Asset Protection Zone and Landscaping Standards

The APZs specified in Table 3 and shown in Figure 2 are to be managed to IPA specifications Table 14 The identified APZs are to be maintained in perpetuity and management undertaken on an annual basis (as a minimum) and prior to the commencement of the bushfire season.

These APZ management specifications should be considered for any future landscaping and maintenance.

Further details on APZ implementation and management can be found on the NSW RFS website (https://www.rfs.nsw.gov.au/resources/publications).

Table 14: APZ management specifications

Vegetation Strata	Inner Protection Area (IPA)	Outer Protection Area (OPA)
Trees	• Tree canopy cover should be less than 15% at maturity; • Trees (at maturity) should not touch or overhang the building; • Lower limbs should be removed up to a height of 2 m above ground; • Canopies should be separated by 2 to 5 m; and • Preference should be given to smooth barked and evergreen trees.	• Tree canopy cover should be less than 30%; and • Canopies should be separated by 2 to 5 m.
Shrubs	• Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided; • Shrubs should not be located under trees; • Shrubs should not form more than 10% ground cover; and • Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.	• Shrubs should not form a continuous canopy; and • Shrubs should form no more than 20% of ground cover.
Grass	• Should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and • Leaves and vegetation debris should be removed.	• Should be kept mown to a height less than 100 mm; and • Leaf and other debris should be removed.

Figure 1.14 Extract from Bushfire Report Ecological 2024

1.7 Sources of information used in the assessment

The following sources of information were used for this assessment:

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

Records from the following databases were collated and reviewed:

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

Plans and drawings specific to this development (and updates of Jan-March 2025):

- Plans Master Set. March 2025.
- Bushfire Plan
- On-site Water Management Plan
- Aboriginal Due Diligence Assessment.
- Arborist Report.
- Overland Flow Impact Assessment.
- Transport Impact Assessment.
- Waste Management Plan.
- Water Quality Monitoring.
- Amended Statement of Environmental Effects.

1.8 Legislative context and statutory requirements

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

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

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

  Matters of national environmental significance identified in the Act are:

  - world heritage properties;

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

The Commonwealth Government has published Significant Impact Guidelines (DE 2013) to assist in the determination of whether an action is likely to have a significant impact on a matter of NES. The proposal does not impact on a 'matter of National Environmental Significance' and therefore is compliant with the EPBC Act.

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

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

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

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

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

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

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

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

- SEPP Resilience and Hazards – in relation to the mapped Coastal Wetland and the site being in the buffer area.
- Northern Beaches Council DCP and LEP

The proposal satisfies provisions outlined in both the Pittwater Local Environmental Plan 2014 -7.6 (Biodiversity protection) and Pittwater Development Control Plan 21 - DCP – B4.2(Flora and Fauna conservation), B4.6 (Wildlife corridors) and B4.11 (Residents adjoining bushland reserve). Impacts on native vegetation and the environment have been avoided and minimised. The main tree loss is the Angophora on the Nature Strip. Offset plantings and other mitigation measures are required.

1.8.1 Biodiversity Offsets Scheme Threshold

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

It has been concluded that the development does not trigger the BOS area clearing threshold.

The BV mapping is on a small area of the southeast corner and no native vegetation is being removed from here.

The area clearing threshold trigger is based on the minimum or actual lot size associated with the property (<1Ha) and the thresholds for clearing which triggers BOS (0.25Ha or more). The building footprint is expected to replace the existing dwelling and will not remove more than 0.25Ha of native vegetation therefore the development does not trigger the BOS.

Area clearing threshold

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

Minimum lot size associated with site is 9,251m^2 and the development will not clear >0.25Ha of vegetation.

Thus, the BOS area clearing threshold does not apply.

Plot data from the site was used to determine the vegetation integrity score (VIS) as the per the BAM calculations. The VIS score of 7.3 calculated within the BAM reflects the composition of vegetation on site and does not trigger the BOS which requires a VIS of 15 or higher.

The plot from which the VIS was calculated was placed in the most biodiverse area on site. Situated in the south-western corner of the property, the depressed area which held a high-water content contained a mixture of both native and exotic grass species. The remaining site, which was slightly more elevated included a high density of exotic grass species.

Biodiversity Values Map threshold

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

Figure 1.15 The site (red mark) located on the BV map

Source: BV Map

The site (red box) is not located on land mapped as biodiversity value - as identified on the Biodiversity Values Map.

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

Figure 1.16 The site (red mark) located on the BV map – close up of the site

Source: Biodiversity Threshold Tool Mapping

1.9 SEPP Resilience and Hazards

Part of the site is within the buffer of Coastal Wetland as per mapping under the SEPP Resilience and Hazards as is shown in Figure 1.17. The light blue line is the buffer edge. Impacts on this area are covered in the SEPP Resilience and Hazards Report (March 2025). Conclusions from that report are no significant impact on the Wetland.

Figure 1.17 SEPP Resilience and Hazards – Wetland

Source: SEED eMapping

2 Methods

2.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball and Field Ecologist Gabriel James assessed the site in August 2022 (4hrs x 2 ecologists). Weather was a combination of fine, sunny and overcast, rainy conditions during the survey. Additional surveys occurred in February 2024 (1 day and 2 evenings) and December 2024 (4 hrs in day and in evening). A total of 4-day and 4-night surveys have occurred on site and surrounds. This in in addition to extensive field work in 2024 on a site within 1.6km of the site. The following species were considered, and the dates covered all required surveys. Due to site degradation, it was obvious absence for most species. Extra care is taken for cryptic species such as orchids.

Table 2.1. Threatened species surveys for flora species credit species on the subject land.

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required ?
		Recommended survey period	Survey method (transects or grids)	Survey in Period	Effort total hours		
Bynoe's Wattle	*Acacia bynoeana*	Year–round	All site	Yes	8	No	No
Downy Wattle	*Acacia pubescens*	Year–round	All site	Yes	8	No	No
Sunshine Wattle	*Acacia terminalis* subsp. *Eastern Sydney*	May–July	All site	Yes	8	No	No
Asterolasia elegans	*Asterolasia elegans*	September–October	All site	Yes	8	No	No
Thick-leaf Star-hair	*Astrotricha crassifolia*	July–December	All site	Yes	8	No	No
Netted Bottle Brush	*Callistemon linearifolius*	October–January	All site	Yes	8	No	No
Camarophyllopsis kearneyi	*Camarophyllopsis kearneyi*	May–June	All site	Yes	8	No	No
Darwinia biflora	*Darwinia biflora*	Year–round	All site	Yes	8	No	No
Darwinia peduncularis	*Darwinia peduncularis*	Year–round	All site	Yes	8	No	No
Deyeuxia appressa	*Deyeuxia appressa*	December	All site	Yes	8	No	No
Epacris purpurascens var. *purpurascens*	*Epacris purpurascens* var. *purpurascens*	September–October	All site	Yes	8	No	No
Camfield's Stringybark	*Eucalyptus camfieldii*	Year–round	All site	Yes	8	No	No
Bauer's Midge Orchid	*Genoplesium baueri*	February–March	All site	Yes	8	No	No
Caley's Grevillea	*Grevillea caleyi*	Year–round	All site	Yes	8	No	No

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required ?
		Recommended survey period	Survey method (transects or grids)	Survey in Period	Effort total hours		
Grevillea parviflora subsp. *supplicans*	*Grevillea parviflora* subsp. *supplicans*	August–November	All site	Yes	8	No	No
Haloragodendron lucasii	*Haloragodendron lucasii*	Year–round	All site	Yes	8	No	No
Julian's Hibbertia	*Hibbertia spanantha*	October–November	All site	Yes	8	No	No
Hibbertia procumbens	*Hibbertia procumbens*	October–January	All site	Yes	8	No	No
Hibbertia superans	*Hibbertia superans*	July–December	All site	Yes	8	No	No
Hygrocybe anomala var. *ianthinomarginata*	*Hygrocybe anomala* var. *ianthinomarginata*	May–June	All site	Yes	8	No	No
Hygrocybe aurantipes	*Hygrocybe aurantipes*	May–June	All site	Yes	8	No	No
Hygrocybe austropratensis	*Hygrocybe austropratensis*	May–June	All site	Yes	8	No	No
Hygrocybe collucera	*Hygrocybe collucera*	June	All site	Yes	8	No	No
Hygrocybe griseoramosa	*Hygrocybe griseoramosa*	May–June	All site	Yes	8	No	No
Hygrocybe lanecovensis	*Hygrocybe lanecovensis*	May–June	All site	Yes	8	No	No
Hygrocybe reesiae	*Hygrocybe reesiae*	May–June	All site	Yes	8	No	No
Hygrocybe rubronivea	*Hygrocybe rubronivea*	May–June	All site	Yes	8	No	No
Deane's Paperbark	*Melaleuca deanei*	Year–round	All site	Yes	8	No	No
Micromyrtus blakelyi	*Micromyrtus blakelyi*	Year–round	All site	Yes	8	No	No
Angus's Onion Orchid	*Microtis angusii*	October	All site	Yes	8	Yes	Yes
Hairy Geebung	*Persoonia hirsuta*	Year–round	All site	Yes	8	No	No
Persoonia mollis subsp. *maxima*	*Persoonia mollis* subsp. *maxima*	Year–round	All site	Yes	8	No	No
Pimelea curviflora var. curviflora	*Pimelea curviflora* var. *curviflora*	December–March	All site	Yes	8	No	No

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required ?
		Recommended survey period	Survey method (transects or grids)	Survey in Period	Effort total hours		
Somersby Mintbush	*Prostanthera junonis*	October–December	All site	Yes	8	No	No
Seaforth Mintbush	*Prostanthera marifolia*	Year–round	All site	Yes	8	No	No
Eastern Australian Underground Orchid	*Rhizanthella slateri*	September–November	All site	Yes	8	No	No
Scrub Turpentine	*Rhodamnia rubescens*	Year–round	All site	Yes	8	No	No
Native Guava	*Rhodomyrtus psidioides*	Year–round	All site	Yes	8	No	No
Tetratheca glandulosa	*Tetratheca glandulosa*	August–November	All site	Yes	8	No	No
Zieria involucrata	*Zieria involucrata*	Year–round	All site	Yes	8	No	No

2.1.1 Threatened fauna surveys

Table 2.2 Threatened species surveys for candidate fauna species credit species on the subject land

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required?
		Recommended survey period	Survey method (transects or grids)	Survey in Time	Total Hours		
BIRDS							
Bush Stone-curlew	*Burhinus grallarius*	Year–round	Transects/ call playback	Yes	2 days/nights 10hr over 4 events	No	No
Gang-gang Cockatoo	*Callocephalon fimbriatum*	October–January	Searches for nest trees/	Yes	8hr over 3 events	No	No
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	January–September	Searches for nest trees/ and food trees	Yes	8hr over 3 events	No	No
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	July–December	Searches for nest trees	Yes	8hr over 3 events	No	No
Little Eagle	*Hieraaetus morphnoides*	August–October	Searches for nest trees	Yes	8hr over 3 events	No	No
Square-tailed Kite	*Lophoictinia isura*	September–January	Searches for nest trees	Yes	8hr over 3 events	No	No
Cotton Pygmy-Goose	*Nettapus coromandelianus*	Year–round	Visual all site	Yes	8hr over 3 events	No	No
Powerful Owl	*Ninox strenua*	January–August	Searches for hollow bearing trees/ call playback	Yes	1 night, \ 12hr over 3 events	Yes (from previous surveys)	No
Eastern Osprey	*Pandion cristatus*	April–November	Searches for nest trees	Yes	8hr over 3 events	No	No
FROGS							
Giant Burrowing Frog	*Heleioporus australiacus*	September–May	Aural-visual surveys	Yes	3 x2hrs each day event, 1 ecologist	No	No
Green and Golden Bell Frog	*Litoria aurea*	November–March	Aural-visual surveys	Yes	4 nights, 1 ecologist, 12hr over 6 events	No	No

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required?
		Recommended survey period	Survey method (transects or grids)	Survey in Time	Total Hours		
Giant Barred Frog	*Mixophyes iteratus*	October–March	Aural-visual surveys	Yes	No habitat	No	No
Red-crowned Toadlet	*Pseudophryne australis*	Year–round	Aural-visual surveys	Yes	4 nights, 1 ecologist, 12hr over 6 events	No	No
MAMMALS							
Squirrel Glider	*Petaurus norfolcensis*	Year–round	Spotlighting	Yes	4hr over 2 events	No	No
Koala	*Phascolarctos cinereus*	Year–round	Spotlighting	Yes	4hr over 2 events	No	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	November–January	Previous Literature			Y	No
Little Bent-winged Bat	*Miniopterus australis*	December–February	Previous Literature			Y	No
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	December–February	Previous Literature			Y	No
Southern Myotis	*Myotis macropus*	October–March	Previous Literature			Y	No
GASTROPODA							
Dural Land Snail	*Pommerhelix duralensis*	Year–round	Raking of/ searches within leaf litter and debris during moist conditions	Yes	8hr	No	No

During site visits, notes and photos were taken of the vegetation types, flora and fauna present. Due to the small area of proposed impacts, detailed or systematic surveys were not performed. Surveys were general and opportunistic in nature and were performed by traversing the site. Surveys included one diurnal bird and fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified. Spotlighting was conducted, though habitat very poor for nocturnal threatened species. Bush stone Curlew was a possibility (unlikely though) no response to call playback. No logs on -site.

3 Results

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

A review of the most up-to-date vegetation mapping, indicate no PCT within eh site boundaries however they are on each side of the site. A small area of 4006 is west of the site *Northern Paperbark-Swamp Mahogany Saw-sedge Forest* and a larger area of PCT 4028 *Estuarine Swamp Oak Twig-rush Forest* is to the East. This eastern vegetation joins the mapped Coastal Wetland (SEPP resilience and hazards). Both PCTs are part of the EEC Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

Table 3.1 Table of vegetation community synonyms as per NSW and Commonwealth legislation.

NSW	PCT Name	BC Act 2016	EPBC Act 1999
PCT Code 4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest Veg Class Coastal Swamp Forests	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Status: Endangered Ecological Community (EEC) https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/swamp-sclerophyll-forest-coastal-floodplains-endangered-ecological-listing	No associated TEC
PCT Code 4028	Veg Class Coastal Floodplain Wetlands		No associated TEC

The site is cleared with scattered re-growth Swamp Oak mainly (*Casuarina glauca*).

The creek is dominated by exotic species, including highly invasive *Ludwigia peruviana* and Coral Trees. The rear of the site descends into a soak area adjacent to the creek. This area consists of a variety of grass and sedge species containing both native and exotic species due to its high-water content. Habitat and vegetation conditions remain poor with the presence of high threat exotic (HTE) weeds.

The existing habitat and vegetation do not meet the required benchmark conditions of the vegetation community in the vicinity of the site.

The vegetation onsite makes up part of the riparian vegetation/habitat corridor lining Narrabeen Creek and adjoining vegetation in surrounding areas. Refer to Figure 2.5.

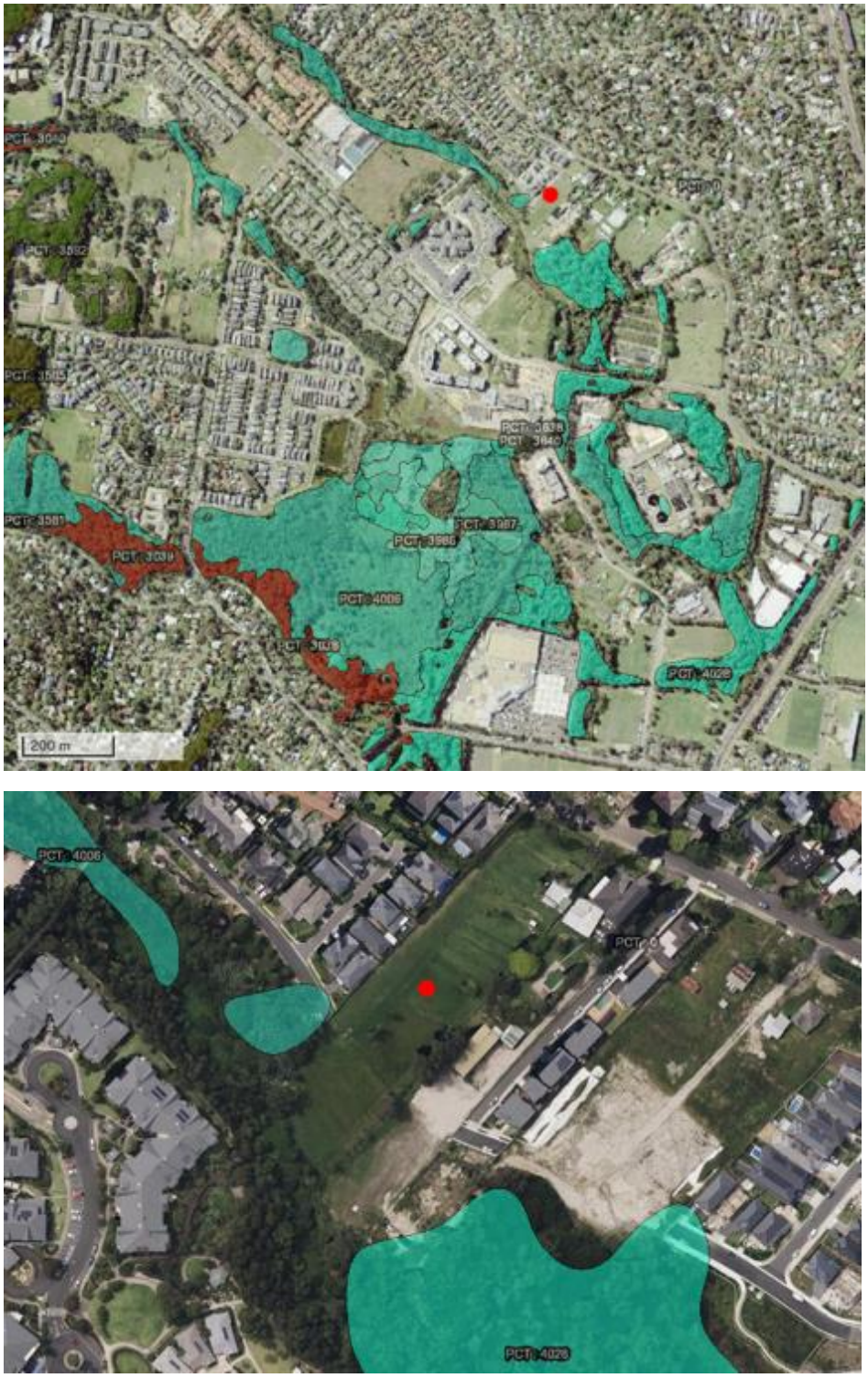


Figure 3.1 Mapped PCT either side. PCT - 4006 Northern Paperbark-Swamp Mahogany Saw-sedge Forest and 4028 Estuarine Swamp Oak Twig-rush Forest. None mapped on the site.

Source: SEED

Figure 3.2 Vegetation/habitat corridors surrounding the site. Site yellow star.

Source: Nearmap

Mapping of Groundwater Dependent Ecosystems (GDE) shows the surrounding mapping PCT are GDE with a category of medium See extract for PCT 4006 in Figure 3.3. This is to be expected and will be the same on the site – once it is replanted. The lack of mapping at the moment is due to there no being sufficient native species to refer to it as an ecosystem.

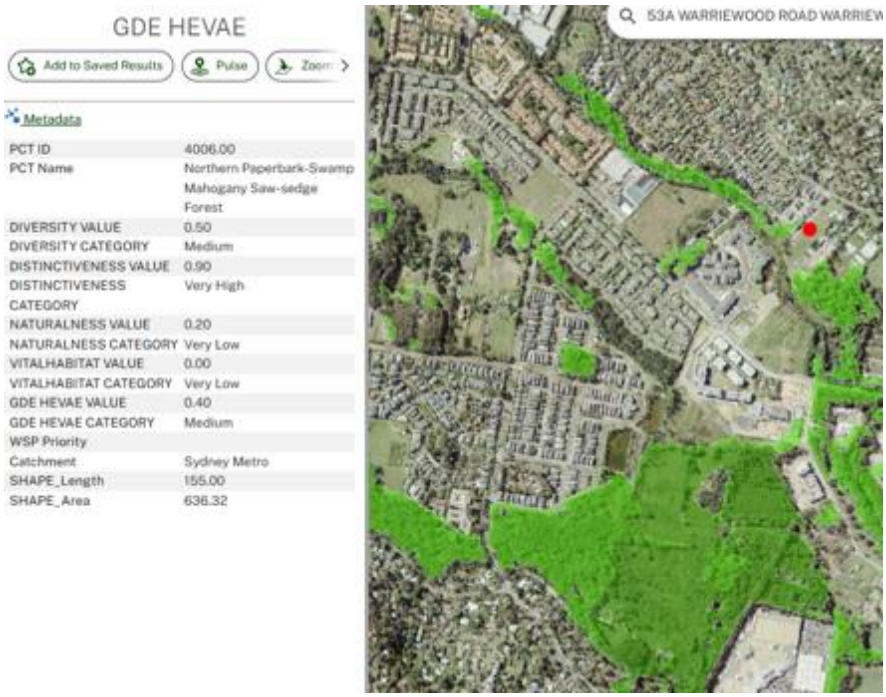


Figure 3.3 Groundwater Dependent Ecosystems (GDE) mapping near the site. This colour code is medium.

Source: SEED

3.2 Findings: vegetation on-site

The site was cleared to the toe of the bank prior to or in 2009 (as per aerial imagery). Native trees near the creek at that time were only in the lower western corner (images included in this report). Current (2025) native canopy is Swamp Oak and Swamp Mahogany and on the roadside an Angophora and a planted Blue

Gum. Native shrubs are Cheese Tree (likely to be self-sown) and planted Callistemons are along the eastern boundary. Ground species are exotic over 98% of the site. Small wet patches (1m x0.5m) include native *Juncus usitatus.* The area of exotic grasses (yellow) and weed dominated edge (red) is provided in Figure 2.6. Figure 2.7 shows the tree canopy, and the extract provided nominates species - noting more in the center of the site are exotic.

Surveys from 2022 to 2025 have seen the increase in natural recruitment of Swamp Oaks. This is expected to occur again after the earth works as this species will germinate and establish in this location easily and is fast growing.

Figure 3.4 Vegetation – mid and ground cover condition.

Source: Nearmap

Red: Coral Tree dominate.

Yellow: exotic grasses

Green: areas of native trees (see also Arborist report from tree detail – extracts in this report)

3.2.1 Site photos

Plate 1. Site closest to the creek in the foreground and neighbouring property with exotics including Arundo and Coral Trees on the neighbouring property. Swamp Mahogany at rear.

Plate 2. Coral Trees, Large leaf Privet, vine weeds and She Oaks among these.

Plate 3. Coral trees on creek edge. Large Leaf Privet also present.

Plate 4. Ground cover exotic including Alligator Weed

Plate 5. Turf area on the raised part of the site all exotic species.

3.3 Threatened flora

Bionet results were compared with the list from the BAM calculator to ensure all possible species were considered.

BioNet records within 10km of the study site had 22 species currently listed as vulnerable or endangered under state and/or commonwealth legislation, out of a total of 2,013 species. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 3.2** below. This is based on likelihood of occurrence. Flora surveys cover the full site. Orchid surveys were in the predicted flowering times.

Table 3.2 Threatened flora recorded within a 10km radius since 1993. NSW OEH Bionet

Family	Scientific Name	Common Name	NSW status	Cwealth status	Records
Fabaceae	*Acacia terminalis* subsp. *Eastern Sydney*	Sunshine wattle	E1	E	2
Rutaceae	*Boronia umbellata*	Orara Boronia	V,P	V	1
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V,3		10

Family	Scientific Name	Common Name	NSW status	Cwealth status	Records
Euphorbiaceae	*Chamaesyce psammogeton*	Sand Spurge	E1		14
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	1
Ericaceae	*Epacris purpurascens* var. *purpurascens*		V		3
Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V	64
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	5
Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	3
Grammitidaceae	*Grammitis stenophylla*	Narrow-leaf Finger Fern	E1,3		2
Proteaceae	*Grevillea caleyi*	Caley's Grevillea	E4A,3	CE	462
Myrtaceae	*Kunzea rupestris*		V	V	1
Malvaceae	*Lasiopetalum joyceae*		V	V	2
Proteaceae	*Macadamia integrifolia*	Macadamia Nut		V	8
Orchidaceae	*Microtis angusii*	Angus's Onion Orchid	E1,P,2	E	165
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	27
Thymelaeaceae	*Pimelea curviflora var. curviflora*		V	V	28
Lamiaceae	*Prostanthera densa*	Villous Mint-bush	V	V	1
Lamiaceae	*Prostanthera marifolia*	Seaforth Mintbush	E4A,3	CE	1
Myrtaceae	***Rhodamnia rubescens***	**Scrub Turpentine**	E4A	CE	34
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	26
Elaeocarpaceae	*Tetratheca glandulosa*		V		155

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

3.4 Threatened fauna

A total of 553 fauna species have been recorded within 10km of the study site according to BioNet records since 1993. Of these, 70 species are currently listed as vulnerable or endangered under state and/or commonwealth legislation. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 3.3** below, this is based on likelihood of occurrence.

NB: species whose habitat doesn't occur on site have been omitted from this list – those with marginal habitat have been retained on the list. The site was surveyed during the day and night. Call playback for Curlew. See methods section. Microbats assumed present. Data obtained from nearby sites as well.

Table 3.3 Threatened fauna recorded within a 10km radius since 1993. NSW OEH Bionet 2022

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	89
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	5
Amphibia	***Pseudophryne australis***	**Red-crowned Toadlet**	V,P		142
Aves	***Anthochaera phrygia***	**Regent Honeyeater**	E4A,P	CE	39
Aves	*Ardenna carneipes*	Flesh-footed Shearwater	V,P	J,K	3
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		8
Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	3
Aves	*Burhinus grallarius*	Bush Stone-curlew	E1,P		54
Aves	*Calidris alba*	Sanderling	V,P	C,J,K	8
Aves	*Calidris canutus*	Red Knot	P	E,C,J,K	2
Aves	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	3
Aves	*Calidris tenuirostris*	Great Knot	V,P	CE,C,J,K	4
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		3
Aves	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		145
Aves	*Charadrius leschenaultii*	Greater Sand-plover	V,P	V,C,J,K	3
Aves	*Charadrius mongolus*	Lesser Sand-plover	V,P	E,C,J,K	2
Aves	*Daphoenositta chrysoptera*	Varied Sittella	V,P		5
Aves	*Esacus magnirostris*	Beach Stone-curlew	E4A,P		2
Aves	***Glossopsitta pusilla***	**Little Lorikeet**	V,P		15
Aves	*Gygis alba*	White Tern	V,P		1
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		27
Aves	*Haematopus longirostris*	Pied Oystercatcher	E1,P		7
Aves	***Haliaeetus leucogaster***	**White-bellied Sea-Eagle**	V,P		54
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		9
Aves	***Hirundapus caudacutus***	**White-throated Needletail**	P	V,C,J,K	19
Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		26
Aves	***Lathamus discolor***	**Swift Parrot**	E1,P,3	CE	33
Aves	*Lophoictinia isura*	Square-tailed Kite	V,P,3		6
Aves	*Macronectes giganteus*	Southern Giant Petrel	E1,P	E	2

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Aves	*Macronectes halli*	Northern Giant-Petrel	V,P	V	1
Aves	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Aves	*Neophema pulchella*	Turquoise Parrot	V,P,3		3
Aves	***Ninox connivens***	**Barking Owl**	V,P,3		39
Aves	***Ninox strenua***	**Powerful Owl**	V,P,3		650
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	10
Aves	***Onychoprion fuscata***	**Sooty Tern**	V,P		3
Aves	***Pandion cristatus***	**Eastern Osprey**	V,P,3		31
Aves	*Petroica boodang*	Scarlet Robin	V,P		3
Aves	*Ptilinopus magnificus*	Wompoo Fruit-Dove	V,P		2
Aves	*Ptilinopus regina*	Rose-crowned Fruit-Dove	V,P		3
Aves	*Ptilinopus superbus*	Superb Fruit-Dove	V,P		5
Aves	*Puffinus assimilis*	Little Shearwater	V,P		2
Aves	***Rostratula australis***	**Australian Painted Snipe**	E1,P	E	3
Aves	*Sternula albifrons*	Little Tern	E1,P	C,J,K	2
Aves	*Tyto novaehollandiae*	Masked Owl	V,P,3		8
Aves	*Tyto tenebricosa*	Sooty Owl	V,P,3		2
Aves	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	2
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V,P		534
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	23
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	18
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		3
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	63
Mammalia	***Micronomus norfolkensis***	**Eastern Coastal Free-tailed Bat**	V,P		28
Mammalia	***Miniopterus australis***	**Little Bent-winged Bat**	V,P		82
Mammalia	***Miniopterus orianae oceanensis***	**Large Bent-winged Bat**	V,P		191
Mammalia	***Myotis macropus***	**Southern Myotis**	V,P		62
Mammalia	***Petaurus norfolcensis***	**Squirrel Glider**	V,P		8
Mammalia	***Phascolarctos cinereus***	**Koala**	V,P	V	75

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Mammalia	*Pseudomys novaehollandiae*	New Holland Mouse	P	V	5
Mammalia	***Pteropus poliocephalus***	**Grey-headed Flying-fox**	V,P	V	246
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		3
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		11
Mammalia	***Vespadelus troughtoni***	**Eastern Cave Bat**	V,P		2
Reptilia	Varanus rosenbergi	Rosenberg's Goanna	V,P		115

3.5 Endangered Populations

One (1) **endangered population** have been recorded to occur within 10km of the site. Table 3.4 identifies the population.

The endangered population are unlikely to be within the study site or a corridor linking populations to those communities. No further assessment is required for these communities.

Table 3.4 Endangered Populations within 10km of site

Family	Scientific Name	Common Name	NSW	Cwealth	Records
Mammalia	*Phascolarctos cinereus*	Koala in the Pittwater Local Government Area	E2,V,P	V	70

Likelihood of occurrence

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

Figure 3.5 Threatened species (yellow orange).

Source: SEED 2025

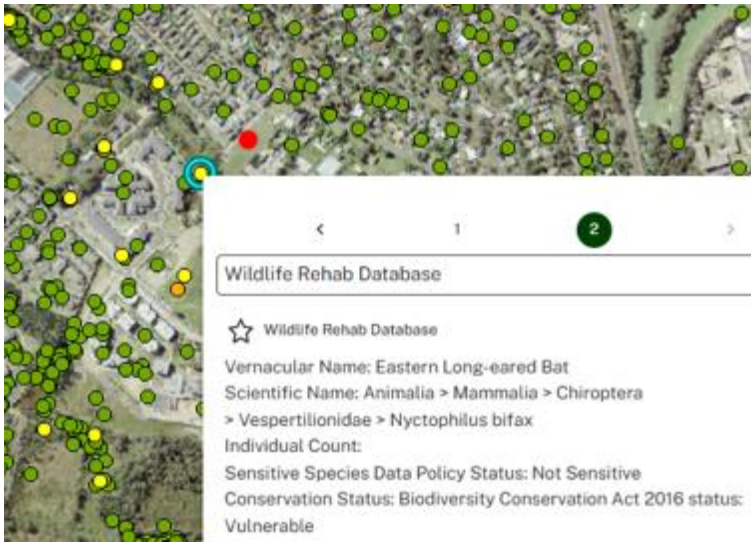


Figure 3.6 Eastern Long-eared Bat sighted near the site

Source: SEED

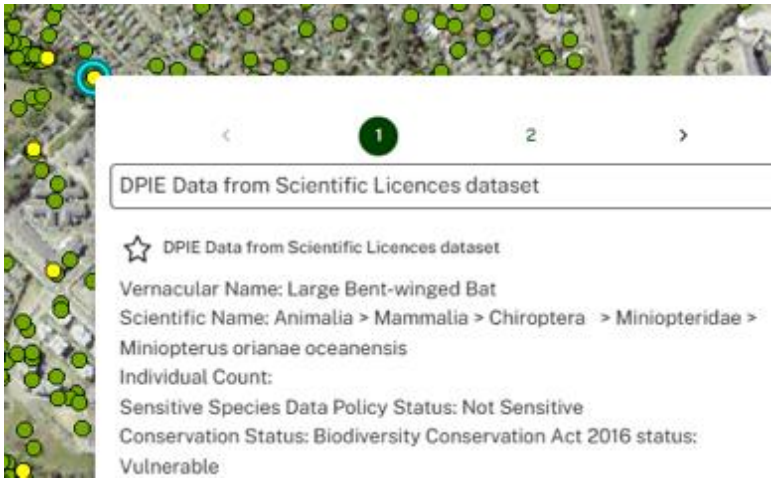


Figure 3.7 Large Bent-winged Bat sighted near the site

Source: SEED

4 Impacts

4.1 Direct Impacts

4.1.1 Tree and Vegetation removal

Twelve (12) prescribed (LGA protected) trees are identified for removal to accommodate design. The tree table summary has been included below. Direct impacts will be made to native tree species during this development. The list includes the removal of the following native tree species.

One large Angophora on the nature strip, 8 small She Oaks, Blueberry Ash (all planted) and *Acacia saligna* (Environmental Weed), Bottlebrush – 2 species – all planted.

TREES REMOVED

T2	*Acacia sp.*	Wattle	7m	Remove to accommodate works
T3	*Acacia sp.*	Wattle	4m	Remove to accommodate works
T4	*Acacia sp.*	Wattle	6,	Remove to accommodate works
T5	*Acacia sp.*	Wattle	8m	Remove to accommodate works
T6	*Eucalypius saligna*	Sydney blue gum	11m	Remove to accommodate works
T7	*Syzygium hedge x 6*	Lilly Pilly	2m	Remove to accommodate works
T8	*Palm x 4*	n/a	3m	Remove to accommodate works
T9	*Rothmannia globosa*	Tree Gardenia	3m	Remove to accommodate works
T10	*Morus alba*	White Mulberry	3m	Remove to accommodate works
T11	*Angophora costata*	Smooth-barked Apple	15m	Remove to accommodate works
T12	*Hibicus sp.*	Hibiscus	2m	Remove to accommodate works
T13	*Yucca sp.*	Yucca	3m	Remove to accommodate works
T14	*Magnolia grandiflora*	Southern Magnolia	3m	Remove to accommodate works
T15	*Elaeocarpus reticulatus*	Blueberry Ash	4m	Remove to accommodate works
T16	*Brachychiton acerifolius*	Flame bottletree	11m	Remove to accommodate works
T17	*Hedge consisting of various species*	n/a	8m	Remove to accommodate works
T18	*Elaeocarpus reticulatus*	Blueberry Ash	5m	Remove to accommodate works
T19	*Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T20	*Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T21	*Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T22	*Yucca sp.*	Yucca	4m	Remove to accommodate works
T23	*Howea forsteriana x 4*	Kentia Palm	6m	Remove to accommodate works
T24	*Ficus benjamina*	Weeping Figs	11m	Remove to accommodate works
T25	*Hedge consisting of various species*		5m	Remove to accommodate works
T26	*Callistemon viminalis*	Weeping Bottlebrush	3m	Remove to accommodate works
T27	*Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T28	*Callistemon viminalis*	Weeping Bottlebrush	5m	Remove to accommodate works
T29	*Hedge consisting of various species*	n/a	3m	Remove to accommodate works
T30	*Cupressocyparis leylandii*	Leyland Cypress	10m	Remove to accommodate works
T31	*Butia capitata*	Jelly Palm	5m	Remove to accommodate works
T32	*Callistemon salignus x 5*	Willow Bottlebrush	8m	Remove to accommodate works
T33	*Casuarina glauca*	Swamp Oak	10m	Remove to accommodate works
T35	*Casuarina glauca*	Swamp Oak	8m	Remove to accommodate works
T36	*Howea forsteriana*	Kentia Palm	7m	Remove to accommodate works
T37	*Casuarina glauca*	Swamp Oak	15m	Remove to accommodate works
T38	*Casuarina glauca (Grouping of 12)*	Swamp Oak	13m	Remove to accommodate works
T39	*Morus alba*	White Mulberry	5m	Remove to accommodate works
T40	*Allocasuarina littoralis*	Black Sheoak	8m	Remove to accommodate works
T41	*Casuarina cunninghamiana*	River Sheoak	8m	Remove to accommodate works
T42	*Allocasuarina littoralis*	Black Sheoak	7m	Remove to accommodate works
T43	*Allocasuarina littoralis*	Black Sheoak	13m	Remove to accommodate works

*Refer to Arboricultural Impact Assessment Report prepared by The Tree Guardian, dated July 2024

Acacia saligna and although native to the country, this tree species is not endemic to the region of Pittwater or New South Wales. Additionally, tree 31 (*Erythrina crista-gali*) is a Cockscomb coral tree and is also not a native species within Australia.

Exempt tree species permitted to be removed.

4.2 Indirect Impacts

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

4.2.1 Loss of Breeding Opportunities

Works in the site may result in temporary-reduced breeding opportunities for locally occurring native species including amphibians, reptiles, birds, mammals and invertebrates through the production of construction noise and vegetation removal.

4.2.2 Weed growth and invasion

Weed species are already abundant and need to be managed throughout the project.

4.2.3 Introduction of pathogens

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

4.2.4 Runoff

The proposed actions may result in transport of sediment from the work zones as a result of increased storm water runoff. This must be effectively managed.

4.2.1 Lighting

The proposed lighting is to be 'Dark-sky' approved fixtures and globes in all areas shining on-to or near the waterway.

4.2.2 Maintaining the Bushfire APZ

The proposed APZ is within the second 25m and out of the inner zone. As there is no current native vegetation being removed to facilitate the APZ it is not a direct impact. It's maintenance however will be an indirect impact as is will require the second 25m to be more sparce that it otherwise could be.

5 Recommendations

5.1 Mitigation Measures

The following mitigation measures have been suggested with approval of the subdivision.

5.1.1 Tree Protection

Tree protection will be installed. See final arborist report for details of works and tree numbers.

5.1.2 Delineation of Work areas

During construction of any infrastructure associated with the subdivision the delineation of works zones, adjacent vegetation is required to minimise impact.

Flagging tape to be placed along the maximum disturbance area. Works are to be from the cleared area of land and reaching in towards the bushland area.

Access will be restricted to already disturbed open areas.

5.1.3 Seed collection and habitat logs

Seed collection is to occur from any native trees that are removed. Seed to be collected from each species and saved in material or paper bags and provided to the site ecologist or Northern Beaches Council.

The site also includes the presence of some native wetland and water plants from which seeds can also be collected. It is important to consider however, the dense composition of grass-like species within this area. Extra care should be taken to reduce the mixture of seeds from exotic and native species. Trees felled can be partially used as habitat logs in the inner creekline corridor.

5.1.4 Care of Bushland Areas Long-term

The VMP addresses long-term maintenance of the riparian area.

Plantings of tube stock across the site from locally native ground and shrub species is recommended and this is to be in accordance with Asset Protection Zone requirements. See VMP and Landscape plan. Noting the Landscape plan has used the species in the DCP for Warriewood Vally.

5.1.5 Erosion and runoff

Silt and sediment controls must be put in place. As per the approved plan.

5.1.6 Weed management

Weed species are present and must be appropriately managed so they do not spread. There must be continuous maintenance of the native vegetation onsite otherwise it may result in increased weed growth, exacerbated by the high abundance of weeds present pre-works.

Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the duration of the project as well as on-going post woks.

Two High-Threat Exotic (HTE) species were identified on site. There was a small presence of *Ludwigia peruviana* (Peruvian primrose-willow). This species produces a high seed count and had the potential to disperse seed on site. Additionally, one individual Opuntia sp. (Prickly Pear) was located on site. This species also has the potential to spread dramatically through the production of its fruit and ability to grow from its segments. As a result, this species will require continuous weed management throughout development and into post-works.

5.1.7 Weed Removal Techniques

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

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

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

5.1.8 Nest boxes

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

Image from: nestboxes.com.au

5.1.9 Pathogen prevention

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

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

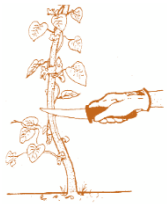
Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)

6 Appendices

6.1 Appendix I– Key Weed Removal Methods

Physical removal

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

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

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

6.2 Appendix II– Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- And, always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)
- Only accredited supplies of plants/mulch to be used.

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

Facts about Phytophthora

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

"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.

6.3 Appendix III – Threatened species likelihood of occurrence

Appendix III is based on BioNet records within 10km of the study site. The following flora and fauna species are currently listed as vulnerable or endangered under state and/or commonwealth legislation. The likelihood of occurrence for the flora and fauna species is listed below.

Table 6.1 Threatened flora species likelihood of occurrence

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Fabaceae	*Acacia terminalis* subsp. *Eastern Sydney*	Sunshine wattle	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. Flowers in autumn but may be through to early winter. Small birds and bees are natural pollinators. Seeds mature in November and are dispersed by ants. Seed viability is high and recruitment occurs mainly after fire. A fire temperature of 60 degrees is required for optimum germination. Although plants are killed by fire, they have been recorded sprouting from the base.	Surveyed for and not present
Rutaceae	*Boronia umbellata*	Orara Boronia	This Boronia grows as an understorey shrub in and around gullies in wet open forest. It appears to regenerate well after disturbance, but it is not known whether prolonged or repeated disturbance affects long-term persistence.	Surveyed for and not present
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers in spring to summer.	Surveyed for and not present.
Euphorbiaceae	*Chamaesyce psammogeton*	Sand Spurge	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (*Spinifex sericeus*) and Prickly Couch (*Zoysia macrantha*). Flowering recorded in spring and summer. Sand Spurge seeds float, so some dispersal between beaches may occur. Longevity of the species is approximately 5–30 years with a primary juvenile period of less than 1 year. Plant growth occurs in spring and summer.	No habitat
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. It appears to prefer open areas in the understorey and is often found in association with the Large Tongue Orchid and the Tartan Tongue Orchid.	Surveyed for and not present

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Ericaceae	*Epacris purpurascens* var. *purpurascens*		Found in a range of habitat types, most of which have a strong shale soil influence. These include ridgetop drainage depressions supporting wet heath within or adjoining shale cap communities e.g. Stringybark and Ironbark woodlands, various shale/sandstone transition forest associations including Turpentine Ironbark Margin Forest, Stringybark/ Scribbly Gum Woodland and Scribbly Gum/ Grey Gum/ Red Bloodwood Woodland. The species also occurs in riparian zones draining into Sydney Sandstone Gully Forest, shale lenses within sandstone habitats and colluvial areas overlying or adjoining sandstone or tertiary alluvium.	No habitat
Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	Restricted distribution at Norah Head, Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Recorded in poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of *E. oblonga* Narrow-leaved Stringybark, *E. capitellata* Brown Stringybark and *E. haemastoma* Scribbly Gum.	No habitat and surveyed for and not present
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	It occurs in grassy or sclerophyll woodland in association with many other eucalypts that grow in the area, including *E. andrewsii* and many of the stringybarks, such as *E. caliginosa*. Grows on shallow relatively infertile soils on shales and slates; Niangala to Glen Innes. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Upland Wetlands of the New England Tablelands and the Monaro Plateau.	Surveyed for and not present
Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	Grows in dry sclerophyll forest and moss gardens over sandstone.	No habitat in possibly impact areas
Grammitidaceae	*Grammitis stenophylla*	Narrow-leaf Finger Fern	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	No habitat in possibly impact areas
Proteaceae	*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. Recorded existing on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by *Eucalyptus sieberi* and *E. gummifera*.	Surveyed for and not present. No habitat in possibly impact areas

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Myrtaceae	*Kunzea rupestris*		Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland. Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so may disperse many metres per week. Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.	No habitat in possibly impact areas
Malvaceae	*Lasiopetalum joyceae*		Grows in heath on sandstone. Flowers in spring. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: Shale/ Sandstone Transition Forest, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Turpentine-Ironbark Forest in the Sydney Basin Bioregion.	No habitat in possibly impact areas
Proteaceae	*Macadamia integrifolia*	Macadamia Nut		Not suitable
Orchidaceae	*Microtis angusii*	Angus's Onion Orchid	Currently known from only one site at Ingleside, north of Sydney. 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.	Surveyed for and not present. No habitat in possibly impact areas
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	Usually found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Habitat Preferences: It also favours disturbed heath, shrubby thickets and sandstone scrubs.	Surveyed for and not present. No habitat in possibly impact areas
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*		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. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	Surveyed for and not present. May come up after disturbance.
Lamiaceae	*Prostanthera densa*	Villous Mint-bush	*Prostanthera densa* generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea. Plants regenerate from rootstock after fire and flower within the first year or two.	Surveyed for and not present.
Lamiaceae	*Prostanthera marifolia*	Seaforth Mintbush	Occurs in localized 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.	Surveyed for and not present. No habitat in possibly impact areas

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	No habitat in possibly impact areas
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest. Is thought to tolerate wet and dry conditions on sands.	No habitat in possibly impact areas
Elaeocarpaceae	*Tetratheca glandulosa*		Occurs on shale/sandstone transition geology particularly in areas where shale caps occur over sandstone. Associated with Lucas heights, Gymea, Lambert and Faulconbridge soil landscapes. Generally occurs on ridgetops, upper slopes and occasionally mid-slope benches. Prefers shallow soils consisting of yellow clayey/sandy loams.	Habitat not ideal Surveyed for and not present. May come up after disturbance.

Table 1.2 Threatened fauna species likelihood of occurrence

Please note – Marine species including Turtles (*Cheloniidae*), Marine Birds *(Diomedeidae, Procellariidae) and Whales (Otariidae, Balaenidae, Balaenopteridae, Physeteridae) have been omitted from this list.*

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	Sites must have native vegetation. The species has not been found on cleared land. Occurs in hanging swamps on sandstone shelves and along perennial creeks. The species is not restricted to watercourses.	In other areas of the Escarpment – no suitable breeding habitat on-site. GBF could move through the site.
Amphibia	***Litoria aurea***	**Green and Golden Bell Frog**	**Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow *(Gambusia holbrooki)*, have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.**	**Site includes water soak. Potential habitat being removed. 5-part test conducted.**

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	In other areas of the Escarpment – no suitable breeding habitat on-site. GBF could move through the site.
Aves	*Anthochaera phrygia*	Regent Honeyeater	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. This species has been seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests.	No habitat
Aves	*Ardenna carneipes*	Flesh-footed Shearwater	Nest on Lord Howe Island in forests on sandy soils from Ned's Beach to Clear Place, with smaller colonies below Transit Hill and at Old Settlement Beach. Eggs are laid at the end of a burrow 1 - 2 metres in length.	No habitat
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	Woodlands and dry open forests with preference for those dominated by eucalypts with mallee associations. May also be found in shrublands, heaths and occasionally in modified habitats and wet forests.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Aves	*Botaurus poiciloptilus*	Australasian Bittern	Freshwater wetlands and occasionally estuarine reedbeds. Prefers permanent shallow wetlands or the pools of creeks and rivers with tall and thick vegetation.	No habitat
Aves	*Burhinus grallarius*	Bush Stone-curlew	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	Habitat is not suitable
Aves	*Calidris alba*	Sanderling	A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands.	No habitat
Aves	*Calidris canutus*	Red Knot	Breeding in the Arctic Circle between August and April, it visits Australian shores in large numbers and frequents coastal sand flats and the margins of estuaries and rivers. It feeds in close-packed flocks that move in unison.	No habitat
Aves	*Calidris ferruginea*	Curlew Sandpiper	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters.	
Aves	*Calidris tenuirostris*	Great Knot	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Most birds return north in March and April, however some individuals may stay over winter in Australia. Forages for food by methodically thrusting its bill deep into the mud to search for invertebrates, such as bivalve molluscs, gastropods, polychaete worms and crustaceans.	No habitat
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	No habitat
Aves	***Calyptorhynchus lathami***	**Glossy Black-Cockatoo**	**Lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Glossy black-cockatoos occasionally eat seeds from eucalypts, angophoras,**	**Food trees for Glossy Black Cockatoos are being removed. 5-part test conducted. Glossy Black Cockatoos are recorded in the Escarpment.**

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			acacias and hakeas, as well as eating insect larvae. Prefers to nest in the hollows of large, old eucalypt trees, alive or dead. The typical nest site will be around 3 to 30 metres above the ground.	
Aves	*Charadrius leschenaultii*	Greater Sand-plover	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders. Diet includes insects, crustaceans, polychaete worms and molluscs. Prey is detected visually by running a short distance, stopping to look, then running to collect the prey.	No habitat
Aves	*Charadrius mongolus*	Lesser Sand-plover	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in river beds.	No habitat
Aves	*Daphoenositta chrysoptera*	Varied Sittella	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	No habitat
Aves	*Esacus magnirostris*	Beach Stone-curlew	The Beach Stone-curlew has been recorded around the north coast of Australia, mainly between mid-north Western Australia	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			and north-east NSW. The species has largely disappeared from the south-east of its former range and is now rarely recorded on ocean beaches in NSW. Occurs on open, undisturbed beaches, islands, reefs, and estuarine intertidal sandflats and mudflats; beaches with estuaries or mangroves nearby are preferred; may also frequent river mouths, offshore sandbars and rock platforms.	
Aves	*Glossopsitta pusilla*	Little Lorikeet	Prefers open Eucalypt forest and woodlands. Primarily feeds within the canopy of Eucalyptus, Angophora and Melaleuca trees. Prefers riparian areas but may visit isolated trees in open or cleared land.	No habitat
Aves	*Gygis alba*	White Tern	Occurs widely in tropical and subtropical seas and islands. The subspecies on Lord Howe Island is rarely seen on the mainland but occurs on Norfolk and Kermadec Islands. Most breeding sites on Lord Howe Island are close to the lagoon in the settlement area. Marine habitat. A recent arrival to Lord Howe Island, only breeding there since the 1960s. This species nests in the high branches of trees. On Lord Howe Island it nests in the introduced Norfolk Island Pine as well as native Sallywood, Blackbutt, Greybark, Banyan and Pandanus. White Terns do not build a nest but select a depression or damaged area on the branch of a tree on which to balance their egg. Breeding and non-breeding birds roost in the trees during the night. Vagrant birds occur in coastal NSW waters, particularly after storm events.	No habitat
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	Inhabits rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Aves	*Haematopus longirostris*	Pied Oystercatcher	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days.	No habitat
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'.	No habitat
Aves	*Hieraaetus morphnoides*	Little Eagle	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Aves	*Hirundapus caudacutus*	White-throated Needletail	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. They are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. They catch the insects in flight in their wide gaping beaks. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. White-throated Needletails are non-breeding migrants in Australia.	No habitat
Aves	*Ixobrychus flavicollis*	Black Bittern	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. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds.	No habitat
Aves	*Lathamus discolor*	Swift Parrot	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 *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			Return to home foraging sites on a cyclic basis depending on food availability.	
Aves	*Lophoictinia isura*	Square-tailed Kite	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.	No habitat
Aves	*Macronectes giganteus*	Southern Giant Petrel	The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory. A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population does not nest. It is an opportunistic scavenger and predator, and scavenges from fishing vessels and animal carcasses on land. It is also an active predator of cephalopods and euphausiids, as well as smaller birds (particularly penguins) both at land and at sea. Birds will desert their nests if disturbed at the breeding colony.	No habitat
Aves	*Macronectes halli*	Northern Giant-Petrel	The Northern Giant-petrel has a circumpolar pelagic distribution, usually between 40-64ºS in open oceans. Their range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			breeding colonies throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds. Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain. A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population do not nest.	
Aves	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	Primarily found in the upper levels of dry open forests and woodlands. Prefers vegetation dominated by box and ironbark Eucalypts but may be found in areas of smooth-barked gums, stringybarks, river sheoaks (nesting) and tea-trees.	No habitat
Aves	*Neophema pulchella*	Turquoise Parrot	Occurs on edges of eucalypt woodlands, ridges through forests and creeks. Prefers shading for ground foraging.	No habitat
Aves	***Ninox connivens***	**Barking Owl**	**Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large Eucalypts. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*Eucalyptus albens*), (Red Box)**	**Potential habitat for prey items. 5-part test conducted.**

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			***Eucalyptus polyanthemos* and Blakely's Red Gum (*Eucalyptus blakelyi*). Breeding occurs during late winter and early spring.**	
Aves	***Ninox strenua***	**Powerful Owl**	**The species requires large tracts of forest or woodland, however fragmented landscapes can contribute to their range. Breeds in forests and woodlands but may forage in open areas. Mainly preys upon medium sized arboreal mammals. Requires tree hollows for breeding.**	**Potential habitat for prey items. 5-part test conducted.**
Aves	*Numenius madagascariensis*	Eastern Curlew	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands.	No habitat
Aves	*Onychoprion fuscata*	Sooty Tern	The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. Occasionally seen along coastal NSW, especially after cyclones. Large flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.	No habitat
Aves	*Pandion cristatus*	Eastern Osprey	Inhabits coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breed	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	
Aves	*Petroica boodang*	Scarlet Robin	Ideal habitat includes eucalypt forests and woodlands with an open and grassy understorey with few shrubs. Can occur in mature or regrowth vegetation. Sometimes seen in mallee, wet forests, wetlands and tea-tree swamps. Habitat generally contains many logs and fallen timber.	No habitat
Aves	*Ptilinopus magnificus*	Wompoo Fruit-Dove	Occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. Three subspecies are recognised, with the most southerly in NSW and south-eastern Queensland. It used to occur in the Illawarra, though there are no recent records. Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit; some of its feed trees rely on species such as the this to distribute their seeds. Feeds alone, or in loose flocks at any height in the canopy. The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground. Breeds in spring and early summer; a single white egg is laid. Most often seen in mature forests, but also found in remnant and regenerating rainforest.	No habitat
Aves	*Ptilinopus regina*	Rose-crowned Fruit-Dove	Coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			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.	
Aves	*Ptilinopus superbus*	Superb Fruit-Dove	The species is found in rainforests, rainforest margins, mangroves, wooded stream-margins, and even isolated figs, lilly pilies and pittosporums. The Superb Fruit-Dove may migrate to New Guinea in winter, but little is known of its movements, or the reasons for its sometimes-southerly flights as far as Tasmania. Feeds almost exclusively on fruit, mainly in large trees.	No habitat
Aves	*Puffinus assimilis*	Little Shearwater	A widespread species in the subtropical Atlantic, Pacific and Indian Oceans. Lord Howe Island has one of the larger breeding colonies in the Australian region. Marine. Breeding sites at Lord Howe Island include Roach Island, Muttonbird Island, Blackburn Island and on the main Island at Muttonbird Point and Transit Hill. The species is known to feed in continental shelf waters and breed on the subtropical and sub- Antarctic islands, where the soil is soft and suitable for burrowing. Burrows are located in tussock grassland, shrubland, woodland and under mats of succulents (e.g. *Carpobrotus, Nitraria, Rhagodia, Atriplex, Tetragonia, Melaleuca*), or among loose rocks.	No habitat
Aves	*Rostratula australis*	Australian Painted Snipe	Inhabits fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	No habitat
Aves	*Sternula albifrons*	Little Tern	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours,	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles. Both parents incubate up to three well-camouflaged eggs for up to 22 days, aggressively defending the nest against intruders until the young fledge at 17 - 19 days. Often seen feeding in flocks, foraging for small fish, crustaceans, insects, annelids and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight.	
Aves	*Tyto novaehollandiae*	Masked Owl	The species prefers dry eucalypt forests and woodlands and hunts along the edges and forests and roadsides. Mainly preys upon arboreal and ground mammals, primarily rats. Requires tree hollows in moist gullies for breeding.	No habitat
Aves	*Tyto tenebricosa*	Sooty Owl	Habitat is limited mainly to the moist eucalypt forests and rainforests of the coastal, escarpment and eastern tablelands regions of NSW. Sooty Owls occur in both steep and undulating country but are strongly associated with sheltered gullies, particularly those with a tall, rainforest understorey. Hollows in live or occasionally dead trees, eucalypt or rainforest species, in moist forest; among dense foliage in rainforest gullies; caves, recesses or ledges in cliffs or banks. Roost sites are in the darkest and most secluded or sheltered positions.	No habitat
Aves	*Xenus cinereus*	Terek Sandpiper	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			the Hunter River estuary. The latter has been identified as nationally and internationally important for the species. Favours mudbanks and sandbanks located near mangroves but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats.	
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	Found in rainforests communities to sclerophyll (including Box-Ironbark) forests, woodland and heath. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, soft fruits are eaten when flowers are unavailable and insects.	No habitat
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	No habitat
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal animal feeding on medium-sized (500g-5kg) mammals.	No habitat
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	Species found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogenous (underground-fruiting) fungi.	No habitat
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	No habitat
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (*M. schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	No habitat
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.	No habitat
Mammalia	***Myotis macropus***	**Southern Myotis**	**Roosts in groups of 10-15 in areas close to water. Will utilise caves, mine shafts, tree hollows, storm water drains, buildings,**	**Potential foraging area being removed. 5-part test conducted.**

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			bridges and dense foliage. Forages over water bodies catching insects and small fish.	
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	Inhabits mature or old growth Blackbutt-Bloodwood forests with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Requires abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	No habitat
Mammalia	*Phascolarctos cinereus*	Koala	Inhabit eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	No habitat
Mammalia	*Pseudomys novaehollandiae*	New Holland Mouse	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. Lives predominantly in burrows shared with other individuals.	No habitat
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	Occurs within tall sclerophyll forests and woodlands, heath, swamp subtropical and temperate rainforests, and urban areas. Occurs within 20km of a significant food source. May be found close to gullies and water within vegetation with a dense canopy.	No habitat
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilize 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	No habitat
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	Roosts in tree hollows but may be found in buildings. Primarily found in gullies and river systems that drain the Great Dividing	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			Range. Occurs in a range of habitats including woodlands to moist or dry eucalypt forest, rainforest with greatest preference for tall wet forests. Forages along creeks and river corridors.	
Mammalia	*Vespadelus troughtoni*	Eastern Cave Bat	Roosts in caves, mine shafts. Generally found in dry open forest and woodlands. Prefers areas near cliffs and rocky overhangs.	No habitat
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	No habitat

6.4 Appendix IV – Species listed on-site

Species recorded on-site (most on periphery)

Acacia saligna
Baumea articulata
Baumea juncea
Baumea rubiginosa
Casuarina glauca
Corymbia maculata
Cynodon dactylon
Cyperus erogrostis
Cyperus sp.
Eleocharis sp.
Eucalytpus robusta
Eucalyptus saligna
Ficus benjamina
Hibuscus tiliaceus
Howea forsteriana
Hydrocotyle sp.
Ludwigia peploides
Ludwigia peruviana
Morus sp.
Opuntia sp.
Paspalum sp.
Pennisetum clandestinum
Persicaria decipiens

6.1 Appendix V – Test of Significance (5 Part Test)

6.1.1 Swamp Mahogany/ Cabbage Tree Palms, Cheese Tree, Swamp Oak tall open forest EEC

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

Not a threatened species

(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

The development proposal is not likely to impact the Swamp Mahogany/ Cabbage Tree Palm tall open forest community as the vegetation community only marginally intersects with the development area. Overall impacts are expected to be negligible and are not expected to impact the community.

(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,

It is unlikely that the composition of the ecological community is likely to be adversely modified. Majority of the area proposed for development consists of exotic grass and wetland species. Some tree species belonging to the EEC are being removed however the scale of removal is small and will not place its occurrence at risk of extinction.

Restoration and mitigation techniques including the planting of species belonging to the EEC will be advised if developments are approved.

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

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

The proposal will not significantly impact or reduce the presence of appropriate habitat or the EEC. The location of the EEC is only marginally located on the border of the proposal.

Six trees and partial removal of one tree belonging to the EEC will take place however the habitat on the property is poor and will not modify habitat.

(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

The EEC community will not become fragmented or isolated as a result of the proposed development. The EEC only marginally borders the proposal area.

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

Six trees with partial removal of an additional tree belonging to the EEC is occurring during developments for this proposal, however these trees are isolated and surrounded by highly modified grassland comprising exotic grass species. The trees therefore provide minimal importance to the EEC 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),

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

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

Yes, tree removal is part of the KTP of habitat loss, however impact to the EEC is minimal. The proposal will not cause any increase in the KTP.

Conclusion

This proposal will not likely significantly alter the Swamp Mahogany/ Cabbage Tree Palm EEC. Although some individual trees belonging to the EEC are being removed, surrounding habitat is deemed as poor and the EEC only marginally borders the proposed development area. Therefore, the EEC will not be placed at risk of extinction.

6.1.2 Large Forest Owls Populations Barking, Powerful, (*Ninox connivens, Ninox strenua*)

(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 tree removals would not however, alone, be expected to adversely affect the life cycle of Large Forest Owls such that a local population would become extinct. Potential impacts from the removal of native trees from which prey species feeds. Tree proposed for removal do not host suitable breeding habitat features for Large Forest Owls. The proposal is unlikely to affect the life cycle of a local population of Large Forest Owls.

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

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

Not EEC

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

Not EEC

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

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

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

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

The removal of trees from the site will include a native hibiscus tree thus impacting the prey species that use these trees preferentially. This is not expected to fragment or isolate the general habitat of Large Forest Owls.

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

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

No essential habitat being removed. Habitat to be removed is not known breeding or roosting habitat.

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

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

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

Yes, tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

Conclusion

This proposal is not likely to significantly affect Populations of Large Forest Owls (*Ninox connivens, Ninox strenua*). Indirect impacts may be made through the removal of prey foraging trees however this will not likely put the local population at a direct risk of extinction.

6.1.3 Microbats

One species of microbat was assessed as having the potential to occur within the study area based on bionet. Though the likelihood of them being on-site very low. Abandoned buildings may be used, however an assessment of this site indicated no use of the existing buildings by microbats. The following species would have lived in the area prior to extensive clearing of the surrounding bushland:

- Southern Myotis (*Myotis macropus)*

The recorded species are considered to be highly mobile and would be likely to be accessing the site occasionally or opportunistically as foraging habitat across a landscape of fragmented habitat. This species has been assessed due to the presence of some foraging habitat on site.

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

The proposed work includes tree removal, however not considered optimal or significant foraging/breeding habitat for the species. Minimal foraging habitat for microbat species may be removed (wetland/soak) however this is not expected to place any microbat species at risk of extinction.

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

(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

Not an EEC

(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 an EEC

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

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

Microbat species are highly mobile and would only be accessing the site occasionally or opportunistically as foraging habitat. It is unlikely that individuals would be exclusively reliant upon the trees being removed for foraging purposes.

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

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

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

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

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

Yes, tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

Recommendations: Micro-bat boxes should be installed on-site x 2. Boxes to be marine ply or equivalent and installed so that there is no nailing into the tree (see best practice – hanging of boxes and using coil-springs to keep in place). Boxes to be at least 4m above the ground.

6.1.4 Green and Golden Bell Frog (*Litoria aurea*)

Green and Golden Bell Frogs (GGBF) have a diverse distribution throughout the state of NSW between the far north coast and the Victorian border. Populations are more common around coastal or near coastal areas and greater numbers of the species can be located around Shoalhaven, mid-north coast and within the Sydney Metropolitan area. Optimum habitat includes unshaded wetlands surrounded by grassy areas and can in-habit, streams, marches and dams, particularly those containing *Typha* spp and *Eleocharis spp.* Breeding usually occurs in summer when conditions are warmer and more favorable. Eggs will be laid on water surface before sinking down amongst aquatic vegetation.

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

The proposed development includes the removal of a small wetland area, located in the depressed, rear end of the property. The GGBF is unlikely to inhabit this area due to the poor habitat quality and high composition of exotic wetland species. There was no presence of individual water bodies and habitat for the species to reproduce was not present.

It is unlikely that the removal of this area will have an impact on the extinction of GGBF.

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

Not an EEC

(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 an EEC

b) In relation to the habitat of a threatened species or ecological community:

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

The small area of wetland/ soak that was present is proposed to be removed during developments. It is unlikely that GGBF would be located within this area.

(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

The wetland/ soak habitat is already fragmented within the area and its small size is insignificant to support a population of GGBF. It is unlikely that the soak is contributing towards habitat connectivity for the GGBF.

(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,

Composition of the wetland/ soak area contained mainly exotic species and did not contain any native species which are known to be important for GGBF habitat.

This proposal, in isolation, will not be place GGBF at an increased risk of extinction.

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

No

d) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

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

Conclusion:

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

6.1.5 Glossy Black Cockatoo (*Calyptorhynchus lathami*)

(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 proposal will not impact on breeding habitat of the Glossy Black Cockatoo. The site displays foraging habitat for the species in the form of casuarina species within the site. Six trees are proposed for removal and one tree is proposed for partial removal. These trees are not considered critical habitat for the survival of the local population.

(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

Not an EEC

(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 an EEC

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

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

Six native trees are proposed for removal and one native tree is proposed for partial removal. These trees form foraging habitat for the Glossy Black Cockatoo. This parcel of foraging habitat is minimal and the trees being removed are young to mature trees and therefore unlikely to make a significant impact to the foraging behaviors of the species.

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

The development will not contribute to the fragmentation of species habitat. The species is highly mobile, and the impact area is relatively small.

(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 habitat on site to be removed does not form breeding habitat for the species due to the lack of hollows. While the trees proposed for removal do form foraging habitat for the species, it is unlikely the site contributes significantly to the long-term survival of the species.

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

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

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

Habitat removal is part of the KTP of habitat loss. Direct and indirect through loss of foraging habitat.

Conclusion:

The proposal in not likely to significantly effect populations Glossy Black Cockatoo and will not be likely to put the local population at risk of extinction.

7 Expertise of authors

With over 25 years wetland and urban ecology experience, a great passion for what she does and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Elaway has over 8 years local government experience as manager of environment and education for Pittwater Council. Elaway 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.

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

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

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). Her 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.

Elaway

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
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

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