
# Flora and Fauna (Biodiversity) Impact Assessment

39 Cabbage Tree Road, Bayview NSW 2104

(Lot 2/-/DP531960)

Report prepared by Narla Environmental Pty Ltd
for Turnbull Planning International Pty Ltd

October 2019

NARLA

environmental

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| **Report:** | Flora and Fauna (Biodiversity) Impact Assessment 39 Cabbage Tree Road, Bayview NSW 2104 (Lot 2/-/DP531960) |
| **Prepared for:** | Turnbull Planning International Pty Ltd |
| **Prepared by:** | Narla Environmental Pty Ltd |
| **Project no:** | tupl1 |
| **Date:** | October 2019 |
| **Version:** | 1.0 |



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# Report Certification

Works for this report were undertaken by:

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# Document Control

| Revision | Document Name | Issue Date | Internal Document Review | Approved for Issue |
|---|---|---|---|---|
| Draft v0.1 | Flora and Fauna Assessment | 3/10/2019 | Kurtis Lindsay | Kurtis Lindsay |
| Draft v0.2 | Flora and Fauna Assessment | 4/10/2019 | Alexander Graham | Kurtis Lindsay |
| 1.0 | Flora and Fauna Assessment | 11/10/2019 | Kurtis Lindsay | Kurtis Lindsay |

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# Glossary

| Acronym/ Term | Definition |
|---|---|
| BC Act | Biodiversity Conservation Act 2016 |
| BDAR | Biodiversity Development Assessment Report |
| CEEC | Critically Endangered Ecological Community |
| DA | Development Application |
| DCP | Development Control Plan |
| Development | The use of land, and the subdivision of land, and the carrying out of a work, and the demolition of a building or work, and the erection of a building, and any other act, matter or thing referred to in section 26 that is controlled by an environmental planning instrument but does not include any development of a class or description prescribed by the regulations for the purposes of this definition (Environmental Planning and Assessment Act 1979). |
| DPI | Department of Primary Industries |
| EEC | Endangered Ecological Community |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 |
| FFA | Flora and Fauna Assessment |
| ha | Hectares |
| km | Kilometre |
| KTP | Key Threatening Process (as listed in the BC Act) |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| Locality | The area within a 10km radius of the Subject Site. The same meaning when describing a local population of a species or local occurrence of an ecological community. |
| m | metres |
| mm | millimetres |
| NPWS | NSW National Parks and Wildlife Services |
| NSW | New South Wales |
| OEH | Office of Environment and Heritage |
| Proposal | The development, activity or action proposed. |
| ROTAP | Rare or Threatened Australian Plants |
| SIS | Species Impact Statement pursuant to s. 5A of the Environmental Planning and Assessment Act 1979 |
| Subject Site | Lot 2/-/DP531960 |
| TEC | Threatened Ecological Community |
| Threatened species, populations and ecological communities | Species, populations and ecological communities specified in Schedules 1, 1A and 2 and *threatened species, population or ecological community* means a species, population or ecological community specified in any of those Schedules. |

# Executive Summary

Narla Environmental Pty Ltd (Narla) was engaged by Turnbull Planning International Pty Ltd on behalf of the proponent to undertake a Flora and Fauna (Biodiversity) Impact Assessment including a Test of Significance (5-Part Test) in accordance with section 7.3 of the NSW *Biodiversity Conservation Act 2016* to assess the impacts of the Development Application (DA) for the proposed construction of a new recreation facility at 39 Cabbage Tree Road, Bayview, NSW, 2104 (Lot 2, DP 531960).

Narla determined that the vegetation assemblage within the Subject Site was representative of S_FoW02 – Coastal Flats Swamp Mahogany Forest (PCT 1795: Coastal Flats Swamp Mahogany Forest – Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions). This PCT constitutes an Endangered Ecological Community (EEC) under the NSW *Biodiversity Conservation Act 2016*. The proposed development will result in the removal of approximately 410 $m^2$ of this EEC. Most of this is comprised of weed-infested groundcover, however a small number of *Casuarina glauca* (Swamp Oak) trees will also be removed.

No threatened fauna were identified on the Subject Site during field survey, however, flowering and fruit-bearing trees that are proposed for removal within the proposed Subject Site have the potential to offer intermittent sheltering and foraging habitat for threatened fauna such as the *Pteropus poliocephalus* (Grey-Headed Flying Fox), *Calyptorhynchus lathami* (Glossy Black-cockatoo) and *Glossopsitta pusilla* (Little Lorikeets).

A small, first order stream dissects the south-west corner of the Subject Site. A Biodiversity (vegetation) Management Plan has been produced to assist in maintenance of the riparian vegetation of the Subject Site.

Due to the small scale of the proposed impact within the Subject Site and locality, it was determined that the development is not likely to significantly impact upon a local occurrence of a threatened ecological community. It was further concluded that the proposed development is not likely to impact upon a local occurrence of any threatened species.

Owing to the lack of any perceived significant effects upon threatened biodiversity, the proposed development can be achieved. It is advised, that no further impact assessments are necessary for the proposed development to proceed.

# 1. Introduction

## 1.1 Project Proposal

This Flora and Fauna Assessment has been prepared to assess any potential impacts to biodiversity from the Development Application (DA) for a new recreation facility at 39 Cabbage Tree Road, Bayview, NSW (Lot 2/DP531960) (hereafter the 'Subject Site'). The proposed activity is positioned within the centre of the Subject Site.

The proposed development will include:

- construction of a two-storey recreation building with an adjoining patio;
- construction of a hard stand car parking lot and associated ancillary structures; and
- soft and hard landscaping.

To facilitate the proposed development, approximately 410m$^2$ of native vegetation will be removed from within the proposed construction footprint. No additional direct impacts to native vegetation will occur as a result of the proposal.

Narla prioritised assessment of areas that may be directly or indirectly impacted by the proposed development and all associated work activities.

## 1.2 Site Description and Location

The Subject Site is situated within the suburb of Bayview, within the Northern Beaches Council Local Government Area (LGA). The Subject Site encompasses approximately 980m$^2$ of land zoned as '*RE2: Private Recreation*' and is situated within a narrow bushland strip on the peripheries of Bayview Golf Course **(Figure 1-1)**.

The Subject Site is a vacant block with no existing buildings or infrastructure. The Subject Site is accessed through Cabbage Tree Road.

### 1.2.1 Topography, Geology and Soils

The Subject Site has a southerly aspect on an elevation range between 4-5m above mean sea level (amsl) on the Australian Height Datum (AHD).

The Subject Site is situated on the 'Deep Creek Landscape' which is characterised by level to gently undulating alluvial floodplain draining the Hawkesbury sandstone. Local relief <5m, slopes <3%. Depositional floors of steeply dissected valleys of the Hornsby Plateau. Partially cleared tall open-woodland and weed infested tall open-forest and closed-forest.

The geology of the Deep Creek Soil Landscape is typically within Holocene silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places. Soils of this Landscape, are generally deep (>200 cm) Podzols on well drained terraces, Siliceous Sands on current floodplain and Humus Podzols in low lying areas (Herbert 1983, Chapman & Murphy 1989).

### 1.2.2 Hydrology

One first order watercourse intersects the south-western corner of the Subject Site as evidenced by 1:25,000 maps (NSW Government Spatial Services 2019). No other hydrological features including dams or swamps were identified. A Biodiversity (Vegetation) Management Plan (BMP( (Narla 2019) has been produced to help manage any impacts that take place on this water course.

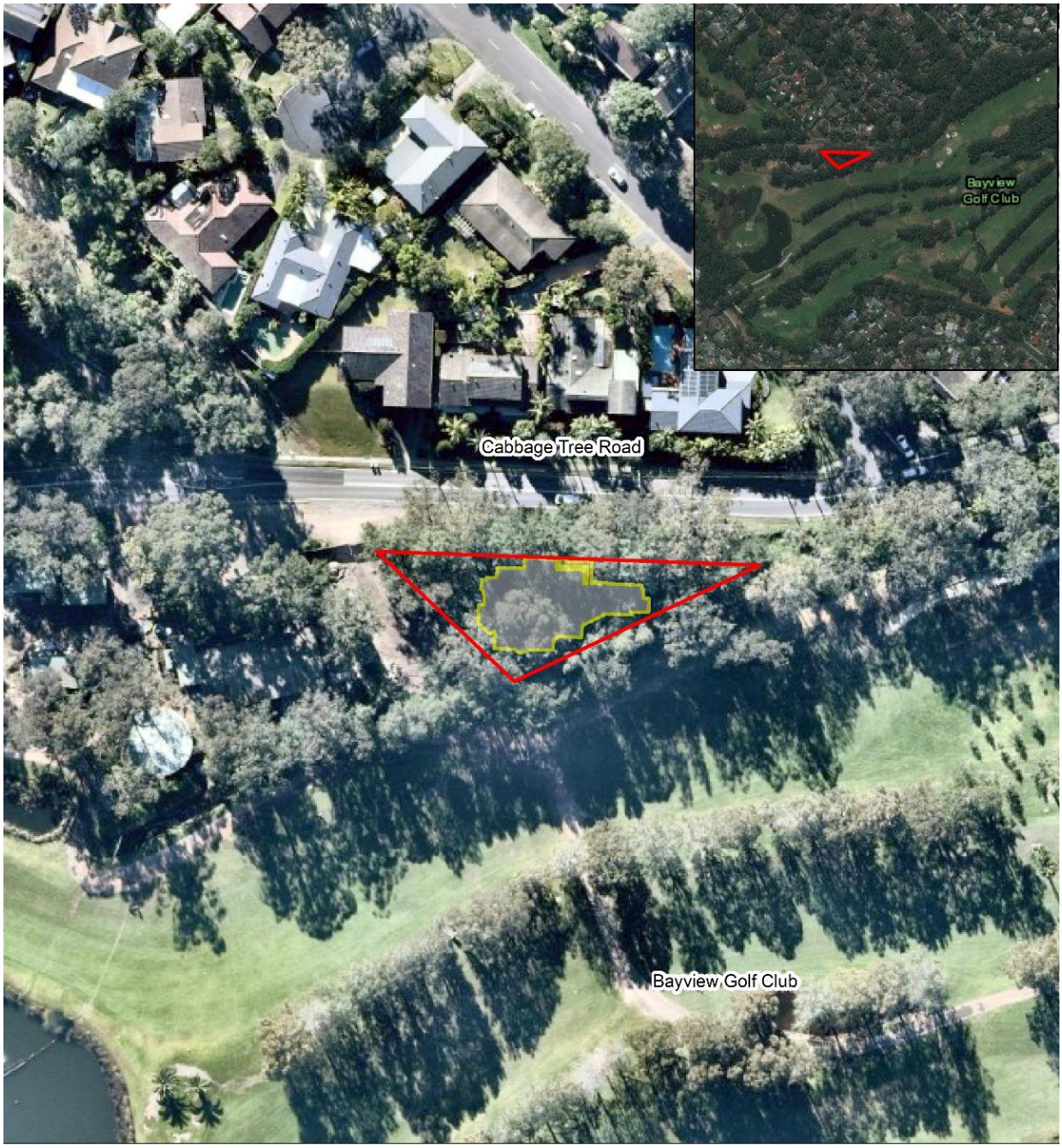


**Figure 1-1 Location of the Subject Site and development footprint within the broader context of the LGA**

## 1.3 Scope of assessment

The objective of this Flora and Fauna Assessment was to assess all possible ecological impacts of the proposed development within the Subject Site; pursuant to section 7.3 of the *Biodiversity Conservation Act 2016* and Part 4 of *the Environmental Planning and Assessment Act 1979* (EP&A Act) and the local planning provisions of Northern Beaches Council, including to:

- Undertake background research to determine the likelihood for NSW and/or Commonwealth threatened biota to utilise or occur within the Study Area during any point of their lifecycles;
- Establish the likelihood of occurrence of migratory species, threatened species, endangered populations and threatened ecological communities as listed under the New South Wales *Biodiversity Conservation Act 2017* (BC Act) and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Identify and map the distribution of vegetation communities within the Subject Site and discuss patch size and condition;
- Record presence and the extent of any priority weed infestations that require management by law;
- Determine ecological impacts or risks that may result due to the proposed works;
- Recommendation of any controls or additional actions to be taken to protect or improve environmental outcomes of the proposed works; and
- Recommend any controls or additional actions to be taken to see the proposed DA through while protecting or improving ecological / biodiversity values of the Subject Site

## 1.4 Sources of Information Used

A thorough literature review of local information relevant to biodiversity and related planning the locality and the Pittwater Ward of the Northern Beaches Council Local Government Area (LGA) was undertaken. Relevant literature that was reviewed in preparation of this report included:

- Relevant State and Commonwealth Databases
  - Protected Matters Search Tool (*Commonwealth of Australia 2019*);
  - NSW Bionet. The website of the Atlas of NSW Wildlife (OEH 2019); and
  - Atlas of Living Australia Spatial Portal (ALA 2019);
- Soil Landscape Mapping
  - Soil Landscapes of the Sydney 1:100,000 sheet (Chapman & Murphy 1989).
- Vegetation Mapping
  - Native Vegetation of the Sydney Metropolitan Area (OEH 2016a; 2016b);
  - Pittwater Native Vegetation Classification, pre-1750 Vegetation Mapping and Vegetation Profiles (Bangalay 2011a; 2011b); and
  - Pittwater Native Vegetation Classification, pre-1750 Vegetation Management Plan (Bangalay 2011c).
- Council Documents
  - Pittwater Local Environmental Plan (Pittwater Council 2014);
  - Pittwater Development Control Plan Pittwater Council 2014); and
  - Priority weeds for the Greater Sydney (Northern Beaches LGA) (DPI 2019).
- State and Federal Guidelines
  - *Threatened Species Survey and Assessment*: Guidelines for Developments and Activities. Working Draft. (DEC 2004); and
  - NSW Guideline to Surveying Threatened Plants (OEH 2016b).
- Project-specific Documents
  - Site Plan: Recreational Facility (Indoor). 39 Cabbage Tree Road, Bayview (Blue Sky Designs 2019);
  - Landscape Plan: Proposed Gym Indoor Recreation Facility 39 Cabbage Tree Road Bayview NSW 2104 (Pamela Fletcher 2019);

- Stormwater Management Concept – Proposed Recreation Centre at 39 Cabbage Tree Road, Bayview, NSW, 2104 (Waddington Consulting 2019); and
- Urban Forestry Australia – Arboricultural Impact Assessment for 39 Cabbage Tree Road, Bayview NSW 2104 (Urban Forestry Australia 2019).

Online databases and literature review were utilised to gain an understanding of the natural environment and ecology of the Subject Site and its surrounds to an area of approximately 10 km².

## 1.5 Relevant Legislation and Policy

The following list of legislation and policy are addressed in this report.

**Table 1-1 Relevant legislation and policy addressed**

| Legislation/ Policy | Relevant Ecological Feature on Site | Triggered | Action Required |
|---|---|---|---|
| **Environmental Planning and Assessment Act 1979 (EP&A Act)** | Threatened ecological communities and habitat for threatened species listed under the Biodiversity Conservation Act 2016. Associated State Environmental Planning Policies. | Yes | This Flora and Fauna Impact Assessment Report and all subsequent recommendations relevant to the DA (The planning process). |
| **Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)** | No EPBC Act listed communities, populations or species were identified within the Subject Site.<br><br>Suitable habitat for several EPBC Act (Commonwealth) threatened fauna species is present. | No | An assessment of significance of impact from the proposed works on Matters of National Environmental Significance (MNES) EPBC Act *Assessment of Significant Impact Criteria.* |
| **Biodiversity Conservation Act 2016 (BC Act)** | One (1) BC Act listed Endangered Ecological Community occurs within the property, *Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion*<br><br>Suitable habitat for several BC Act (NSW) threatened fauna species is present. | Yes | A Test of Significance (5-part test) in accordance with section 7.3 of the BC Act of upon all potentially impacted listed threatened species and endangered ecological communities (this report). |
| **Biosecurity Act 2015 (Bio Act)** | Two (2) *Priority* weeds were identified in the Subject Site:<br>▪ *Rubus fruticosus* species *aggregate* (Blackberry)<br>▪ *Asparagus aethiopicus* (Ground Asparagus) | Yes | Blackberry - Prohibited on dealings, must not be imported into the state or sold.<br>Ground Asparagus: Prohibition on dealings, must not be imported into the State or sold. |
| **State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44)** | SEPP 44 applies to land within the 'Pittwater' LGA with an area larger than 1 ha. The lands must also contain Koala feed tree species as listed under *Schedule 2*<br><br>The Subject Site has an area <1 hectare and therefore SEPP44 is not applicable. | No | None |
| **State Environmental Planning Policy No. 19 - Bushland in Urban Areas (SEPP 19)** | The Subject Site does not adjoin bushland or any public access reserves which are applicable under the SEPP 19. | No | None |

| Legislation/ Policy | Relevant Ecological Feature on Site | Triggered | Action Required |
|---|---|---|---|
| **State Environmental Planning Policy (Coastal Management) 2018** | The Subject site does not contain or adjoin any of the map units applicable (Coastal Wetlands, Littoral Rainforests and Coastal Protection) under this planning policy. | No | None |
| **Water Management Act 2000** | A small first order water course dissects the south-western corner of the Subject Site. The DA is therefore considered to be 'Waterfront Land'. | Yes | Biodiversity (Vegetation) Management Plan has been produced to manage the riparian vegetation of the Subject Site. |

## 1.6 Biodiversity Assessment Pathway

### 1.6.1 Vegetation Clearing Thresholds

The requirements of the BC Act 2016 and *Biodiversity Conservation Regulation 2017* are mandatory for all DA assessed under Part 4 of the EP&A Act. This legislation and associated regulation stipulate a clearing 'area threshold' values that determine whether a development is required to be assessed in accordance with the 'Biodiversity Offset Scheme' (BOS). Minimum entry thresholds for vegetation clearing depend on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

If native vegetation clearing exceeds the minimum threshold, the BOS applies to the proposed development including biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017

**Table 1-2 Biodiversity Offset Scheme Entry Threshold**

| Minimum lot size associated with the Site | 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 |

In this instance, the area of native vegetation to be removed for the proposed DA is approximately 0.04 ha, which falls under the required threshold (0.25ha), therefore:

- the BOS is not triggered;
- the BAM calculator does not apply;
- an Accredited Assessor is not required to prepare a BDAR; and
- no offset credit calculations are required.

### 1.6.2 Biodiversity Value Map

If the proposed development encompasses land mapped as 'biodiversity values' within the Biodiversity Values Map and Threshold Tool (OEH 2019d) then the BOS is triggered. The Subject Site does not contain lands mapped as biodiversity values within the Biodiversity Value Map (OEH 2019d) **(Figure 1-2).** Therefore, in this case, the BOS is not triggered.

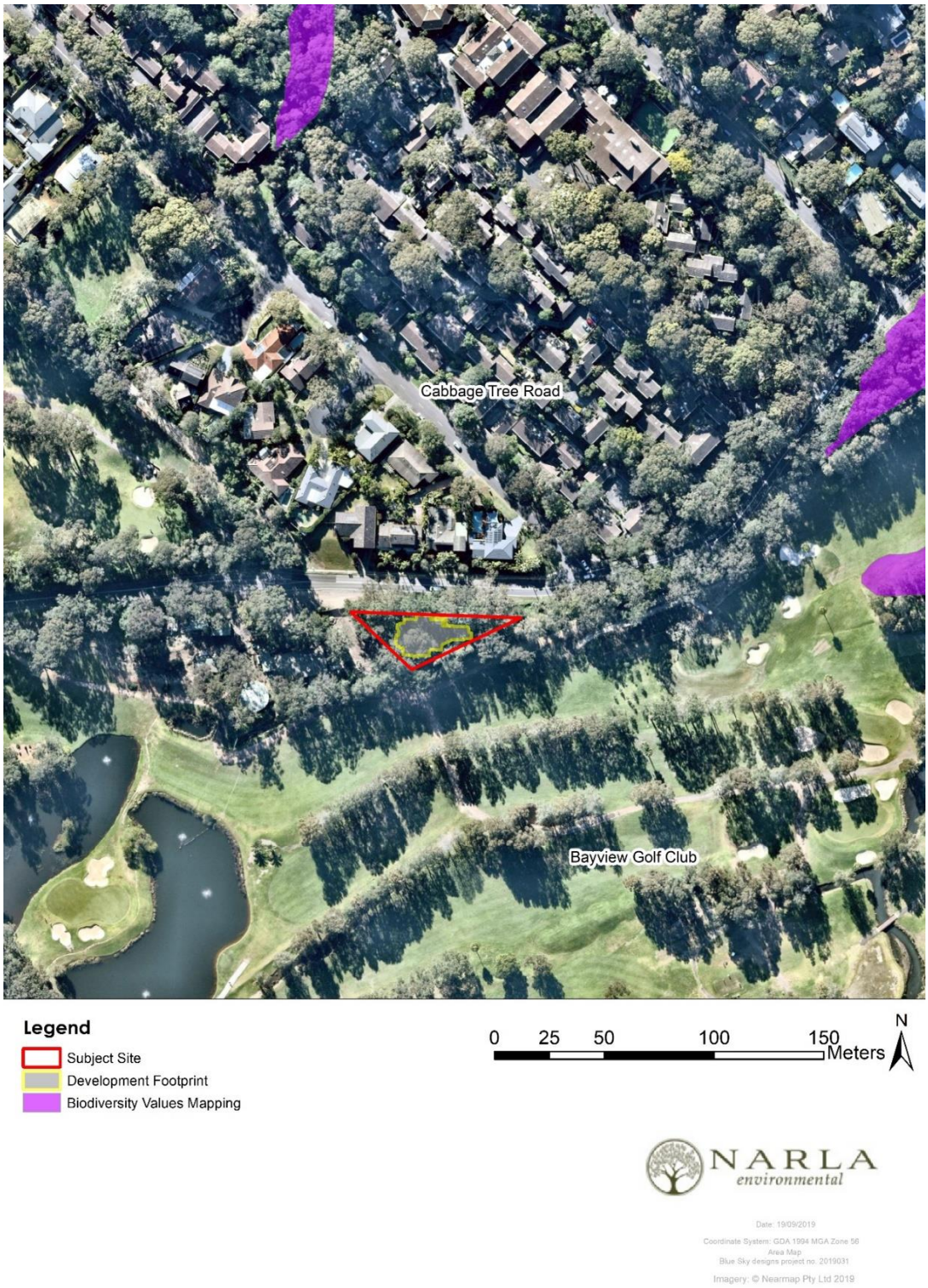


**Figure 1-2 Biodiversity values mapping for the Subject Site and surrounds [Accessed 24/09/2019] (DPIE 2019b)**

## 1.7 Pittwater Local Environmental Plan

The proposed development will be undertaken in a manner that meets the requirements of the Pittwater Local Environmental Plan 2014 (LEP).

### 1.7.1 Zoning

The Subject Site has been zoned *RE2 – Private Recreation* under the Pittwater Local Environmental Plan 2014. The proposed footprint of the entire development is situated within lands zoned *RE2 – Private Recreation.* The development will be undertaken in a manner to satisfy the zone objectives of the LEP which include the following:

- To enable land to be used for private open space or recreational purposes;
- To provide a range of recreational settings and activities and compatible land uses;
- To protect and enhance the natural environment for recreational purposes; and
- To allow development of a scale and character that is appropriate to the nature of its recreational use and is integrated with the landform and landscape.

The proposed DA will achieve usage for recreational purposes and will result in protected and enhanced natural environment through active biodiversity management and rehabilitation of native vegetation.

### 1.7.2 Terrestrial Biodiversity

Section 7.6 of the Pittwater Local Environmental Plan 2014 (PLEP 2014) applies to the proposal. The objectives of this clause are to maintain terrestrial, riparian and aquatic biodiversity by:

- Protecting native fauna and flora;
- Protecting the ecological processes necessary for their continued existence; and
- Encouraging the conservation and recovery of native fauna and flora and their habitats.

This Flora and Fauna Assessment satisfies the objectives listed above surveying and assessing the potential impacts upon threated species, populations or endangered ecological communities.

## 1.8 Pittwater Development Control Plan

### 1.8.1 Preservation and Management of Trees and Bushland Vegetation

B4.22, 'Preservation and Management of Trees and Bushland Vegetation' of the Pittwater Development Control Plan 2015 (PDCP 2015) applies to the proposal. The objectives of this part of the DCP are to:

- protect and enhance the urban forest of the Northern Beaches;
- effectively manage the risks that come with an established urban forest through professional management of trees;
- minimise soil erosion and to improve air quality, water quality, carbon sequestration, storm water retention, energy conservation and noise reduction;
- protect, enhance bushland that provides habitat for locally native plant and animal species, threatened species populations and endangered ecological communities;
- promote the retention and planting of trees which will help enable plant and animal communities to survive in the long-term; and
- protect and enhance the scenic value and character that trees and/or bushland vegetation provide.

When a DA requires for the clearing of vegetation the following requirements apply:

- Development is to be sited and designed to minimise the impact on remnant native vegetation, including canopy trees and understorey vegetation, and on remnant native ground cover species;

- Where the applicant demonstrates that no reasonable alternative design exists and a tree must be removed, suitable compensatory tree planting is required. Details including proposed species and the location of replacement planting are to be provided;

- Development must also avoid any impact on trees on public land; and

- For development applications involving the construction of new buildings and works containing Classes 2-9 (BCA), the information contained in Appendix 18 (P21DCP) is to be submitted.

The proponent has aimed to satisfy the objectives listed above by retaining as many indigenous native trees as possible by positioning the proposed development within previously disturbed lands where. All *Eucalyptus robusta* (Swamp Mahogany) and the majority of *Casuarina glauca* (Swamp Oak) trees that occur on the Subject Site will be retained. Additionally, all landscaping will incorporate 100% locally indigenous flora representative of the original vegetation assemblage, trees removed will be replaced with *Eucalyptus robusta* (Swamp Mahogany) wherever possible and all Noxious and Priority weeds will be removed from the site post construction through implementation of a Biodiversity Management Plan (BMP) (Narla 2019).

### 1.8.2 Landscaping

Appendix 9, 'Landscape and Vegetation Management' of the Pittwater Development Control Plan 2015 (PDCP 2009) applies to the proposal. The objectives of this part of the DCP are to:

- Provide a professional consultative environment for the preparation of applications, enabling better documentation, informed Council and private sector assessment, and an improved level of control and checks on implementation;
- Provide a framework for development that will promote ecologically sustainable outcomes, maintaining and wherever possible, enhancing visual and environmental qualities, biological diversity and ecological processes;
- Improve retention and protection measures for long-term viability of existing remnant bushland, landscape features and tree cover within a consolidating urban environment;
- Ensure that development occurs in a manner that responds appropriately to the context of its site and reinforces the local and regional landscape character;
- Ensure that development occurs in a manner which preserves and enhances any landscape items of cultural or heritage value;
- Improve the standard of landscape survey, site planning and landscape design with detailed consideration of the development's visual and environmental impact on the subject site and surrounding locality;
- Promote landscape planning and design which is site-responsive, reinforcing the value of natural attributes, particularly within sensitive areas containing items of local, regional or state significance;
- Establish site-sensitive work practices which minimise site disturbance, soil erosion, run-off, contamination, nutrient enrichment and vegetation clearing;
- Promote diversity in re-planting schemes, using locally occurring native plants, and ensure elimination of any exotic weed species, and
- Establish management structures and mechanisms for implementing this Plan, and for monitoring, reviewing and adjusting this Appendix.

The proponent has aimed to satisfy the objectives listed above by positioning the proposed development within previously disturbed lands where possible avoiding native vegetation. The proponent has opted to landscape the Subject Site with 100% locally indigenous flora, represent of the locally indigenous vegetation of area (Pamela Fletcher 2019).

### 1.8.3 Wildlife Corridors

In order to maximise retention and enhancement of wildlife corridors ensuring/providing the connection of flora and fauna habitats:

- Development shall not directly impact on / or significantly reduce / degrade habitat for locally native species, threatened species, endangered populations or endangered ecological communities;
- Development shall retain, and provide an adequate buffer to, wildlife corridors;
- Development shall provide wildlife corridors via creation, restoration, and / or regeneration of habitat;
- Development shall not result in a significant loss of canopy cover or a net loss in native canopy trees;
- Development shall ensure that at least 60% of any new planting incorporates native vegetation (as per species listed in Native Plants for Your Garden available on the Pittwater Council website). Landscaping is to be outside areas of existing bushland and not include environmental weeds;
- Planting is to maximise linkage within the wildlife corridor;
- Caretakers of domestic animals shall prevent them from entering areas of wildlife habitat; and
- Fencing, where permitted, shall be passable by native wildlife.

The proponent has aimed to satisfy the objectives listed above by retaining as many indigenous native trees as possible on the Subject Site, through active, design planning and redesign to positioning the proposed development primarily within lands that have been previously disturbed and weed infested.

All *Eucalyptus robusta* (Swamp Mahogany) trees will be retained.

Additional Swamp Mahogany trees will be planted (Pamela Fletcher 2019).

Additionally, the Subject Site will be managed under a Biodiversity Management Plan (Narla 2019) all landscaping will incorporate 100% locally indigenous flora representative of the original vegetation assemblage, trees removed will be replaced with *Eucalyptus robusta* (Swamp Mahogany) wherever possible and all Noxious and Priority weeds will be removed from the site post construction through implementation of a Biodiversity Management Plan (BMP) (Narla 2019).

Native tree canopies will grow close to the building and fauna will be able to move through the canopy of the remaining trees located on the Subject Site, allowing the integrity of the wildlife corridor to remain.

# 2. Methodology

## 2.1 Desktop Assessment and Literature Review

A thorough literature review of information relevant to the Northern Beaches Council City Council locality was undertaken. Searches utilising NSW Wildlife Atlas (Bionet) and the Commonwealth Protected Matters Search Tool were conducted to identify all current threatened flora and fauna and migratory records within a 10 km² search area centred on the Subject Site. This data was used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent the Subject Site, and helped inform our Ecologist on what to look for during the site assessment.

The following documents were also reviewed as part of the preparation of this report:

- Pittwater Local Environmental Plan (PLEP) 2014;
- Pittwater Development Control Plan (PDCP) 2015;
- Stormwater Management Concept – Proposed Recreation Centre at 39 Cabbage Tree Road, Bayview, NSW, 2104 (Waddington Consulting 2019);
- Landscape Plan: Proposed Gym Indoor Recreation Facility at 39 Cabbage Tree Road Bayview NSW 2104 (Pamela Fletcher 2019); and
- Urban Forestry Australia - Arboricultural Impact Assessment for 39 Cabbage Tree Road Bayview NSW 2104 (Urban Forestry Australia 2019).

Soil landscape and geological mapping was examined to gain an understating of the environment on the Subject Site and assist in determining whether any threatened flora or ecological communities may occur there (Herbert 1983, Chapman & Murphy 1989).

## 2.2 Ecological Site Assessment

The following sections of this report detail the site assessments undertaken by Narla Environmental including the survey methods and the weather conditions experienced in the lead-up and during each assessment.

### 2.2.1 General survey

A site assessment was performed by Ecologist Christopher Moore on 31st July 2018. A follow up site assessment was undertaken by Principal Ecologist Kurtis Lindsay on the 29th May 2019. The area proposed for development works was assessed of threatened ecological communities and threatened species/populations and their habitat.

During the site assessment, the following activities were undertaken:

- Identifying and recording the vegetation communities present on the Subject Site, with focus on identifying any Threatened Ecological Communities (TEC) and Endangered Ecological Communities (EEC);
- Recording a detailed list of flora species encountered on the Subject Site, with a focus on threatened species, species diagnostic of threatened ecological communities and priority weeds;
- Recording opportunistic sightings of any fauna species seen or heard on or within the immediate surrounds of the Subject Site;
- Assessment of the connectivity and quality of the vegetation and wildlife corridor values within the subject site and surrounding area;
- Identifying and recording the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats;

- Targeting the habitat of any threatened and regionally significant fauna including:
  - Tree hollows (habitat for threatened large forest owls, parrots, cockatoos and arboreal mammals);
  - Caves and crevices (habitat for threatened reptiles, small mammals and microbats);
  - Termite mounds (habitat for threatened reptiles and the echidna);
  - Soaks (habitat for threatened frogs and dragonflies);
  - Wetlands (habitat for threatened fish, frogs and water birds);
  - Drainage lines (habitat for threatened fish and frogs);
  - Fruiting trees (food for threatened frugivorous birds and mammals);
  - Flowering trees (food for threatened nectivorous mammals and birds);
  - Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals);
  - Logs, bark and artificial debris (habitat for threatened frogs, reptiles and snails); and
  - Any other habitat features that may support fauna (particularly threatened) species.
- Assessing the connectivity and quality of the vegetation within the Subject Site and surrounding area.

### 2.2.2 Weather conditions prior and during the general flora and fauna survey

A summary of the prevailing weather conditions during the Subject Site survey and the lead-up to the survey is presented **(**Error! Reference source not found.**).** This data was collected from the nearest w eather station 'Terry Hills'.

**Table 2-1 Weather conditions taken from the nearest weather station (Terry Hills) in the lead up to and during the field survey (BOM 2019) (Survey dates in bold).**

| Survey date | Minimum Temp. °C | Maximum Temp. °C | Rainfall (mm) |
|---|---|---|---|
| 24/07/2018 | 9.6 | 22.5 | 0 |
| 25/07/2018 | 10.9 | 20.8 | 0 |
| 26/07/2018 | 8.8 | 18.9 | 0 |
| 27/07/2018 | 6.4 | 18.8 | 0 |
| 28/07/2018 | 8.3 | 19.6 | 0 |
| 29/07/2018 | 11.3 | 23.4 | 0.2 |
| 30/07/2018 | 7.8 | 17.5 | 0 |
| **31/07/2018** | **12.6** | **19.7** | **0** |
| 23/05/2019 | 13.9 | 22.1 | 0 |
| 24/05/2019 | 11.1 | 23.2 | 0 |
| 25/05/2019 | 11.9 | 24.4 | 0 |
| 26/05/2019 | 14.2 | 21.2 | 0 |
| 27/05/2019 | 9.8 | 18.6 | 0 |
| 28/05/2019 | 6.0 | 17.5 | 0.4 |
| **29/05/2019** | **10.4** | **17.8** | **0** |

### 2.2.3 Vegetation Community Assessment

An initial desktop assessment using aerial imagery, geological mapping, soil landscape mapping and topographic mapping, in addition to existing vegetation mapping (NPWS 2002) was used to stratify the Subject Site into distinct stratigraphic units.

The following documents were consulted during assessment to assist in identification of the vegetation communities present within the Subject Site:

- Native Vegetation of the Sydney Metropolitan Area (OEH 2016a; 2016b); and
- Pittwater Native Vegetation Classification, pre-1750 Vegetation Mapping and Vegetation Profiles. Report prepared for Pittwater Council.

Vegetation on the Subject Site was based on desktop and field analysis of the geomorphology and geology of the Subject Site, in addition to a quantitative analysis of the positive 'diagnostic' flora species (DECCW 2009) identified in each discrete vegetation patch within the Subject Site.

During the site assessment surveys, the Ecologist visited each map unit to further validate and delineate the vegetation stratigraphic units across the Subject Site.

Narla allocated each vegetation stratigraphic unit to a 'vegetation community' from the New South Wales Vegetation Information System (OEH 2019a) based on the number of 'positive diagnostic species' recorded within each stratigraphic unit. The vegetation community description that shared the most positive 'diagnostic' species with each stratigraphic unit was assigned to that stratigraphic unit.

### 2.2.4 Targeted Threatened Flora Surveys

Targeted surveys were undertaken to identify locations of the threatened flora species known or predicted to occur within the locality (within 10km of the Subject Site). Narla Environmental undertook targeted survey for all threatened flora with potential to occur, with effort focused on all flora listed in **Table 2-2**.

Targeted surveys were undertaken in accordance with the 'NSW Guide to Surveying Threatened Plants' (OEH 2016b) with maximum effort directed toward the proposed development site followed by investigative searches of any identified microhabitats determined likely to contain one of the target species.

All of the potentially occurring threatened flora species are annual shrubs and trees. While these species may not have been flowering at the time of survey, the Ecologist thoroughly assessed the site for any plants with foliage that vaguely appeared like one of the targeted threatened species. All tentative threatened species found were photographed and specimens taken for identification utilising formal keys. Where necessary this involved the use of a microscope.

Any confirmed or plausible specimens identified were GPS tagged, for future reference. Where identification of plausible specimens could not be made with absolute confidence by Narla Ecologists, specimens were collected and sent to the National Herbarium for expert identification.

**Table 2-2 Optimal survey periods for the threatened flora species targeted (OEH 2019c)**

| Species | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Epacris purpurascens var. purpurascens* | | | | | | | | | | | | |
| *Chamaesyce psammogeton* | | | | | | | | | | | | |
| *Prostanthera densa* | | | | | | | | | | | | |
| *Lasiopetalum joyceae* | | | | | | | | | | | | |
| *Callistemon linearifolius* | | | | | | | | | | | | |
| *Cynanchum elegans* | | | | | | | | | | | | |
| *Eucalyptus camfieldii* | | | | | | | | | | | | |
| *Eucalyptus nicholii* | | | | | | | | | | | | |
| *Rhodamnia rubescens* | | | | | | | | | | | | |
| *Syzygium paniculatum* | | | | | | | | | | | | |
| *Kunzea rupestris* | | | | | | | | | | | | |
| *Grevillea caleyi* | | | | | | | | | | | | |
| *Persoonia hirsuta* | | | | | | | | | | | | |
| *Boronia umbellata* | | | | | | | | | | | | |
| **KEY** | | Timing of Survey Undertaken by Narla (2019) | | | Flowering Period | | | Sporadic flowering/ identifiable from other features | | | Unsuitable Survey Times | |

### 2.2.5 Opportunistic sightings and analysis of scats, tracks and traces

During all site visits throughout the project, opportunistic fauna observations including sightings, scats, tracks, characteristic scrapes on trees, burrows and bones were collected. These were identified within the site, and/or used as focus areas to position additional targeted survey techniques to determine species presence.

## 2.3 Study Limitations

The ecological dataset provided for the site was restricted to what was observed by Narla Environmental during the site assessments in July 2018 and May 2019.

The timing of the survey may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering herbs and orchids, seasonal migratory fauna or nocturnal fauna. No targeted survey was undertaken for threatened fauna as this was outside the scope of works.

# 3. Results and Discussion

If the appropriate recommendations in this report are followed, the development should progress with no significant ecological loss, effect or impact.

## 3.1 Vegetation Communities

### 3.1.1 Historically Mapped Vegetation Communities

The *Native Vegetation of the Sydney Metropolitan Area* (OEH 2016b) mapping of vegetation communities within the greater Subject Site and immediate locality have identified one vegetation communities which have potential to constitute all or part of the vegetation assemblage within the Subject Site (**Figure 3-1**).

These vegetation communities include:

- S_FoW02 – Coastal Flats Swamp Mahogany Forest.

### 3.1.2 Field Validated Plant Community Type within the Subject Site

Field survey confirmed the presence of Coastal Flats Mahogany Forest within the Subject Site.

Coastal Flats Mahogany Forest forms a part of the 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner Bioregions' which is listed as an Endangered Ecological Community (EEC) under the BC Act **(Table 3-1**Table 3-1**).**

The determinations of field validated vegetation communities within the Subject Site were based on the geomorphology and geology of the Subject Site, as well as the number of 'positive diagnostic' (OEH 2016b) species identified throughout each vegetation community within the Subject Site.

Details of vegetation communities occurring within the Subject Site, including a floristic and structural description are presented in **Table 3-1.**

The condition of this Swamp Sclerophyll Forest EEC on the subject site was poor, with high densities of weeds, including vines, scramblers, grasses and herbs.

**Table 3-1 Extent of Vegetation Communities within the Subject Site**

| Community | Total Extent within the Subject Site | Location |
|---|---|---|
| S_FoW02: Coastal Flats Swamp Mahogany Forest | 980m$^2$ | The entire site is comprised of this vegetation community |

On implementing the 5-part Test of Significance under the BC Act, it was deemed that the proposed development will not contribute a significant impact on the local occurrence of the community such that it will be placed at risk of extinction. Therefore, no further impact assessment such as a Biodiversity Development Assessment Report (BDAR) is considered necessary for the proposed development to proceed.


**Figure 3-1. Vegetation communities mapped within the subject site by Office of Environment and Heritage (OEH 2016)**

## 3.2 Threatened Flora

Desktop analysis revealed thirteen (13) species of threatened flora as occurring or having the potential to occur on or within 10 km radius of the Subject Site.

Extensive targeted surveys were undertaken throughout the Subject Site for potentially occurring threatened flora **(see 2.2.4).** Targeted survey identified no threatened flora within the Subject Site.

As the proposal involves limited clearing of native vegetation, and no threatened flora were detected during targeted searches, it is anticipated that there will be no impact to threatened flora.

**Table 3-2 Assessment of threatened flora habitat and likelihood of occurrence within the Subject Site**

| Species | BC Act | EPBC Act | No. records within 10km of Subject Site | Habitat requirements (OEH) | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|
| *Epacris purpurascens var. purpurascens* | Vulnerable | Not listed | 1 | Found in a range of habitat types, most of which have a strong shale soil influence | None. Species not observed during targeted surveys | No |
| *Chamaesyce psammogeto* (*Sand Spurge*) | Endangered | Not listed | 1 | Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (Spinifex sericeus) and Prickly Couch (Zoysia macrantha). | None. Species not observed during targeted surveys | No |
| *Prostanthera densa* (Villous Mint-bush ) | Vulnerable | Vulnerable | 1 | 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 | None. Species not observed during targeted surveys | No |
| *Lasiopetalum joyceae* | Vulnerable | Vulnerable | 1 | Grows in heath on sandstone. | None. Species not observed during targeted surveys | No |
| *Callistemon linearifolius* (Netted Bottle Brush) | Vulnerable | Not listed | 7 | Grows in dry sclerophyll forest on the coast and adjacent ranges | None. Species not observed during targeted surveys | No |
| *Eucalyptus camfieldii* (Camfield's Stringybark) | Vulnerable | Vulnerable | 8 | Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. | None. Species not observed during targeted surveys | No |
| *Eucalyptus nicholi* (Narrow-leaved Black Peppermint) | Vulnerable | Vulnerable | 4 | Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. | None. Species not observed during targeted surveys | No |
| *Kunzea rupestris* | Vulnerable | Vulnerable | 15 | Grows in shallow depressions on large flat sandstone rock outcrops | None. Species not observed during targeted surveys | No |
| *Rhodamnia rubescens (Scrub Turpentine)* | Endangered | Endangered | 16 | Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. | None. Species not observed during targeted surveys | No |

| Species | BC Act | EPBC Act | No. records within 10km of Subject Site | Habitat requirements (OEH) | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|
| *Syzygium paniculatum (Magenta Lilly Pilly)* | Endangered | Endangered | 1 | On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. | None. Species not observed during targeted surveys | No |
| *Grevillea caleyi (Caley's Grevillea)* | Endangered | Critically Endangered | 180 | Occurs 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. | None. Species not observed during targeted surveys | No |
| *Persoonia hirsute (Hairy Geebung)* | Endangered | Endangered | 4 | The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone | None. Species not observed during targeted surveys | No |
| *Boronia umbellata (Orara Boronia)* | Vulnerable | Vulnerable | 16 | This Boronia grows as an understorey shrub in and around gullies in wet open forest | None. Species not observed during targeted surveys | No |

## 3.3 Threatened Fauna

Desktop analysis and site habitat assessment revealed a suite of threatened fauna species as having potential to utilise habitat on the Subject Site during part of their lifecycles. The total list of threatened species, and their likelihood of occurrence on the Subject Site and potential for any impact from the development is presented in **Table 3-3.**

### 3.3.1 Threatened Fauna Habitat

One hollow-bearing tree was identified as providing suitable habitat for a range of threatened fauna. No other suitable habitat such as deep cracks or decorticating bark were recorded within the Subject Site. Potential foraging habitat, including fruit and flower-bearing trees may provide valuable foraging habitat for local and nomadic fauna, including:

- *Pteropus poliocephalus* (Grey-headed Flying Fox);
- *Lathamus discolor* (Swift Parrot); and
- *Glossopsitta pusilla* (Little Lorikeet).

Small-medium sized mammals and birds within the Subject Site may attract large predatory birds including:

- *Haliaeetus leucogaster* (White-bellied Sea-Eagle);
- *Lophoictinia isura* (Square-tailed Kite);
- *Hieraaetus morphnoides* (Little Eagle);
- *Ninox connivens* (Barking Owl); and
- *Ninox strenua* (Powerful Owl).

The total list of threatened species deemed as having potential to occur in the Subject Site is presented in Error! Reference source not found..

### 3.3.2 Migratory Fauna Species

A list of five (7) EPBC Act listed migratory fauna species were considered likely to occasionally use habitat within the Subject Site for foraging or passage, these were:

- *Myiagra cyanoleuca* (Satin Flycatcher);
- *Monarcha melanopsis* (Black-faced Monarch);
- *Hirundapus caudacutus* (White-throated Needletail);
- *Rhipidura rufifrons* (Rufous Fantail);
- *Cuculus optatus* (Oriental Cuckoo);
- *Monarcha trivirgatus* (Spectacled Monarch); and
- *Apus pacificus* (Fork-tailed Swift).

It was determined that the proposed works will not have a significant impact on these species. Therefore, an EPBC Act Referral to Commonwealth is not required.

**Table 3-3 Assessment of threatened fauna habitat and likelihood of occurrence within the Subject Site**

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Litoria aurea* (Green and Golden Bell Frog) | Endangered | Vulnerable | No suitable foraging habitat identified within Subject Site.<br><br>Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.) (OEH 2013-2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Habits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.) | 2 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Heleioporus australiacus* (Giant Burrowing Frog) | Vulnerable | Vulnerable | No suitable foraging habitat identified within Subject Site.<br><br>Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. The Giant Burrowing Frog has a generalist diet and studies to date indicate that they eat mainly invertebrates including ants, beetles, cockroaches, spiders, centipedes and scorpions (OEH 2013-2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water (OEH 2013-2019). | 14 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Pseudophryne australis* (Red-crowned Toadlet) | Vulnerable | Not Listed | No suitable foraging habitat identified within Subject Site.<br><br>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 (OEH 2013-2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters (OEH 2013-2019). | 19 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Varanus rosenbergi* (Rosenberg's Goanna) | Vulnerable | Not Listed | Sub-optimal foraging habitat identified within Subject Site.<br><br>Feeds on carrion, birds, eggs, reptiles and small mammals (OEH 2013-2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component (OEH 2013-2019). | 24 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Ptilinopus regina* (Rose-crowned Fruit Dove) | Vulnerable | Not Listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Prefer sub-tropical and dry rainforest. Occasionally occurs in moist eucalypt forest and swamp forest, where fruit is plentiful (OEH 2013-2019). | Sub-optimal breeding habitat present. Unlikely to be utilised by this species.<br><br>Unlikely to be utilised by this species. Nests in dense tree canopy, usually within, or close-to a fruiting tree. (OEH 2013-2019). | 1 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Ptilinopus superbus* (Superb Fruit-Dove) | Vulnerable | Not Listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Unlikely to be utilised by this species Forages on soft-fruited trees. Prefers native rainforest trees but may forage on exotic species such as Privet and Camphor acacia woodland where there are fruit-bearing trees (OEH 2013-2019). | Sub-optimal breeding habitat present. Unlikely to be utilised by this species.<br><br>Nests in dense tree canopy, usually within, or close-to a fruiting tree. | 4 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Botaurus poiciloptilus* (Australian Bittern) | Endangered | Endangered | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Inhabits permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails (OEH 2012 – 2019). | Sub-optimal breeding habitat present.<br><br>Nests are built in secluded places in densely-vegetated reedlands on a platform of reeds (OEH 2012 – 2019); | 3 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Ixobrychus flavicollis* (Black Bittern) | Vulnerable | Not listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br>Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation (OEH 2012 – 2019) | Sub-optimal breeding habitat present. Unlikely to be utilised by this species.<br><br>Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks (OEH 2012 – 2019). | 16 | None.<br>No important foraging or breeding habitat to be impacted by the proposal. | No |
| *Haliaeetus leucogaster* (White-bellied Sea Eagle) | Vulnerable | Not listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Hunts across a wide range of habitats, typically on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion (OEH 2012 – 2019). | Sub-optimal breeding habitat present. Unlikely to be utilised by this species. Requires mature tall 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 (OEH 2012 – 2019). | 43 | None.<br><br>No important foraging or breeding habitat to be impacted by the proposal. | No |
| *Pandion haliaetus* (Osprey) | Vulnerable | Not listed | No suitable foraging habitat identified within Subject Site.<br><br>Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water | No suitable breeding habitat identified within the Subject Site.<br><br>Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. | 21 | None.<br><br>No important foraging or breeding habitat to be impacted by the proposal. | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Lophoictinia isura* (Square-tailed Kite) | Vulnerable | Not listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Dry woodlands and open forests along watercourse. Feeds on passerines (OEH 2012 – 2019). | Sub-optimal breeding habitat present. Unlikely to be utilised by this species.<br><br>Nest sites generally located along or near watercourses, in a fork or on large horizontal limbs (OEH 2012 – 2019). | 2 | No important foraging or breeding habitat to be impacted by the proposal. | No |
| *Hieraaetus morphnoides* (Little Eagle) | Vulnerable | Not listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion. (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used (OEH 2012 – 2019). | 7 | No important foraging or breeding habitat to be impacted by the proposal. | No |
| *Calyptorhynchus lathami* (Glossy Black Cockatoo) | Vulnerable | Not listed | Suitable foraging habitat identified within Subject Site. Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species) (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Dependent on large hollow-bearing eucalypts for nest sites (OEH 2012 – 2019). | 54 | Yes. Low quality foraging habitat and no suitable breeding habitat. | No |
| *Callocephalon fimbriatum* (Gang-gang Cockatoo) | Vulnerable | Not listed | No suitable foraging habitat identified within Subject Site<br><br>In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests.<br>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 (OEH 2013-2019). | No suitable breeding habitat identified within the Subject Site<br><br>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 (OEH 2012 – 2019). | 1 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Glossopsitta pusilla* (Little Lorikeet) | Vulnerable | Not listed | Present.<br><br>Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity (OEH 2012 – 2019). | Present.<br><br>Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m) (OEH 2012 – 2019). | 10 | None. Nopotential foraging habitat and no suitable breeding habitat. | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Lathamus discolour* (Swift Parrot) | Endangered | Critically Endangered | Present.<br><br>In the mainland they occur in areas where eucalypts are flowering profusely or where there is abundant lerp (from sap-sucking bugs) infestations (OEH 2012 – 2019). | None<br><br>No suitable breeding habitat identified within Subject Site.<br>Breeds only in Tasmania (OEH 2012 – 2019). | 16 | None.<br>No foraging habitat to be impacted by the proposal.<br>This species breeds in Tasmanian therefore the removal of the hollow bearing tree will be negligible. | No |
| *Anthochaera phrygia* (Regent Honeyeater) | Critically Endangered | Critically Endangered | Present.<br><br>Ideal habitat is woodland with a large number of mature trees (especially box ironbark) with dense foliage forming a forest canopy. Also found in forest edges, wooded farmland, urban patches of eucalyptus and coastal heathland and scrub with flowering banksias (OEH 2012 – 2019). | None.<br><br>There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria (OEH 2013-2019). | 13 | None.<br>No foraging or breeding habitat to be impacted by the proposal. | No |
| *Tyto connivens* (Barking Owl) | Vulnerable | Not listed | Present<br><br>Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. | No suitable breeding habitat identified within the Subject Site.<br><br>Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.<br><br>Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas). | 27 | None.<br>No foraging or breeding habitat to be impacted by the proposal.<br>The hollow bearing tree to be removed offers a small hollow it is determined that this hollow will not provide suitable breeding habitat for the Barking Owl. | No |
| *Ninox strenua* (Powerful Owl) | Vulnerable | Not listed | Sub-optimal foraging habitat present. Unlikely to be utilised by this species.<br><br>May forage anywhere there are prey items, which include birds, possums and similar-sized mammals (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting ((OEH 2012 – 2019). | 278 | None.<br><br>No Foraging or breeding habitat to be impacted by the proposal.<br>The hollow bearing tree to be removed offers a small hollow it is | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| | | | | | | determined that this hollow will not provide suitable breeding habitat for the Powerful Owl. | |
| *Dasyornis brachypterus* (Eastern Bristlebird) | Endangered | Endangered | No suitable foraging habitat identified within Subject Site.<br><br>Inhabits low vegetation including heath and open woodland with a heathy understorey where it feeds on a variety of insects, particularly ants (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Nests are elliptical domes constructed on or near the ground amongst dense vegetation (OEH 2012 – 2019). | - | None. No foraging or breeding habitat to be impacted by the proposal. | No |
| *Daphoensitta chrysoptera (*Varied Sitella) | Vulnerable | Not listed | No suitable foraging habitat identified within Subject Site.<br><br>Feeds on arthropods in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site.<br><br>Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (OEH 2012 – 2019). | 3 | None. No foraging or breeding habitat to be impacted by the proposal. | No |
| *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) | Vulnerable | Not listed | No suitable foraging habitat identified within Subject Site.<br><br>Inhabits open eucalypt forests and woodlands where it hovers above the canopy or over water feeding on insects (OEH 2012 – 2019). | Sub-optimal breeding habitat present. Unlikely to be utilised by this species.<br><br>Builds a cup-shaped nest, generally occurs in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. | 1 | None. No foraging or breeding habitat to be impacted by the proposal. | No |
| *Burhinus grallarius* (Bush Stone-curlew) | Endangered | Not Listed | Feed on insects and small vertebrates, such as frogs, lizards and snakes Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber (OEH 2012 – 2019). | Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Nest on the ground in a scrape or small bare patch (OEH 2012 – 2019). | 49 | None. No foraging or breeding habitat to be impacted by the proposal.<br>The Swamp sclerophyll forest is characterised by abundant groundcover vegetation. This does not provide suitable foraging or breeding habitat. | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Broad-headed Snake Hoplocephalus bungaroides* (Broad-headed Snake) | Endangered | Vulnerable | No suitable foraging habitat identified within Subject Site.<br><br>Feeds mostly on geckos and small skinks; will also eat frogs and small mammals occasionally. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevieces or hollows in large trees within 500m of escarpments in summer (OEH 2012 – 2019). | No suitable breeding habitat identified within the Subject Site<br><br>Females produce four to 12 live young from January to March. (Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevieces or hollows in large trees within 500m of escarpments in summer) (OEH 2012 – 2019). | - | None. No foraging or breeding habitat to be impacted by the proposal. | No |
| *Phascolarctos cinereus* (Koala) | Vulnerable | Vulnerable | Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 2012 – 2019). | Inhabit eucalypt woodlands and forests. Females breed at two years of age and produce one young per year. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size (OEH 2012 – 2019). | 61 | Yes. However, there have been no proximal records of Koala in the last 10 years. The last recent record was from Avalon in 2006. | No |
| *Dasyurus maculatu* (Spotted-tailed Quoll) | Vulnerable | Endangered | A generalist predator with a preference for medium-sized (500g-5kg) mammals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects. Also eats carrion and takes domestic fowl. 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 (OEH 2012-2019) | Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. Are known to traverse their home ranges along densely vegetated creek lines (OEH 2012-2019). | 12 | None. No foraging or breeding habitat to be impacted by the proposal. | No |
| *Isoodon obsesulus* (Southern BrownBandicoot) | Vulnerable | Endangered | They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil (OEH 2012-2019). | Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees Xanthorrhoea spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest. Mating occurs any time of the year, usually following heavy rain. Two or three litters of 2-4 young may be produced annually. The gestation period of 11-12 days is the shortest known of any marsupial while young remarkably become independent around 60 days after being born (OEH 2012-2019). | - | None. No foraging or breeding habitat to be impacted by the proposal | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Petaurus norfolcensis* (Squirrel Glider) | Vulnerable | Not Listed | Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Requires abundant tree hollows for refuge and nest sites (OEH 2012-2019). | Prefers mixed species stands with a shrub or Acacia midstorey. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (OEH 2012-2019). | - | None. No foraging or breeding habitat to be impacted by the proposal | No |
| *Cercartetus nanus* (Eastern Pygmy-possum) | Vulnerable | Not Listed | Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests (OEH 2012-2019). | Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks (OEH 2012-2019). | 164 | None. No foraging or breeding habitat to be impacted by the proposal | No |
| *Chalinolobus dwyeri* (Large-eared Pied Bat) | Vulnerable | Vulnerable | Found in well-timbered areas containing gullies 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 (OEH 2012-2019). | Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years (OEH 2012-2019). | 11 | None. No foraging or breeding habitat to be impacted by the proposal | No |
| *Miniopterus schreibersii oceanensis* (Eastern Bent-wing Bat) | Vulnerable | Vulnerable | Hunt in forested areas, catching moths and other flying insects above the tree tops (OEH 2012-2019). | Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young (OEH 2012-2019). | 59 | None. No foraging or breeding habitat to be impacted by the proposal | No |
| *Miniopterus australis* (Little Bent-wing Bat) | Vulnerable | Not Listed | Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. At night forage for small insects beneath the canopy of densely vegetated habitats (OEH 2012-2019). | Only five nursery sites /maternity colonies are known in Australia. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (Miniopterus schreibersii) and appears to depend on the large colony to provide the high temperatures needed to rear its young | 34 | None. No potential breeding habitat. | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| | | | | Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats (OEH 2012-2019). | | | |
| *Scoteanax rueppellii* (Greater Broad-nosed Bat) | Vulnerable | Not Listed | Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species (OEH 2012-2019) | Little is known of its reproductive cycle, however single young are born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young. Although this species usually roosts in tree hollows, it has also been found in buildings (OEH 2012-2019) | 8 | None. No potential breeding habitat. | No |
| *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) | Vulnerable | Not Listed | Prefers moist habitats, with trees taller than 20 m. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy (OEH 2012-2019). | Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. (OEH 2012-2019). | 3 | None. No potential breeding habitat. | No |
| *Mormopterus norfolkensis* (Eastern Freetail-bat) | Vulnerable | Not Listed | Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Usually solitary but also recorded roosting communally, probably insectivorous (OEH 2012-2019). | Roost mainly in tree hollows but will also roost under bark or in man-made structures (OEH 2012-2019). | 10 | None. No potential breeding habitat. | No |
| *Saccolaimus flaviventris* (Yellow-bellied Sheathai) | Vulnerable | Not Listed | Forages for insects in Dry and wet eucalypt forest and woodland, rainforest, but show a preference for moist gully forests and most other habitats across its very wide range, with and without trees (OEH 2012-2019). | Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows (OEH 2012-2019). | 1 | None. No potential breeding habitat. | No |
| *Myotis macropus* (Southern Myotis) | Vulnerable | Not Listed | Forage over streams and pools catching insects and small fish by raking their feet across the water surface (OEH 2012-2019). | Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage (OEH 2012-2019). | 28 | None. No foraging or breeding habitat to be impacted by the proposal | No |

| Species | BC Act | EPBC Act | Foraging Habitat Present on Subject Site | Breeding Habitat Present on Subject Site | Number of historical records within 10km of the Subject Site | Anticipated Impact | 5-Part Test required? |
|---|---|---|---|---|---|---|---|
| *Pteropus poliocephalus* (Grey-headed Flying-Fox) | | | Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines (OEH 2012-2019). | Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young (OEH 2012-2019). | 145 | None. No foraging or breeding habitat to be impacted by the proposal. | No |

## 3.4 Priority and Environmental Weeds

Two (2) *Priority* weed species as listed under the *Biosecurity Act 2015*, within the Pittwater Local Government Area (LGA) was identified within the Subject Site:

- *Rubus fruticosus agg* (Blackberry); and
- *Asparagus aethiopicus* (Ground Asparagus).

## 3.5 Other State and Federal Conservation Matters

### 3.5.1 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value (AOBV), as declared under the BC Act, occurred within the Subject Site at the time of survey.

### 3.5.2 Other Matters of National Environmental Significance

No other EPBC Act MNES were identified as having potential to occur on the Subject Site.

# 4. Impact Summary

The following section of the report details the ecological impacts associated with the proposed DA.

## 4.1 Vegetation Loss

### 4.1.1 Vegetation clearing summary

The development footprint of 410m$^2$ of Swamp Sclerophyll Forest is comprised of eighty-one (81) trees, twenty-eight (28) of which are being removed from within the Subject Site to facilitate the proposed development application (Urban Forestry Australia 2018). These trees include:

- Sixteen (16) small *Casuarina glauca* (Swamp Oak) – this species forms part of Swamp Sclerophyll Forest EEC;
- Nine (9) *Casuarina cunninghamiana* (River She-Oak) – this species is not locally indigenous, all of these individuals were historically planted, most likely as as a 'screen'/'windbreak'; and
- Three (3) stags (dead trees).

Fifteen (15) of the sixteen (16) Swamp She-Oaks are suckering trees and only one individual has been identified as healthy/ mature/ high retention value (Urban Forestry Australia 2019).

## 4.2 Fauna Habitat to be Removed or Modified

The removal of sixteen (16) *Casuarina glauca* (Swamp Oak) are to be removed due to the proposed development. The majority of these 16 trees are 'suckering' individuals which have grown from a larger, mature individual located in the centre of the Subject Site. None of these trees contain hollows.

No hollow bearing trees will be removed and the stags have been identified as not suitable for classification as important fauna habitat trees.

Of the nine (9) River She-Oaks to be removed it is noted that most are suppressed and declining.

# 5. . Recommendations

## 5.1 Impact Mitigation and Minimisation Measures

This section of the report details recommended efforts to avoid and minimise impact on biodiversity values associated with the proposed development. Measures to be implemented before, during and post construction to avoid and minimise the impacts of the project are detailed in **Table 5-1.**

**Table 5-1. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project**

| Action | Outcome/Measure | Risk and Consequence of Residual Impacts | Timing | Responsibility |
|---|---|---|---|---|
| **Project Location** | The location of the proposed development has been positioned within historically degraded land in order to avoid and minimise the potential resulting impacts on biodiversity values within the Subject Site. | Risk = Moderate<br><br>Consequence =<br><br>Harm to native vegetation and native fauna | Pre-construction phase | ▪ Proponent<br>▪ Architect |
| **Assigning a Project Ecologist** | Prior to construction, the proponent will commission the services of a qualified and experienced Ecologist Consultant.<br><br>The Ecologist will be commissioned to:<br>▪ Assist the proponent in identifying and assigning an appropriate skilled Bushland Restoration Professional to implement vegetation restoration;<br>▪ Advise the Bushland Restoration Professionals during vegetation clearing for the implementation of the APZ.<br>▪ Help the proponent undertake any threatened species habitat augmentation or translocation;<br>▪ Undertake any required targeted searches for threatened flora prior to vegetation clearing; and<br>▪ Undertake an extensive pre-clearing survey; delineating habitat-bearing trees, active fauna nests and shrubs to be retained, removed or relocated. | Risk = low<br><br>Consequence =<br><br>No continuity, professional advice, guidance or monitoring of management actions. | Prior to vegetation clearance works | ▪ Proponent |

| Action | Outcome/Measure | Risk and Consequence of Residual Impacts | Timing | Responsibility |
|---|---|---|---|---|
| **Clearing of vegetation/ fauna habitat** | The following conditions must be adhered to:<br>▪ Before any vegetation is damaged or removed, a qualified Ecologist with flora identification experience should be assigned to undertake a pre-clearing survey to delineate areas permitted to be cleared, from areas that must be retained. Bunting or strong flagging tape should be used.<br>▪ Prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience should determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the Subject Site due to be cleared.<br>▪ An Ecologist should be on site during vegetation clearing to rescue and relocate any displaced fauna.<br>The removal of trees is strictly limited to (Urban Forestry Australia 2019):<br>▪ T11, T 13 and T29 Stags<br>▪ T17 One (1) *Casuarina glauca* (Swamp She Oak)<br>▪ T18 One (1) mature *Casuarina glauca* (Swamp She-Oak)<br>▪ G15-G23 Nine (9) *Casuarina* cunninghamiana (River She-Oak) | Risk = moderate<br><br>Consequence =<br><br>Harm to native vegetation and native fauna. | Construction phase | ▪ Earthworks / Arborist<br>▪ Project Ecologist<br>▪ Proponent |
| **Erosion and Sedimentation** | Appropriate erosion and sediment control must be erected and maintained at all times during construction. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004). | Risk = low<br><br>Consequence =<br><br>Degradation of vegetation | Construction phase | ▪ Construction Contractor |

| Action | Outcome/Measure | Risk and Consequence of Residual Impacts | Timing | Responsibility |
|---|---|---|---|---|
| **Storage and Stockpiling of Soil and Materials** | Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained.<br><br>Storage and stockpile areas should be restricted to the proposed development footprint or areas identified as containing *Exotics and Herbaceous Weeds* and/or Pasture or *Turf Grasses.*<br><br>Never stockpile under the canopy/drip zone of a tree as this can damage and even kill the tree.<br><br>Never import non-certified soil or stone from outside the site as this can introduce weeds and pathogens to the site. | Risk = low<br><br>Consequence =<br><br>Harm to native vegetation and native fauna | Construction phase | ▪ Construction Contractors |
| **Stormwater** | The proposed activity is unlikely to result in significant changes to storm-water runoff so it is expected there will be no exacerbated impact on native species of flora and fauna. Stormwater and/or rainwater flow from the proposed dwelling and hard surfaces will be directed to a rainwater reuse tank. All stormwater and /or rainwater is to be piped through separate drainage lines for roof water across even surfaces to prevent pooling (Waddington Consulting 2019). | Risk = moderate<br><br>Consequence =<br><br>Harm to native vegetation and native fauna habitat. | Post-construction phase | ▪ Proponent<br>▪ Construction Architect |
| **Sewerage** | All sewerage produced on site will be contained in an appropriate sewerage system. Containing sewerage produced on site to a certified sewerage system will eliminate any adverse effects to the local ecology. This will be mitigated by the implementation of a pollution control pit (Waddington Consulting 2019). | Risk = low<br><br>Consequence =<br><br>Harm to native vegetation and native fauna habitat. | Post-construction phase | ▪ Proponent |

| Action | Outcome/Measure | Risk and Consequence of Residual Impacts | Timing | Responsibility |
|---|---|---|---|---|
| **Biodiversity Management Plan** | To assist in avoiding, minimising and improving the biodiversity values of the Subject Site, a Biodiversity Management Plan has been prepared (Narla 2019). This document details vegetation rehabilitation works assigned for improving disturbed and weed infested areas within the Subject Site:<br>▪ the control of Priority weeds throughout the Subject Site and broader Subject Site and<br>▪ the continued suppression and management of environmental weeds in areas of remnant native vegetation specifically on the interface between historically cleared/disturbed lands and remnant bushland. | | | ▪ |
| **Vegetation Rehabilitation Works** | Weed management works should be conducted by qualified Bush Regenerators under the guidance of the Biodiversity Management Plan (Narla Environmental 2019) and the Landscape Management Plan (Pamela Fletcher 2019).<br><br>Weed control works should prioritise:<br>▪ Enhancing the habitat for locally occurring native fauna and flora;<br>▪ Protect the ecological processes within the Subject Site necessary for the continued existence of locally occurring native fauna and flora;<br>Encourage the conservation and recovery of native fauna and flora and their habitats<br><br>The proposed landscaping of the Subject Site will constitute 100% locally indigenous species covering all strata levels and representative of 'Coastal Flats Swamp Mahogany Forest' or otherwise as approved by the Project Ecologist. | Risk = Moderate<br><br>Consequence=<br><br>Loss of vegetation with no offset and restorative actions. | Post-construction phase | ▪ Proponent |

# 6. Conclusion

The proposed DA is subject to assessment under Part 4 of the EP&A Act and section 7.3 of the BC Act.

This assessment has examined and taken into account to the fullest extent possible all matters affecting or likely to affect biodiversity by reason of the proposed activity.

The proposed DA is located within an area of disturbed and weed infested bushland wedged between a road and a golf course. The site contains one endangered ecological community, Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community; however, it is in poor condition as a result of historical disturbance and weed infestation.

The proposed development is not likely to incur any significant impacts upon any threatened species, populations or communities listed under NSW or Commonwealth legislation.

The primary impact mitigation recommendation is the active revegetation and infill planting is undertaken using 100% locally indigenous Coastal Flats Swamp Mahogany Forest (*Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*) flora over all parts of the subject site where landscaping is proposed (outside of pathways and entrance points).

The landscape plan for the proposed development has allowed for the planting of eight (8) *Eucalyptus robusta* (Swamp Mahogany). Replacement of trees lost to trees gained will not be 1:1 as to promote optimal canopy cover and account for proximity to buildings. This however, will be supplemented with a range of shrub and groundcover species locally indigenous to the area.

Safeguards and management measures as detailed in this Flora and Fauna Assessment would ameliorate or minimise these expected impacts.

Due to the small scale of the proposed impact within the Subject Site and locality, it was determined that the development is not likely to significantly impact upon a local occurrence of a threatened ecological community. It was further concluded that the proposed development is not likely to impact upon a local occurrence of any threatened species.

Owing to the lack of any perceived significant effects upon threatened biodiversity, the proposed development can be achieved. It is advised, that no further impact assessments are necessary for the proposed development to proceed.

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# 8. Appendices

**Appendix A. Flora species inventory from Site Assessment**

**Appendix B. Fauna species inventory from Site Assessment**

**Appendix C. Biodiversity Conservation Act Test of Significance (5-Part-Test)**

**Appendix D. Proposed Design (Blue Sky Building Designs 2019)**

**Appendix E. Proposed Design (Blue Sky Drafting 2019)**

**Appendix F. Landscape Site Plans (Pamela Fletcher 2019)**

**Appendix A. Flora species inventory**

| Scientific Name | Status | Growth From |
|---|---|---|
| *Acetosa sagittata** | | Vine |
| *Ageratina adenophora** | | Shrub |
| *Araujia sericifera** | | Vine |
| *Asparagus aethiopicus** | **Priority Weed**<br>**WoNS** | Herbaceous Weed |
| *Bidens pilosa** | | |
| *Callistemon spp.* | | Tree |
| *Casuarina glauca* | | Tree |
| *Casuarina cunninghamiana* | | Tree |
| *Cayratia clematidea* | | Vine |
| *Ceratopetalum apetalum* | | Tree |
| *Cinnamomum camphora** | | Tree |
| *Commelina cyanea* | | Herb |
| *Cupaniopsis anacardioides* | | Tree |
| *Cyathea cooperi* | | Tree |
| *Dichondra repens* | | Herbaceous Weed |
| *Ehrharta erecta** | | Grass & grasslike |
| *Eucalyptus robusta* | | Tree |
| *Ficus coronata* | | Tree |
| *Fumaria spp.** | | Herb |
| *Geranium homeanum* | | Herb |
| *Glycine clandestina* | | Vine |
| *Homalanthus populifolius* | | Vine |
| *Hydrocotyle bonariensis* | | Herb |
| *Ipomoea indica*.* | | Vine |
| *Livistona australis* | | Tree |
| *Microlaena stipoides* | | Grass & grasslike |
| *Modiola caroliniana** | | Herb |

| Scientific Name | Status | Growth From |
|---|---|---|
| *Notelaea ovata* | | Shrub |
| *Nothoscordum gracile** | | Herb |
| *Oplismenus aemulus* | | Grass & grasslike |
| *Parietaria judaica ** | | Herb |
| *Potentilla indica ** | | Herb |
| *Rubus fruticosus agg** | **Priority Weed**<br>**WoNS** | Grass & grasslike |
| *Senna pendula** | | Shrub |
| *Setaria palmifolia** | | Grass & grasslike |
| *Sonchus oleraceus ** | | Herb |
| *Stenotaphrum secundatum** | | Grass & grasslike |
| *Stephania japonica* | | Vine |
| *Tradescantia fluminensis** | | Herbaceous Weed |
| *Viola hederacea* | | Herb |

** Denotes exotic species*

**Appendix B. Fauna Species Inventory**

| Species | Common Name | Status |
|---|---|---|
| *Cacatua galerita* | Sulphur-crested Cockatoo | Protected |
| *Cracticus torquatus* | Grey Butcherbird | Protected |
| *Dacelo novaeguineae* | Laughing Kookaburra | Protected |
| *Manorina melanocephala* | Noisy Miner | Protected |
| *Porphyrio porphyrio* | Purple Swamphen | Protected |
| *Trichoglossus haematodus* | Rainbow Lorikeet | Protected |

## Appendix C. NSW Biodiversity Conservation Act 2016 Test of Significance (5-part Test)

| **NSW Biodiversity Conservation Act 2016<br>Test of Significance (5-part Test)<br>for<br>Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion** | | |
|---|---|---|
| **BC Act Status: [3] Endangered Ecological Community** | | |
| **Background to Test of Significance** | This Biodiversity Conservation Act 2016 Test of Significance (5-Part Test) is for the combined impacts of the proposed activity Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion:<br>▪ Sixteen (16) *Casuarina glauca* (Swamp She-Oak). | |
| **Community Description** | *The most widespread and abundant dominant trees include Eucalyptus robusta (swamp mahogany), Melaleuca quinquenervia (paperbark) and, south from Sydney, Eucalyptus botryoides (bangalay) and Eucalyptus longifolia (woollybutt). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including Callistemon salignus (sweet willow bottlebrush), Casuarina glauca (swamp oak) and Eucalyptus resinifera subsp. hemilampra (red mahogany), Livistona australis (cabbage palm) and Lophostemon suaveolens (swamp turpentine).*<br><br>A layer of small trees may be present, including *Acacia irrorata (green wattle), Acmena smithii (lilly pilly), Elaeocarpus reticulatus (blueberry ash), Glochidion ferdinandi (cheese tree), Melaleuca linariifolia and M. styphelioides (paperbarks).*<br><br>Shrubs include *Acacia longifolia, Dodonaea triquetra, Ficus coronata, Leptospermum polygalifolium subsp. polygalifolium and Melaleuca spp. Occasional vines include Parsonsia straminea, Morinda jasminoides and Stephania japonica var. discolor.*<br><br>The groundcover is composed of abundant sedges, ferns, forbs, and grasses including *Gahnia clarkei, Pteridium esculentum, Hypolepis muelleri, Calochlaena dubia, Dianella caerulea, Viola hederacea, Lomandra longifolia, Entolasia marginata and Imperata cylindrica.* | |
| **(a) in the case of a threatened species, whether the proposed activity or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction** | Not Applicable – Swamp Sclerophyll Forest on Coastal Floodplains (SSF EEC) is not a species. | |
| **Or (b) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:** | **(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** | (i) No, the proposed DA is not 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.<br><br>No adverse effect on the local occurrence of SFF EEC will occur due to the localised footprint of the proposed development and active avoidance of important and mature trees.<br><br>The proposed development will involve the thinning of *Casuarina glauca* and will not involve any removal of *Eucalyptus robusta* or any other species representative of this community. |

| NSW Biodiversity Conservation Act 2016<br>Test of Significance (5-part Test)<br>for<br>Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion | | |
|---|---|---|
| **BC Act Status: [3] Endangered Ecological Community** | | |
| | | Floristic species richness and composition across the Subject Site will be enhanced through implementation of the Landscape Plan and Biodiversity Management Plan. |
| | **(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,** | (ii) The proposed DA is not likely to substantially modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.<br><br>The composition of the SFF EEC on this site will be enhanced with the planting of eight (8) *Eucalyptus robusta* plants and a good coverage of locally indigenous groundcover and shrub species. The removal of *Casuarina glauca* on the site will only result in a thinning of the species from this site and will have no adverse impacts on local occurrence. |
| **(c) in relation to the habitat of a threatened species, population or ecological community:** | **(i) the extent to which habitat is likely to be removed or modified as a result of the proposed activity or activity, and** | (i) The proposed development activity will involve the loss of approximately 0.041 ha of severely weed infested SSF within the Subject Site that includes thinning of *Casuarina glauca*. The majority of these individuals are classified are semi-mature and suckering trees. |
| | **(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed activity or activity, and** | (ii) Fragmentation of SSF EEC will unlikely be exacerbated by the proposed development. The corridor of SFF EEC bordering the Bayview Golf Club will not be impacted and the proposed development has been designed as to utilise the heavily weed infested areas with low ecological value. The landscape plan will seek to add value back into this small area of SFF EEC by planting eight (8) *Eucalyptus robusta* and a range of locally indigenous groundcover and shrub species. |
| | **(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,** | (iii) The proposed development will seek to boost the quality and value of the SFF EEC on the site by adding eight (8) high value *Eucalyptus robusta* species and planting a good cover of locally indigenous shrub and groundcover species. There will be no significant impact on the local fragmentation of this community as the major corridor running along the boundary between the site and Bayview Golf Club will be retained. The proposed development will only require a thinning of the *Casuarina glauca* species on the site and will have no significant impact on the long-term survival of the SFF EEC. |
| **(d) whether the proposed activity or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),** | | The development proposed is not likely to have an adverse effect on any declared area of outstanding biodiversity value, directly or indirectly. |

| NSW Biodiversity Conservation Act 2016<br>Test of Significance (5-part Test)<br>for<br>Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion | |
|---|---|
| **BC Act Status: [3] Endangered Ecological Community** | |
| **(e) whether the proposed activity or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.** | The proposed activity is associated with two key threatening processes:<br>▪ loss of native vegetation; and<br>▪ removal of dead wood and dead trees.<br>The proposed development is unlikely to increase the impact of these key threatening processes on the SFF EEC as the landscape plan states that 100% locally indigenous plants will be used in the planting process and the integrity of the SFF EEC will be retained (Pamela Fletcher 2019). |

**Conclusion**

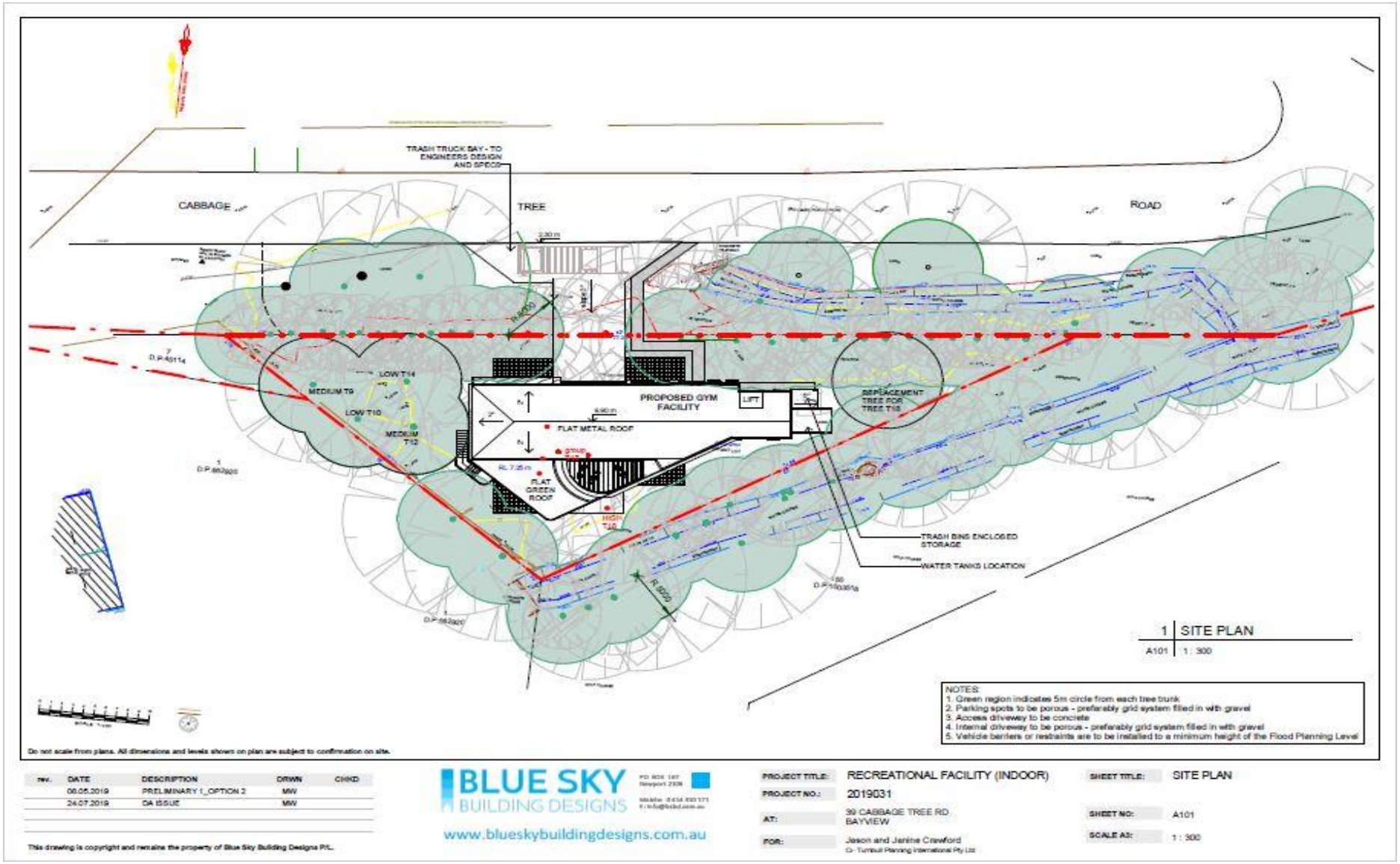
Swamp Sclerophyll Forest on Coastal Floodplains in the Sydney Basin Bioregion therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).

**References**

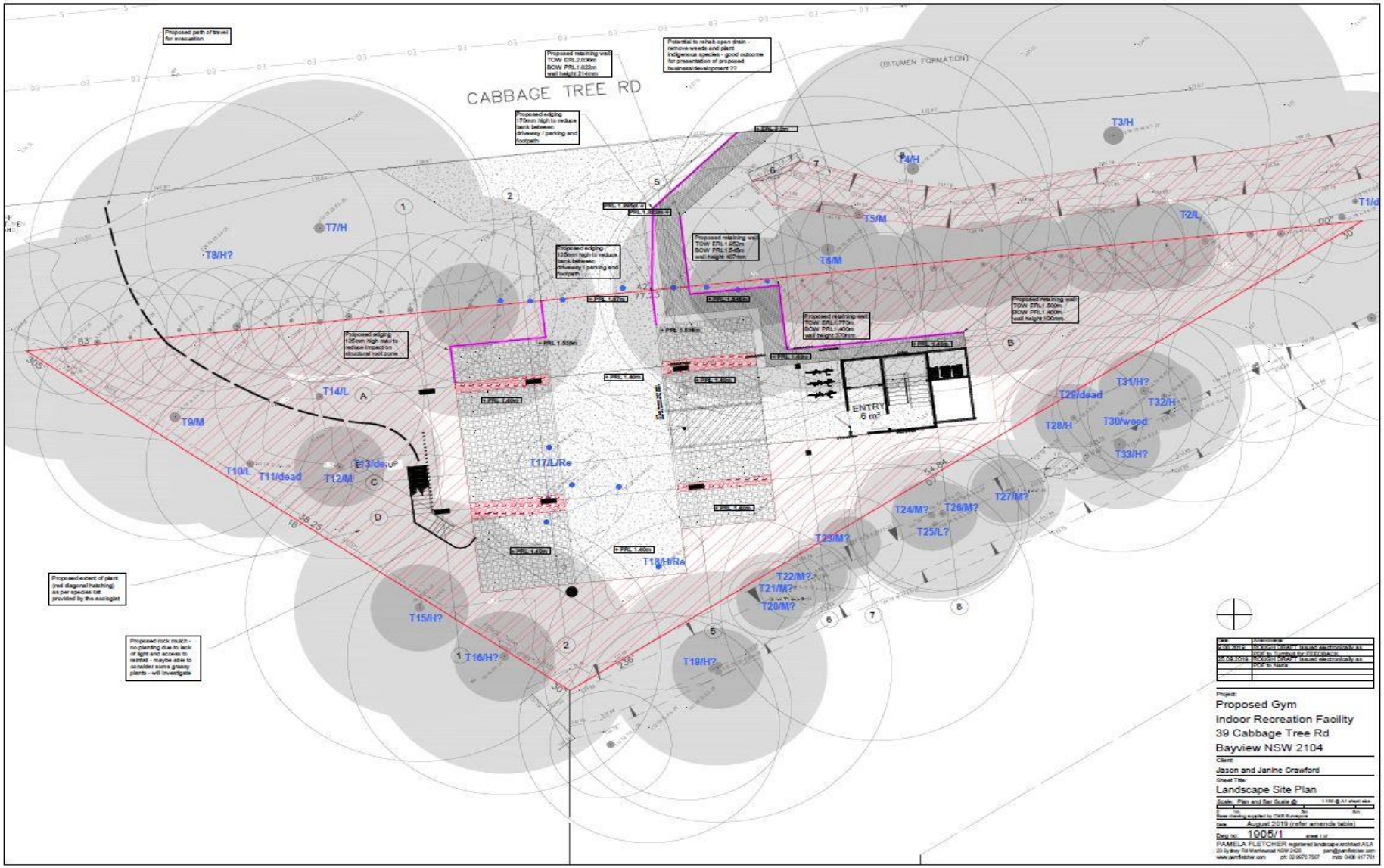
NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening Processes https://www.legislation.nsw.gov.au/acts/2016-63.pdf

**Appendix D. Recommended Planting list for all Future Landscaping Efforts**

| Species Name | Common Name | Growth Form |
|---|---|---|
| *Alternanthera denticulata* | Lesser Joyweed | Herb |
| *Calochlaena dubia* | Rainbow Fern | Fern |
| *Commelina cyanea* | Native Wandering Jew | Herb |
| *Cyathea australis* | Rough Tree-Fern | Fern |
| *Dianella caerulea* | Blue Flax lily | Herb |
| *Entolasia marginata* | Bordered Panic | Grass |
| *Eucalyptus robusta* | Swamp Mahognay | Tree |
| *Eupomatia laurina* | Bolwarra | Shrub |
| *Gahnia clarkei* | Tall Saw-sedge | Sedge |
| *Geitonoplesium cymosum* | Scrambling Lily | Vine |
| *Gleichenia dicarpa* | Pouched Coral Fern | Fern |
| *Glochidion ferdinanadi* | Cheese Tree | Tree |
| *Homalanthus populifolius* | Bleeding Heart | Shrub |
| *Hypolepis mulleri* | Harsh Ground Fern | Fern |
| *Juncus usitatus* | - | Sedge |
| *Kennedia rubicunda* | Dusky Coral Pea | Herb |
| *Livistona australis* | Cabbage Palm | Tree |
| *Lomandra longifolia* | Spiny-headed Mat-rush | Herb |
| *Oplismenus imbecillis* | - | Grass |
| *Parsonsia straminea* | Common Silkpod | Vine |
| *Persicaria decipiens* | Slender Knotweed | Herb |
| *Phragmites australis* | Common Reed | Grass |
| *Pittosporum undulatum* | Sweet Pittosporum | Shrub |
| *Pteridium esculentum* | Bracken Fern | Fern |
| *Stephania japonica var. discolor* | Snake Vine | Vine |
| *Viola hederacea* | Ivy-leaved Violet | Herb |




**Appendix E. Proposed Design (Blue Sky Drafting 2019)**




**Appendix F. Landscape Site Plans (Pamela Fletcher 2019)**

NARLA

*environmental*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