

A photograph of a squirrel climbing a tree trunk, positioned vertically on the left side of the cover. The squirrel is facing upwards, with its front paws reaching up and its hind legs pushing off the bark. The bark is rough and textured. The background is a solid blue gradient.

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# Biodiversity Development Assessment Report

Proposed cemetery buildings  
Frenchs Forest Cemetery  
Frenchs Forest

SEPTEMBER 2020  
(REF: 18LIG07BDAR)





# Biodiversity Development Assessment Report

## Proposed cemetery buildings Frenchs Forest Cemetery Frenchs Forest NSW

|                 |  |
|-----------------|--|
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| Date:           | 30/09/2020   |
| File:           | 18LIG07BDAR  |

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### Disclaimer:

*This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be interpreted without reference to the entire report.*

*The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.*



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# List of abbreviations

|                     |  |
|---------------------|--|
| APZ                 | asset protection zone  |
| BAM                 | Biodiversity Assessment Method   |
| BAR                 | Biodiversity Assessment Report   |
| <i>BC Act</i>       | <i>Biodiversity Conservation Act (2016)</i>  |
| <i>BC Reg</i>       | <i>Biodiversity Conservation Regulation (2017)</i>   |
| BCAR                | Biodiversity Certification Assessment Report   |
| BDAR                | Biodiversity Development Assessment Report   |
| BOS                 | Biodiversity Offset Scheme   |
| BPA                 | bushfire protection assessment   |
| BSSAR               | Biodiversity Stewardship Site Assessment Report  |
| CEEC                | Critically endangered ecological community   |
| <i>CM Act</i>       | <i>Coastal Management Act 2016</i>   |
| DCP                 | development control plan   |
| DEC                 | NSW Department of Environment and Conservation (superseded by DECC from April 2007)                        |
| DECC                | NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)                   |
| DECCW               | NSW Department of Environment, Climate Change and Water (superseded by OEHL from April 2011)               |
| DEWHA               | Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)                  |
| DOEE                | Commonwealth Department of Environment & Energy  |
| DPIE                | NSW Department of Planning, Industry and Environment   |
| EEC                 | endangered ecological community  |
| EPA                 | Environment Protection Authority   |
| <i>EP&amp;A Act</i> | <i>Environmental Planning and Assessment Act (1979)</i>  |
| <i>EPBC Act</i>     | <i>Environment Protection and Biodiversity Conservation Act (1999)</i>                                     |
| <i>FM Act</i>       | <i>Fisheries Management Act</i>  |
| IBRA                | Interim Biogeographic Regionalisation for Australia  |
| LEP                 | local environmental plan   |
| LGA                 | local government area  |
| <i>LLS Act</i>      | <i>Local Land Services Act (2013)</i>  |
| NES                 | national environmental significance  |
| <i>NPW Act</i>      | <i>National Parks and Wildlife Act (1974)</i>  |
| NRAR                | Natural Resources Access Regulator (NSW)   |
| NSW DPI             | NSW Department of Industry and Investment  |
| OEHL                | Office of Environment and Heritage (superseded by DPIE August 2019)  |
| PCT                 | plant community type   |
| PFC                 | projected foliage cover  |
| RFS                 | NSW Rural Fire Service   |
| ROTAP               | rare or threatened Australian plants   |
| SAII                | Serious And Irreversible Impacts   |
| SEPP                | State Environmental Planning Policy  |
| SEWPAC              | Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)    |
| SIS                 | species impact statement   |
| SULE                | safe useful life expectancy  |
| TEC                 | threatened ecological community  |
| TPZ                 | tree preservation zone   |
| <i>TSC Act</i>      | <i>Threatened Species Conservation Act (1995) – Superseded by the Biodiversity Conservation Act (2016)</i> |
| VMP                 | vegetation management plan   |





# Biodiversity Development Assessment

## 1.0 Background

*Travers bushfire & ecology* has been engaged to undertake a biodiversity development assessment report (BDAR) for a proposed development located off Hakea Avenue within the Frenchs Forest Cemetery, Frenchs Forest, within the local government area (LGA) of Northern Beaches. The proposed development is located within the southern portion of Lot 7335 DP 1152473.

In late 2019, *Travers bushfire & ecology* undertook a preliminary ecological constraints study of the entire cemetery that will assist in determining the requirements for target threatened species surveys, defining vegetation types and watercourse considerations.

The proposal is described in section 1.1 and the primary focus of studies for this BDAR is shown in Figure 1.

The proposal shall be assessed under the *Biodiversity Conservation Act (BC Act)*, 2016.

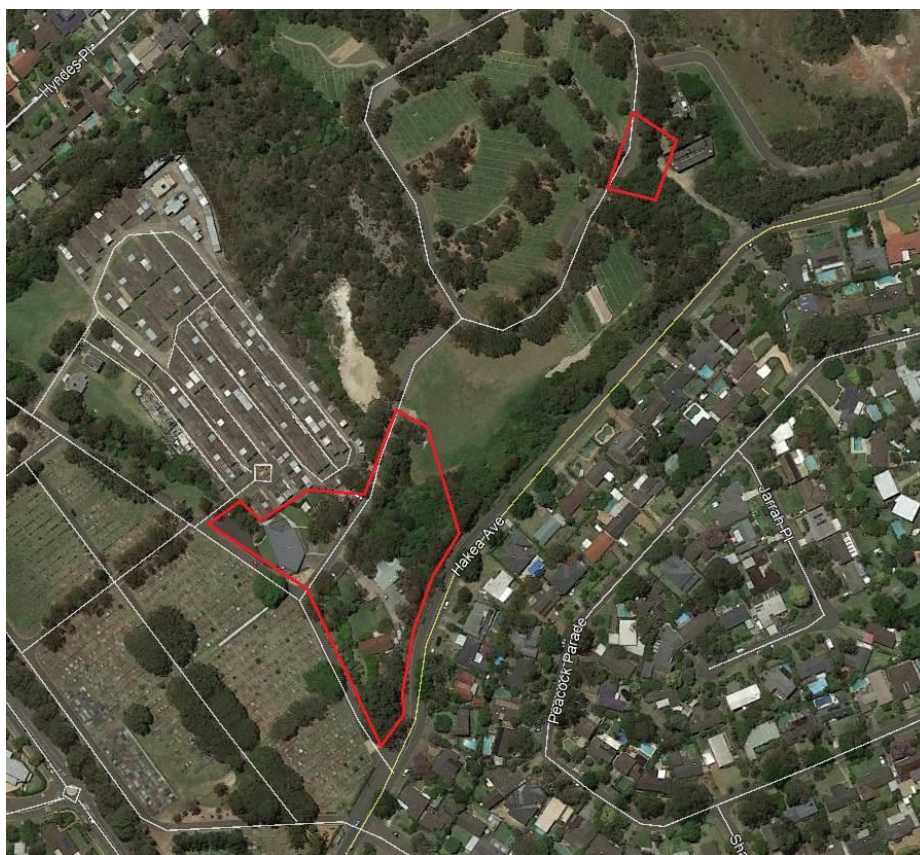


Figure 1 – Primary focus areas

## **1.1 Proposed development**

The proposal includes the following works:

- The expansion of the existing administration building (known as the Lorikeet Room) to provide a larger function room;
- Construction of a new chapel;
- Vehicle access to the new chapel via a new 5m wide vehicle driveway on the Darwinia Drive southern frontage;
- Car parking provision for 213 spaces;
- New operations building for administration, staff amenities, and storage;
- New landscaping and ash garden; and
- New toilet amenities building at the north-eastern section of the site.

The proposed development is shown on Figure 2.







Note, the proposed toilet block in the far north-east has been shifted approximately 20m north from its location on Figure 2 to avoid impacts on Duffys Forest threatened ecological community (TEC) vegetation.

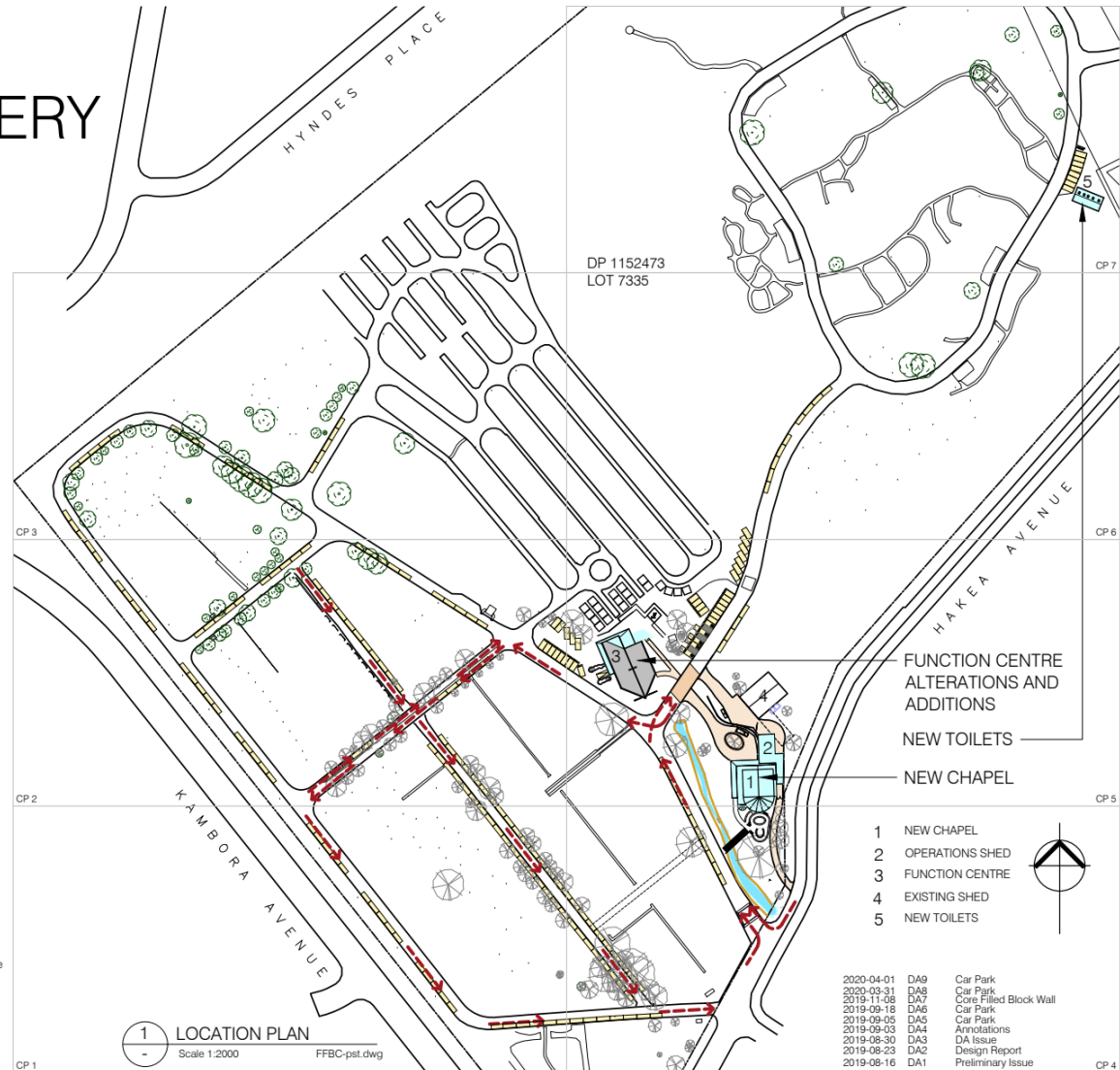
# FRENCHS FOREST BUSHLAND CEMETERY

1 HAKEA AVE, FRENCHS FOREST 2086

## DRAWING REGISTER - DEVELOPMENT APPLICATION

| JOB  | DWG. NO. | DRAWING TITLE                                   | SCALE  |
|------|----------|---|--------|
| FFBC | 00       | DRAWING REGISTER & LOCATION PLAN                | 1:2000 |
| FFBC | 01       | SITE PLAN - EVENT AREA                          | 1:500  |
| FFBC | 03       | CHAPEL - GROUND FLOOR PLAN                      | 1:200  |
| FFBC | 04       | CHAPEL - CLERESTORY PLAN                        | 1:200  |
| FFBC | 05       | CHAPEL - ROOF PLAN                              | 1:200  |
| FFBC | 06       | CHAPEL - NORTH AND SOUTH ELEVATIONS             | 1:200  |
| FFBC | 08       | CHAPEL - EAST AND WEST ELEVATIONS               | 1:200  |
| FFBC | 10       | CHAPEL - SECTION A                              | 1:100  |
| FFBC | 11       | SITE SECTION THROUGH CHAPEL LOOKING NORTH       | 1:600  |
| FFBC | 12       | CHAPEL - SECTION C                              | 1:100  |
| FFBC | 14       | DEMOLITION PLAN - COTTAGE AND STORE             | 1:500  |
| FFBC | 20       | FUNCTION CENTRE - MEASURED PLANS                | 1:200  |
| FFBC | 21       | FUNCTION CENTRE - MEASURED ELEVATIONS           | 1:200  |
| FFBC | 22       | FUNCTION CENTRE - GROUND FLOOR PLAN / ROOF PLAN | 1:200  |
| FFBC | 23       | FUNCTION CENTRE - ELEVATIONS 1                  | 1:200  |
| FFBC | 24       | FUNCTION CENTRE - ELEVATIONS 2                  | 1:200  |
| FFBC | 25       | FUNCTION CENTRE - SECTIONS 1                    | 1:200  |
| FFBC | 30       | TOILET BLOCK                                    | 1:100  |
| FFBC | 31       | SHADOW DIAGRAMS                                 | NTS    |
| FFBC | 32       | CAR PARK PLAN 1                                 | 1:500  |
| FFBC | 33       | CAR PARK PLAN 2                                 | 1:500  |
| FFBC | 34       | CAR PARK PLAN 3                                 | 1:500  |
| FFBC | 35       | CAR PARK PLAN 4                                 | 1:500  |
| FFBC | 35       | CAR PARK PLAN 5                                 | 1:500  |
| FFBC | 35       | CAR PARK PLAN 6                                 | 1:500  |
| FFBC | 35       | CAR PARK PLAN 7                                 | 1:500  |

-  Existing buildings
-  Proposed new works shown coloured
-  Proposed new roads
-  Proposed new carspaces
-  Existing Water course
-  Traffic flow



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Verify all dimensions  
Figured dimensions to be  
taken in preference to scale

Project: FRENCHS FOREST  
BUSHLAND CEMETERY  
  
NORTHERN METROPOLITAN  
CEMETERIES TRUST

Dwg. Title:  
DRAWING REGISTER &  
LOCATION PLAN

Scale @ A3: 1:2000

Issue Date: March 2020

Dwg. Name: FFBC  
Dwg. No.: 00

Drawn: AC AB

Checked:

Stage: DA  
Issue: 9

**Figure 2 – Proposed Chapel**  
(Source: Hector Abrahams Architects, March 2020)

## 1.2 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the subject site.

**Table 1 – Site features**

|                               |   |
|-------------------------------|---|
| <b>Location</b>               | Hakea Avenue, Frenchs Forest. Lot 7335 DP 1152473   |
| <b>Size</b>                   | The target area of investigation is approximately 0.7 ha. The entire cemetery grounds is approximately 23 ha.   |
| <b>Local government area</b>  | Northern Beaches (formerly Warringah)   |
| <b>Grid reference</b>         | 333450E 6265100N  |
| <b>Elevation</b>              | Approximately 140 m AHD   |
| <b>Topography</b>             | Situated on almost flat slopes  |
| <b>Geology and soils</b>      | <p>Geology: Hawkesbury Sandstone – Medium to coarse grained quartz sandstone, very minor shale and laminate lenses.</p> <p>Soils: Lambert shallow (&lt;50 cm) discontinuous Earthy Sands (Uc5.11, Uc5.22) and Yellow Earths (Gn2.2) on crests and insides of benches; shallow (&lt;20 cm) Siliceous Sands/Lithosols (Uc1.2) on leading edges; shallow to moderately deep (&lt;150 cm) Leached Sands (Uc2.21), Grey Earths (Gn2.81) and Gleyed Podzolic Soils (Dg4.21) in poorly drained areas; localised Yellow Podzolic Soils (Dy4.1, Dy5.2) associated with shale lenses.</p> |
| <b>Geological hazards</b>     | There are no geological hazards on site.  |
| <b>Patch size</b>             | There is limited connectivity through the cemetery to the north before it adjoins national park lands. The patch size is >1,000 ha.   |
| <b>Catchment and drainage</b> | Middle Harbour catchment is the main catchment for the site. The watercourses on the site are First and Second Order tributaries of Frenchs Creek which discharges into Middle Harbour.   |
| <b>Vegetation</b>             | Vegetation within the study area is largely planted or remnant native trees with landscaping shrubs and a combination of natural native groundcovers with a high incidence of weeds.  |
| <b>Existing land use</b>      | Cemetery  |



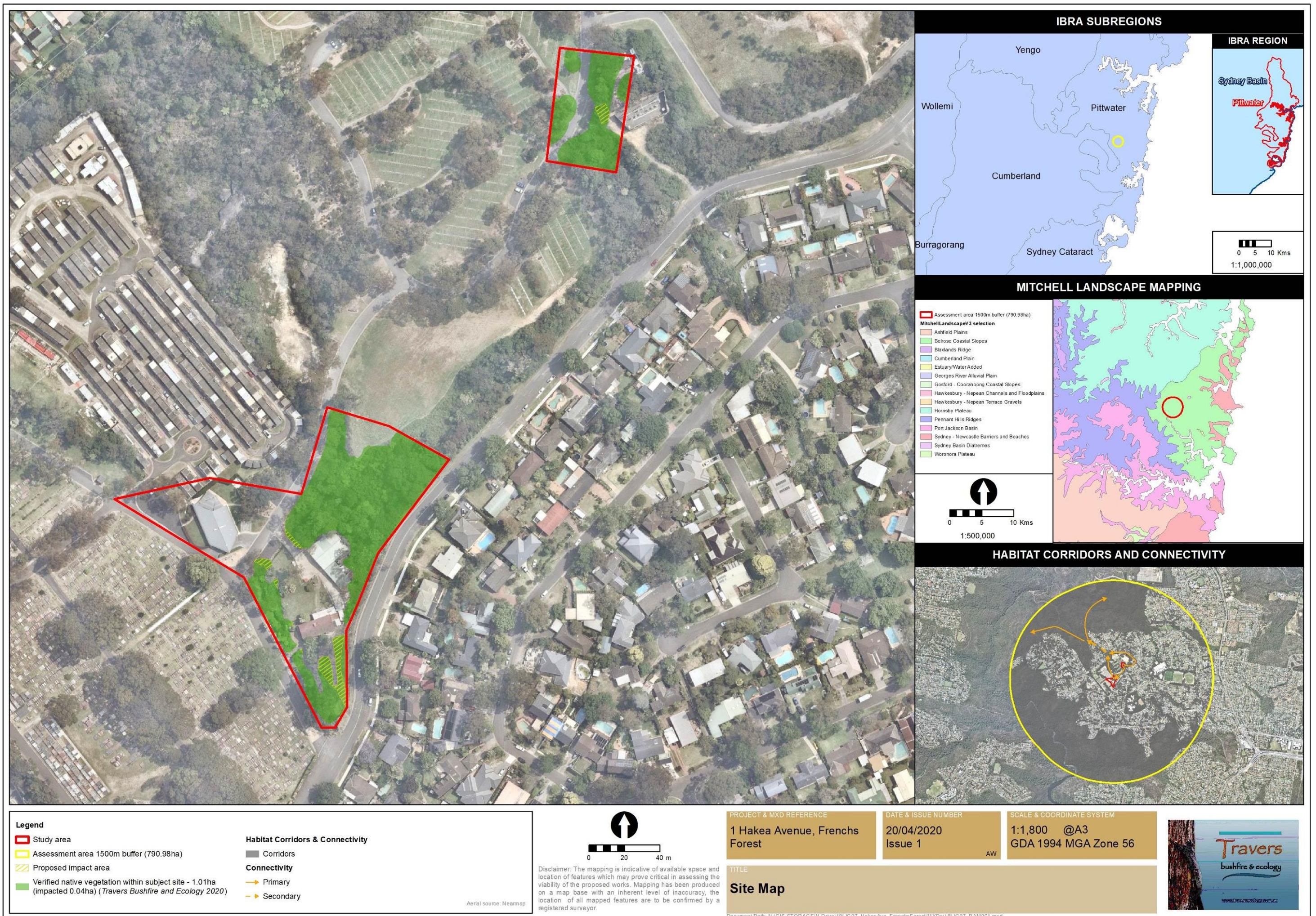


Figure 3 - Site map







## 2.0 Biodiversity Offsets Scheme(BOS)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*.

Together with the [Biodiversity Conservation Regulation 2017](#), the *BC Act* establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS). Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

### 2.1 Threshold assessment

The BOS includes two (2) elements to the threshold test – an area trigger and a Sensitive Biodiversity Values Land Map trigger. If clearing exceeds either trigger, the BOS applies to the proposed clearing.

#### 2.1.1 Biodiversity Land Map

Biodiversity Values Land has not been mapped within the study area – an offset is not required under this trigger. Figure 5 shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.



**Figure 5** – Biodiversity value land (not mapped at this extent) in the local area  
(Source: DPIE – Biodiversity Values Map – March 2020)

### 2.1.2 Area clearing threshold

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

The Warringah LEP maps identify the minimum lot size as being 0.25 ha. This means that if the clearing of native vegetation is 0.25 ha or greater, the BOS will apply.

Given the level of clearing is below the threshold, the proposal is not required to be offset under the BOS based upon the area clearing threshold.

## 2.2 Serious and irreversible impacts on biodiversity values

Development consent cannot be granted for non-State significant development under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) if the consent authority is of the opinion it is likely to have serious and irreversible impacts (SAIL) on biodiversity values. The determination of SAIL is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation* (2017).

Candidate SAIL entities/species recorded or with varying potential to occur within the impact area include:

- *Eucalyptus scoparia* (recorded)
- Large Bent-winged Bat (recorded)
- Little Bent-winged Bat (recorded)
- Swift Parrot (low)
- Large-eared Pied Bat (low)
- Regent Honeyeater (unlikely)

The additional impact assessment provisions for threatened species are outlined under Section 10.2.3 of the BAM (2017) and have been applied to the recorded Little Bent-winged Bat and Large Bent-winged Bat within Appendix 5. As a result of this assessment it is considered that the proposal will not likely cause a serious or irreversible impact on this microbat species or other candidate fauna species considered.

Additional assessment has not been applied to *Eucalyptus scoparia*. The species occurs east of the Wallangarra district, on the QLD/NSW border. Most populations occur in clefts on large granite outcrops at altitudes to 1,300m on skeletal soils and mostly as individuals or small groups. There are only three (3) known populations within NSW, all in close proximity to Tenterfield, and all on privately owned land. Given that the species is planted on site as it does not occur in the Sydney Basin Bioregion, its protection is not warranted for survival of the species, and thus impacts on species outside of their natural distribution should not contribute to an SAIL.

The two (2) TECs on site include Duffys Forest and Coastal Upland Swamp. Coastal Upland Swamp is not a potential SAIL community. Duffys Forest vegetation will not be impacted by this proposal, therefore the SAIL criteria in accordance with Section 10.2.2 of the BAM has not been applied.



## 3.0 Flora

### 3.1 Survey

An initial botanical survey as part of a constraints assessment was undertaken over the entire cemetery site on 11 November 2019. This provided an overview of the PCTs across the site and several locations of threatened species were plotted by the GPS. Seven (7) rapid assessment plots were undertaken across the site to assist with determining the vegetation communities and their extent.

A specific botanical survey of the impact areas and immediate surrounds was undertaken on 1 April 2020 over a time frame of approximately 4.5 hrs.

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site, as well as target threatened species searches. A review of the *Atlas of NSW Wildlife* (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the site, and relevant target searches were undertaken as suited, generally as near-linear transects

All naturally occurring species were identified to species level where possible, and are listed in Appendix 2.

### 3.2 Vegetation communities

The Native Vegetation of the Sydney Metropolitan Area OEH (2016) maps the vegetation within the site as:

- PCT 1783 - Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
- PCT1824 - Mallee - Banksia - Tea-tree - Hakea heath-woodland of the coastal sandstone plateaus of the Sydney basin
- Weeds and Exotics

Field verification of the entire cemetery grounds found the following vegetation communities:

- PCT 1783 - Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
- PCT1841 - Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney Region
- PCT1804 - Needlebush - Banksia wet heath swamps on coastal sandstone plateaus of the Sydney basin
- PCT 1786 - Red Bloodwood - Silvertop Ash - Stringybark open forest on ironstone in the Sydney region
- Planted native vegetation, most similar to PCT 1783 based on any regenerating understorey.

Vegetation descriptions provided below are for those PCTs being potentially impacted.

#### **PCT 1841 - Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney Region**

This vegetation occupies the majority of the naturally vegetated study area around the proposed chapel. It is a moderate to highly disturbed community that has been largely cleared on the western side of the proposed chapel with very limited remnant trees or

understorey. To the east the vegetation is better quality with less disturbance but suffers edge effects such as contain garden escapes and a general moderate influence from non-native species.

Canopy - *Angophora costata*, *Eucalyptus botryoides* x *saligna*, *Eucalyptus pilularis*, *Eucalyptus oblonga*, *Eucalyptus sieberi* and planted *Eucalyptus scoparia*. Most of the mature trees are 20-30m tall. The projected foliage cover is highly variable from 5% to approximately 35% in more intact areas.

Mid-storey - Dominated by exotic species such as *Lantana camara*, *Ligustrum* spp., *Phyllostachys aurea*, *Senna pendula*, *Lonicera japonica* and *Ochna serrulata*. Native species include *Cyathea cooperi*, *Ceratopetalum gummiferum*, *Acacia suaveolens*, *Acacia terminalis*, *Melia azedarach*, *Acacia mearnsii*, *Syzygium paniculatum* and *Pittosporum undulatum*.

Ground layer - Dominated by exotic and non-local species (garden escapes), particularly in the watercourse. Some of the native species include *Entolasia* spp., *Dichondra repens*, *Centella asiatica*, *Microlaena stipoides*, *Lobelia purpurascens*, *Commelina cyanea*, *Viola hederacea*, *Oplismenus* spp., *Gahnia sieberiana* and *Dianella caerulea*.



Photo 1 - Remnant vegetation along the watercourse where Plot 1 was undertaken





Photo 2 - Disturbed vegetation close to Hakea Avenue just to the east of the shed

**PCT 1804 - Needlebush - Banksia wet heath swamps on coastal sandstone plateaus of the Sydney basin**

This vegetation community occurs to the north of the proposed chapel and will not be directly impacted. It is associated with a fanned watercourse approximately 20m to the north of the existing shed facilities.

Canopy - There are a few *Allocasuarina littoralis* on drier higher areas near the middle of the heath swamp.

Mid-storey - Occasional specimens of *Banksia ericifolia*, *Hakea teretifolia*, *Callicoma serratifolia* (on edge of swamp that flows into the main watercourse), *Cyathea cooperi* and *Leptospermum trinervium* may occur.

Ground layer - Dominated by *Gleichenia dicarpa*. Other species may include *Lepyrodia scariosa*, *Schoenus melanostachys*, *Xanthorrhoea media*, *Gonocarpus teucroides* and some ferns that were not identified (possibly *Hypolepis muelleri*).





Photo 3 - Coastal Upland Swamp with dominant *Gleichenia dicarpa*

**Planted native vegetation, most similar to PCT 1783 based on any regenerating understorey.**

This describes the cleared lands where native vegetation typically exists that has largely replaced remnant vegetation. This includes planted native trees and semi-native landscape beds. *Eucalyptus scoparia* is commonly planted throughout the grounds of the cemetery. This is a threatened species that is typically located in far northern NSW and continues into southern QLD around the Wallangarra area. It does not occur naturally in the Sydney Basin Bioregion but has been extensively planted, particularly in well-established suburbs.

This vegetation is comprised primarily of planted native trees and shrubs. Species are both local and non-local species, and include *Eucalyptus scoparia*, *Corymbia maculata*, *Callistemon salignus*, *Casuarina glauca*, *Eucalyptus saligna*, *Eucalyptus botryoides*, *Eucalyptus haemastoma*, *Eucalyptus punctata*, *Acmena smithii*, *Syzygium* and *Grevillea* cultivars, *Allocasuarina littoralis* and *Hakea dactyloides*.

This mix of species would not naturally occur together in that landscape position. It is therefore not possible to assign an accurate PCT based on species composition. Based on extrapolation of the most likely remnant vegetation within the site, it is probable that the original vegetation in this position would have been commensurate with PCT 1783. In this case, it is reasonable to assign this planted vegetation to PCT 1783.





Photo 4 - Avenue of planted *Eucalyptus scoparia*

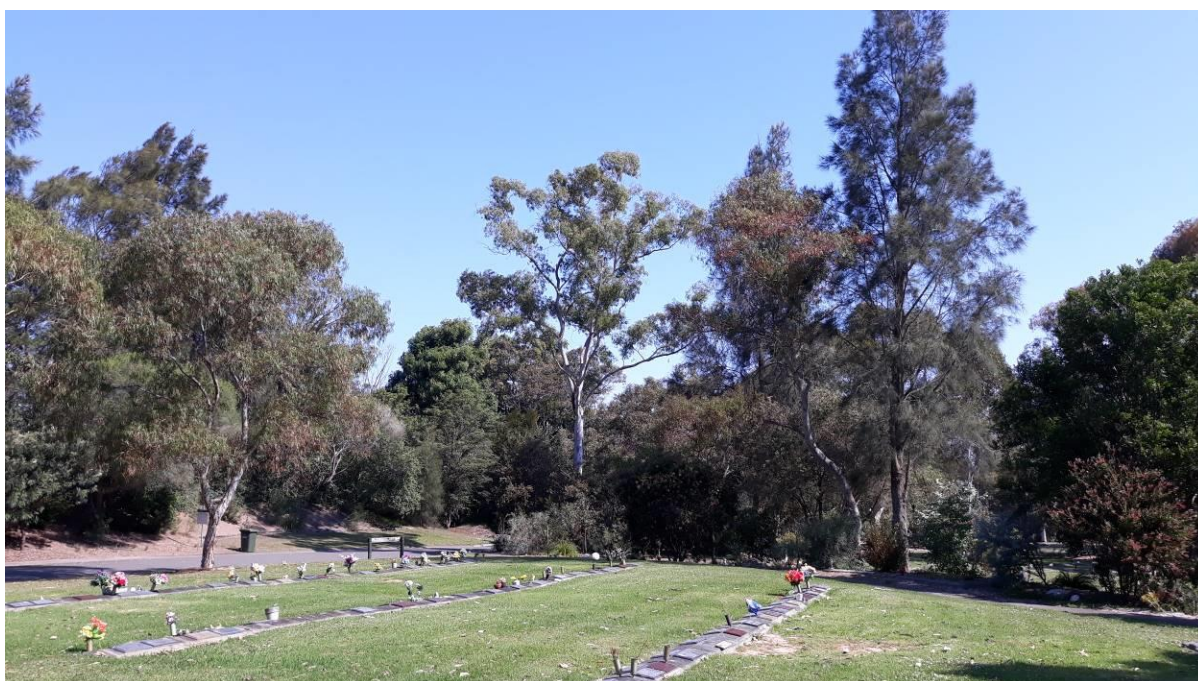


Photo 5 - Typical largely native plantings of trees and shrubs

### 3.3 Threatened flora species

**BC Act** – A search of the *Atlas of NSW Wildlife* (DPIE, 2020) indicated a list of species that have been recorded within a 10 km radius of the subject site. These species are listed in Appendix 3 Table A3.1 and are considered for potential habitat within the subject site.

**EPBC Act** – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10 km radius of the subject site. These species have also been listed in Appendix 3 Table A3.1 for consideration of potential to occur.

Based on the habitat assessment within Table A3.1 it is considered that the subject site provides potential habitat for the following threatened flora species. These species will be considered in the test of significance within Appendix 4:

**Table 2** – Threatened flora species with suitable habitat present

| Scientific name                                      | BC Act | EPBC Act | Potential to occur | Survey period (DPIE) |
|--|--------|----------|--------------------|----------------------|
| <i>Eucalyptus scoparia</i>                           | E1     | V        | recorded (planted) | All months           |
| <i>Eucalyptus nicholii</i>                           | V      | -        | recorded (planted) | All months           |
| <i>Syzygium paniculatum</i>                          | V      | V        | recorded           | April–June           |
| <i>Acacia bynoeana</i>                               | E1     | V        | ✓                  | Sept–March           |
| <i>Grevillea caleyi</i>                              | E1     | E        | ✓                  | All months           |
| <i>Tetratheca glandulosa</i>                         | V      | -        | ✓                  | June–Nov             |
| <i>Callistemon linearifolius</i>                     | V      | -        | low                | Sept–March           |
| <i>Pimelea curviflora</i> var. <i>curviflora</i>     | V      | V        | low                | All months           |
| <i>Epacris purpurascens</i> var. <i>purpurascens</i> | V      | -        | low                | All months           |

The study area contains heavily impacted native vegetation through edge effects, weed invasion, introduction of planted species and previous clearing which significantly reduces the likelihood of occurrence for threatened species in their natural habitat.

*Eucalyptus scoparia* has been recorded at a number of locations throughout the cemetery grounds, with individuals in close proximity to the development area identified and located by GPS. One (1) specimen of *Eucalyptus nicholii* was located in close proximity to the development area which has been planted, and one (1) mature specimen of *Syzygium paniculatum* was observed in the watercourse near the southern edge of the study area (close to the cemetery main entrance).

Several other species not listed in Table 3 may have potential to occur in other locations across the cemetery grounds where disturbance is much less hence the table above may differ to that in the constraints report previously produced.

Based upon the constraints survey and target survey in the development area and surrounds, sufficient survey has been undertaken for all listed species in Table 3 except for *Syzygium paniculatum*. Based upon the location, substrate, landscape position and vegetation types present, there is very little likelihood of it occurring naturally, and the identified specimen in the watercourse could have been planted some decades ago. The

species is more typically found in wet sclerophyll, rainforest and littoral rainforests which are absent from the development area. Although survey has been undertaken outside of the specified period (April–June), the impact area has been thoroughly traversed and there are no *Syzygium* sp. or similar plants present that could potentially be *S. paniculatum*. It is considered that the proposal will have no impact on this species.

### 3.4 Endangered flora populations

No endangered flora populations occur within former Warringah LGA and no endangered population is known to occur within 10 km of the study area.

### 3.5 Threatened ecological communities

Two (2) threatened ecological communities (TECs) were observed during survey:

- Coastal Upland Swamp in the Sydney Basin Bioregion, and
- Duffys Forest Ecological Community in the Sydney Basin Bioregion

#### Coastal Upland Swamp

Coastal Upland Swamp in the Sydney Basin Bioregion (CUS) occurs as a small patch to the north of the proposed chapel in association with the Needlebush - Banksia wet heath swamp vegetation (PCT1804). CUS is listed as endangered under the *BC Act* and *EPBC Act*. It is also associated with a fanned watercourse on thin soils over sandstone that are damp the majority of the time allowing for the growth of ferns (in particular *Gleichenia dicarpa*) and sedges, with an overstorey (where present) of species such as *Banksia ericifolia* and other shrubs. Eucalyptus species are typically absent from the community.

The CUS is located upslope from the chapel development and should not experience any hydrological changes that may alter the functioning of the community. There is also sufficient separation between any development area and the CUS such that most direct impacts should be absorbed before they reach this sensitive community.

CUS was observed in a few locations throughout the cemetery, therefore its extent in the locality is larger than that shown on Figure 3.

Given the proposal is sighted away from this community, there should be no impacts that would place the TEC at risk of local extinction.

#### Duffys Forest

Duffys Forest Ecological Community in the Sydney Basin Bioregion (DF) is listed as endangered under the *BC Act*. It occurs within the study area in association with two (2) patches of vegetation attributable to Red Bloodwood - Silvertop Ash - Stringybark open forest (PCT 1786), close to the north-western and south-eastern boundaries of the cemetery. The proposed toilet block is located within the DF southern patch shown on Figure 3. The location within DF is not supported and the proponent has been advised to move it to an alternative location to avoid any direct impact upon this TEC. The proponent has agreed and will shift the toilet block to the north, against the transmission easement within disturbed and planted vegetation associated with PCT 1783. The approximately location of the moved facility is also shown on Figure 3.

Given the avoidance of impact, the proposal will not place the TEC at risk of local extinction.



## 4.0 Fauna

### 4.1 Site Survey

Fauna survey including afternoon/morning diurnal survey, nocturnal survey and threatened species habitat assessment was undertaken within the subject site and nearby surrounds on 6<sup>th</sup> & 7<sup>th</sup> April 2020.

Diurnal fauna survey included bird activity and call survey, searches for chewed *Allocasuarina* cones to indicate foraging by Glossy Black-Cockatoo (*Calyptorhynchus lathami*), opportunistic habitat searches for reptiles/amphibians and habitat tree survey.

Nocturnal fauna survey included stag-watching both of the only two recorded hollows, spotlighting, threatened owl call-playback, frog call identification and passive ultrasonic microbat recording.

The full survey effort table showing timing and weather conditions is provided in Attachment 1. Specific survey effort locations and results are shown on Figure 7. All fauna species recorded during combined surveys within the study area are listed in Table A2.2 in Appendix 2.

A review of the BioNet - Atlas of NSW Wildlife (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site.

### 4.2 Habitat assessment

During the fauna survey a habitat assessment was undertaken with consideration to threatened species recorded within 10km.

The following habitat features were noted present within the subject site:

- Native canopy trees for roosting and foraging
- Late winter, spring and summer flowering resources,
- Two (2) hollow-bearing trees containing a medium (10-15cm) sized split hollow and one large (20-30cm) trunk hollow (tree T202 of the arborist's report)

The recorded hollows may be suitable for hollow-dependent threatened species with considered potential to occur including Little Lorikeet and threatened microbats. This however is not expected as Little Lorikeet was not recorded and typically will utilise smaller trunk hollows and the entry is open to the weather and not likely suitable for microbat shelter.

Microbat activity was recorded within the subject site in the first 2 hours after dark during the April 2020 survey. The hollows present were stag-watched with no recorded use at this time. The hollows are more typical of a Rainbow Lorikeet excavated chamber. Therefore, the retention of these tree and its hollow is not considered a priority within the development landscape. Retention for local fauna would be beneficial. This is supported by the arborist's report which is allowing the retention of the hollow-bearing trees.

Hollow-bearing tree locations are shown on Figure 7.

### 4.3 Threatened fauna species

*BC Act* – A search of the *Atlas of NSW Wildlife* (DPIE, 2020) provided a list of threatened fauna species previously recorded within a 10km radius of the subject site. These species



are listed in Appendix Table A3.2 and are considered for potential habitat within the subject site.

*EPBC Act* – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the subject site. These species have also been listed in Appendix Table A3.2.

In accordance with Table A3.2 the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the subject site. The state listed species will be considered in the test of significance (Appendix 4):

**Table 3** – Threatened fauna species with suitable habitat present

| Common name                             | BC Act | EPBC Act | Potential to occur |
|---|--------|----------|--------------------|
| Grey-headed Flying-fox                  | V      | V        | Recorded           |
| Little Bent-winged Bat                  | V      | -        | Recorded           |
| Large Bent-winged Bat                   | V      | -        | Recorded           |
| Glossy Black-Cockatoo                   | V      | -        | ✓                  |
| Little Lorikeet                         | V      | -        | ✓                  |
| Red-crowned Toadlet                     | V      | -        | Low                |
| Square-tailed Kite                      | V      | -        | Low                |
| Swift Parrot                            | E      | E        | Low                |
| Barking Owl                             | V      | -        | Low                |
| East-coast Freetail Bat                 | V      | -        | Low                |
| Large-eared Pied Bat                    | V      | V        | Low                |
| Gang-gang Cockatoo                      | V      | -        | Unlikely           |
| Turquoise Parrot                        | V      | -        | Unlikely           |
| Powerful Owl                            | V      | -        | Unlikely           |
| Masked Owl                              | V      | -        | Unlikely           |
| White-throated Needletail <sup>MS</sup> | -      | V        | Unlikely           |
| Brown Treecreeper                       | V      | -        | Unlikely           |
| Regent Honeyeater                       | E4A    | CE       | Unlikely           |
| Varied Sittella                         | V      | -        | Unlikely           |
| Scarlet Robin                           | V      | -        | Unlikely           |
| Southern Brown Bandicoot                | E      | E        | Unlikely           |
| Eastern Pygmy Possum                    | V      | -        | Unlikely           |
| Squirrel Glider                         | V      | -        | Unlikely           |
| Yellow-bellied Sheath-tail-bat          | V      | -        | Unlikely           |
| Eastern False Pipistrelle               | V      | -        | Unlikely           |
| Southern Myotis                         | V      | -        | Unlikely           |
| Greater Broad-nosed Bat                 | V      | -        | Unlikely           |

*Fisheries Management Act (FM Act)* – No habitats suitable for threatened aquatic species were observed within the subject site and as such the provisions of this act do not require any further consideration.

Additionally, protected migratory species listed under the *EPBC Act* are considered for habitat potential in Table A3.3.

Following a detailed significance of impact test under the *BC Act* (Appendix 4) and a review of EPBC impact criteria (Appendix 6), it is concluded that there will be no likely significant

impact any state or nationally listed threatened fauna species with considered potential to occur.

#### **4.3.1 SEPP Koala Habitat Protection - State Environmental Planning Policy (SEPP)**

SEPP (Koala Habitat Protection) 2019 now replaces SEPP 44 – Koala Habitat Protection. In accordance with Section 10 of the SEPP:

A council is not prevented from granting consent to a development application for consent to carry out development on land if—

- (a) the land—
  - (i) is not identified on the *Koala Development Application Map*, or
  - (ii) does not have an approved koala plan of management applying to the land, or
- (b) the council is satisfied that the land is not core koala habitat.

The following insert compares the previous SEPP44 DA process with the *SEPP (Koala Habitat Protection) 2019*.

In accordance with *SEPP Koala Habitat Protection*, the following conclusions have been made under the SEPP:

- a) The development is a Part 4 development under the EP&A Act;
- b) No Koala Plan of Management exists for the Northern Beaches LGA;
- c) The lot size and together with adjacent land under the same ownership is greater than 1 hectare;
- d) Koala Development Application Area has been mapped throughout the entire development footprint area (see Figure 6 below);
- e) The proposal involves clearing of 0.04 ha native vegetation therefore the proposed development impacts mapped Koala habitat and the development automatically becomes Tier 2 development;
- f) The proponent may either choose to dispute or accept the Koala Development Application Area mapping.
  - i. If the proponent chooses to dispute the mapping, then Appendix C of the Koala Habitat Protection Guideline needs to be addressed.  
Part A – Koala Presence – This involves a field-based assessment of the presence of Koala to specific criteria by a demonstrated experienced person. If Koala is recorded then the SEPP process proceeds to (2) below. If Koala is not recorded then Part B survey is required.  
Part B (i) Presence of Highly Suitable Habitat – Involves vegetated mapping of Plant Community Types (PCTs) and determination of “highly suitable Koala habitat” for each PCT based on the presence of >15% of the regionally relevant Koala use trees listed in Schedule 2. If this is determined then the SEPP process proceeds to (ii).  
(ii) Koala Records – Core Koala Habitat is concluded where any Koala records spanning 18 years (3 Koala generations) within 2.5km of the site (east of the great divide) or 5km (remaining western LGAs with KMAs noted in Schedule 1) are present, reflecting median Koala home ranges. The suitably qualified and experienced person should consider movements also based on an examination of the broader landscape.
  - ii. By accepting the Koala Development Application Area mapping a Koala Assessment Report will be required. This will need to be

prepared by a demonstrated experienced person and will need to outline details how the proposed development avoids, minimises and compensates for impacts to Koala habitat following the Koala Habitat Protection Guideline. Note: A Koala Assessment Report is accepting of Koalas in the locality and will therefore likely incur further development criteria and design.

## Old SEPP

Applies to all land in Local Government Areas (LGAs) listed in Schedule 1.

## New SEPP

Applies to land in the same LGAs as the old SEPP if identified on the pink development application map.

Both the old and new SEPPs apply to the same LGAs, on land over one hectare (excluding National Parks and State Forests). Neither SEPP applies if council has an approved KPoM in place. The approved KPoM sets out any relevant DA requirements.

### STEP 1

Landholder commissions a flora survey to establish if their site is 'potential koala habitat'.

### STEP 1

Address the streamlined development application criteria of the Guideline, including the direct and indirect impacts of the proposal on koalas/koala habitat.

New SEPP limits DA requirements to land on the pink map.

### STEP 2

Landholder commissions a fauna survey to establish koala presence.

#### Tier 1 development

Low or no impact to koalas/habitat—No surveys or suitably qualified persons required.

#### Tier 2 development

Affects koalas/habitat—Prepare Koala Assessment Report.

### STEP 3

Landholder commissions an Individual Koala Plan of Management (KPoM) to address impact on koala habitat.

OR

Landholder commissions a survey to demonstrate the land is not core koala habitat. Similar to requirement to conduct tree survey under the old SEPP.

Suitably qualified person always required by the old SEPP but only by the new SEPP if the proposal has an impact on koalas/habitat. Individual KPOMs are no longer required under the new SEPP. Instead the Guideline contains a streamlined set of DA criteria. Core koala habitat previously identified through Individual KPOMs will no longer be identified.

### STEP 4

Council assesses proposal and determines if KPOM adequately responds to impact on koalas.

### STEP 2

Council assesses proposal and determines if application adequately addresses any direct/indirect impact to koala habitat proportionate to development impact.

### STEP 5

Secretary of the Department considers and determines the KPOM. DAs determined by council if the Secretary approves the KPOM. Land identified as core koala habitat in an approved Individual KPOM becomes Category 2 – Sensitive Regulated Land which restricts code-based clearing under the Local Land Services Act 2013. Private native forestry codes prevent private native forestry.

No land is identified as core koala habitat through the new DA process.

For more information visit: [planning.nsw.gov.au](http://planning.nsw.gov.au)

Policy and Legislation > Environment and Heritage > [Koala Habitat Protection SEPP](#)



Travers bushfire & ecology recommend that the Koala Development Application Mapping should be disputed for the site based on no likelihood of supporting Koala activity. Under Part A of this process TBE did Koala survey that did not involve the full rigorous criteria outlined by the SEPP given the fragmented nature of the site within the urban landscape and the separation from extensive natural habitat by 250m, which includes a road and a line of houses along Borgnis St. Even in the event that more detailed survey was undertaken, Koala would still not be recorded and it's logical that we will proceed with the Part B considerations.



**Figure 6 – Koala Habitat Assessment Mapping**

(i) Presence of Highly Suitable Habitat

Five (5) eucalypt and three (3) non-eucalypt Koala use trees were recorded within the study area by TBE which covers the entire cemetery and a further three (3) species were identified by the arborist report. These trees are listed in Table 4

**Table 4 – Koala use trees (SEPP 2019) in the study area**

| Family        | Scientific name                                  | Common name         |
|---------------|--|---------------------|
| <b>TREES</b>  |  |                     |
| Casuarinaceae | <i>Allocasuarina littoralis</i>                  | Black She-oak       |
| Myrtaceae     | <i>Angophora costata</i>                         | Smooth-barked Apple |
| Myrtaceae     | <i>Corymbia gummifera</i>                        | Red Bloodwood       |
| Myrtaceae     | <i>Corymbia maculata</i>                         | Spotted Gum         |
| Myrtaceae     | <i>Eucalyptus botryoides</i> <--> <i>saligna</i> | -                   |

| Family    | Scientific name             | Common name       |
|-----------|-----------------------------|-------------------|
| Myrtaceae | <i>Eucalyptus oblonga</i>   | Stringybark       |
| Myrtaceae | <i>Eucalyptus pilularis</i> | Blackbutt         |
| Myrtaceae | <i>Euc capitellata</i> ,    |                   |
| Myrtaceae | <i>Euc globoidea</i>        |                   |
| Myrtaceae | <i>Eucalyptus piperita</i>  | Sydney Peppermint |
| Myrtaceae | <i>Eucalyptus sieberi</i>   | Silvertop Ash     |

Species assemblage in the impacted PCT's include:

- PCT 1841 (for the chapel) - >15% Koala use trees present in the PCT estimated at 24% – 0.03ha impacted vegetation
- PCT 1783 (for the toilet block - 15% Koala use trees present in the PCT estimated at 65% – 0.01 ha impacted vegetation

Therefore, both of the impacted PCT's the impacted vegetation is considered to be "highly suitable Koala habitat" in accordance with the SEPP. Proceeding to (ii).

#### (ii) Koala Records

There are three records of Koala within the specified 2.5km radius. The only record within the connective landscape was from 1940. The remaining two records, one also from 1940 and the other from 1997, were recorded in non-connective lands on the other eastern side of Belrose and Frenchs Forest.

Therefore, no Koalas have been recorded in the connective locality within a Koala home range for 18 years.

#### Conclusion

Based on the above, the SEPP 2019 assessment process concludes that the site does not support "core Koala habitat" and a Koala Assessment Report and associated development design criteria will not be required.

It is also noted that the proposal can mitigate the loss of Koala use tree species by replacement planting with the riparian and surrounding landscape.

### **4.4 Protected migratory species (National)**

*The EPBC Act Protected Matters Report* provides additionally listed terrestrial, wetland and marine migratory species of national significance likely to occur, or with habitat for these species likely to occur, within a 10 km radius of the subject site. The habitat potential of migratory species is considered in Table A3.3 (Appendix 3). The habitat potential of threatened migratory species is considered in Table A3.3 Table A3.2 (Appendix 3).

No nationally protected migratory bird species were recorded present within the study area during the surveys. Following a review of the protected migratory bird species impact criteria under the EPBC Act (Appendix 6), it is concluded that the proposal will not likely significantly impact on any such species with potential to occur. This is given that the study area does not likely contain any breeding habitat or habitat otherwise of importance.



#### **4.5 Endangered fauna populations**

There are three endangered populations recorded within 10km of the subject site. These include:

- Koala in the Pittwater Local Government Area
- Long-nosed Bandicoot at North Head
- Gang-gang Cockatoo at Hornsby and Ku-ring-gai LGAs

The study area is not within the recognised extent of any of these populations therefore there is no potential for any of them to occur.



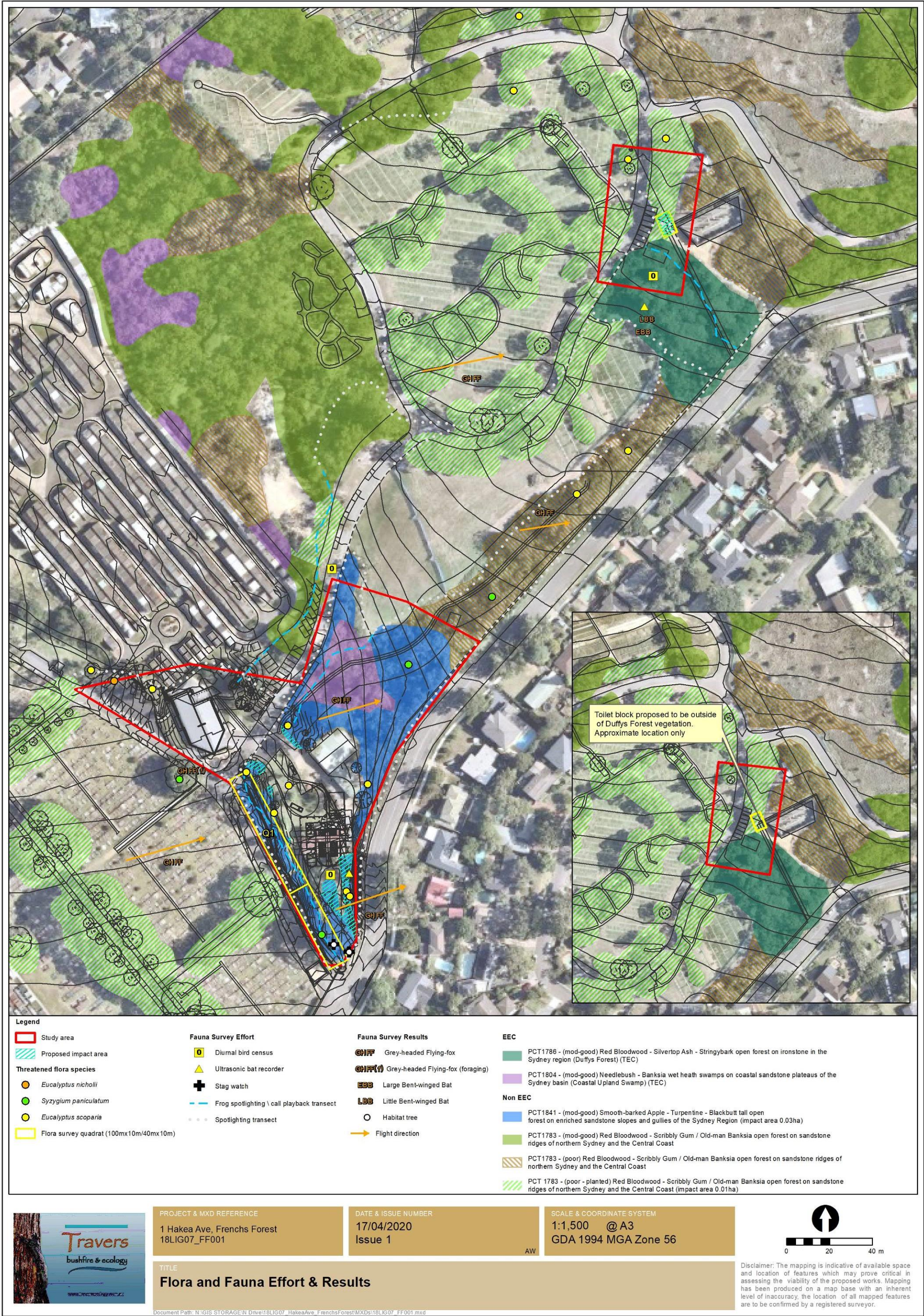


Figure 7 – Flora and fauna survey effort and results



## 4.6 Connectivity

The vegetation within the cemetery and any proposed impacts on vegetation by this proposal are not part of a primary corridor link. There are significant corridors through national parks in the general vicinity. The location of the cemetery is on a plateau, and the primary linkages are through the extensive sandstone gullies that surround the plateau. There are narrow slithers of vegetation that arise from the tops of the gullies that provide secondary connectivity through parts of the cemetery. The connectivity is more suitable for agile species, birds and bats, less so for mammals.

There are a few remnant vegetation areas of moderate-good quality throughout the cemetery with the main connectivity being largely around the perimeter, and one pathway through the middle.

The impacts to the vegetation from the proposed development will not cause any fragmentation or isolation of habitats for threatened species and their movement. Important local connectivity is demonstrated on Figure 8.



**Figure 8 – Local connectivity**



## 5.0 Watercourses and wetlands

### 5.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC Act*. We note that 'wetlands' are included in the definition of 'waterfront lands' in accordance with the *Water Management Act (WM Act)* 2000, due to their inclusion in the definition of a 'lake' under the same act.

Impacts on wetland communities must be assessed under the *BC Act* and if present the management of wetland communities must be given due consideration in accordance with the objectives and principles of management as contained within the NSW Wetlands Policy (2010), and appropriate management as determined by NSW DPI - Office of Water in their general terms of approval (GTA's). This may include but not limited to the provision of buffers, management of stormwater runoff and maintenance of natural inflows or runoff into those wetland communities.

- Artesian springs ecological community - endangered ecological community listing
- Castlereagh swamp woodland community - endangered ecological community listing
- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Coastal upland swamp in the Sydney Basin bioregion - endangered ecological community listing
- Coolibah–Black Box woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands bioregions - endangered ecological community listing
- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Kurri sand swamp woodland in the Sydney Basin Bioregion - endangered ecological community listing
- Lagunaria swamp forest on Lord Howe Island - endangered ecological community listing
- Maroota Sands swamp forest - endangered ecological community listing
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion - endangered ecological community listing
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological listing
- Sydney Freshwater Wetlands in the Sydney Basin Bioregion - endangered ecological community listing
- The shorebird community occurring on the relict tidal delta sands at Taren Point - endangered ecological community listing
- Upland wetlands of the drainage divide of the New England Tableland Bioregion - endangered ecological community listing
- Wingecarribee Swamp

Coastal Upland Swamp in the Sydney Basin bioregion (CUS) is an endangered wetland community and was observed within the study area.

In accordance with the *Water Management Act 2000*, endangered wetland communities are through the definition of 'lakes' potentially classed as waterfront land. Referral to NRAR may

be required for determination under the *Water Management Act 2000* as a controlled activity. As well as protection, a buffer may be applied to these communities as specified by NRAR.

- *Impact on the extent of wetland vegetation*

A 20 m conservation buffer is to be placed around the CUS within the study area. This buffer is to exclude all development and APZs. With the implementation of this buffer, the extent of CUS will not be reduced or directly impacted.

- *Impact on Acid Sulfate soils*

The Warringah LEP does not map any acid sulfate soils within the study site, or nearby (see: <https://services.northernbeaches.nsw.gov.au/icongis/index.html>).

- *Indirect impacts*

Indirect impacts may include potential sedimentation, nutrient pollution, dumping of rubbish and garden waste, accidental spillages post development, and weed incursions. The CUS is located upslope of the nearby proposed building and thus indirect impacts should be minimal, especially any hydrological changes.

A biodiversity management plan (BMP) is recommended that specifies the strategies and works required to manage this vegetation community within the study area and to limit and minimise indirect impacts on endangered wetland vegetation. Direct and indirect impacts would be negligible given the CUS is upslope, however, other management actions can be applied to reduce risks such as removing any pedestrian access, weed control, etc.

- *Impacts due to stormwater quality or quantity*

The proposal should see no long-term changes to stormwater quality or quantity. With the CUS being upslope from the main development areas, there should be little change to hydrological features.

- *Impacts on groundwater*

The proposal should see no long-term changes to stormwater quality or quantity. With the CUS being upslope from the main development areas, there should be little change to hydrological features.

- *Proposed mitigation measures*

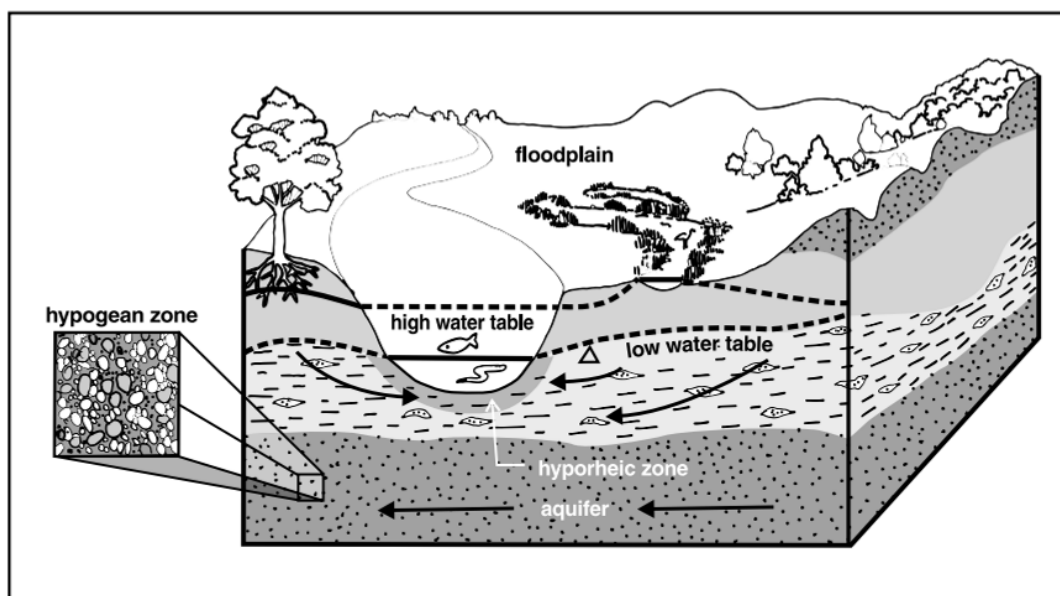
A BMP is recommended that specifies the strategies and works required to manage this vegetation community within the study area.

## **5.2 Groundwater dependent ecosystems (GDEs)**

Groundwater dependent ecosystems are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Some examples of ecosystems which depend on groundwater are:

- wetlands;
- red gum forests, vegetation on coastal sand dunes and other terrestrial vegetation;
- ecosystems in streams fed by groundwater;
- limestone cave systems;

- springs; and
- hanging valleys and swamps.



**Alluvial groundwater system discharging into a river**

Groundwater dependent ecosystems are therefore ecosystems which have their species composition and their natural ecological processes determined by groundwater (NSW State Groundwater Dependent Ecosystems Policy April 2002).

The CUS is a GDE as it is likely fed from a shallow groundwater aquifer within the sandstone. In addition, this vegetation community may be situated on a humic or peaty substrate which is also capable of holding large quantities of water.

It is recommended that the CUS vegetation be wholly retained within the study area. A vegetated buffer is maintained around this vegetation community, in order to retain, improve and manage it.

### **5.3 Watercourse assessment**

Ground-truthing has identified two (2) first order streams that converge to form a second order stream in the vicinity of the development proposal. A 10 m riparian buffer around the first order streams, and a 20 m buffer around the second order stream, are required. These streams are located in the southern portion of the study area. The above Coastal Upland Swamp is also recognised as “water front land” and assessed in more detail within the Waterway impact statement

A Waterway Impact Statement has been prepared (*Travers bushfire & ecology* 2020) that provides greater detail on these watercourses, the wetland and provides recommended management strategies.

## 6.0 Conclusions

*Travers bushfire & ecology* has been engaged to undertake a biodiversity development assessment report (BDAR) for a proposed development located off Hakea Avenue within the Frenchs Forest Cemetery, Frenchs Forest, within the local government area (LGA) of Northern Beaches. The proposed development is located within the southern portion of Lot 7335 DP 1152473.

Ecological survey and assessment have been undertaken in accordance with relevant legislation including the *Environmental Planning and Assessment Act 1979*, the *Biodiversity Conservation Act 2016*, the commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the *Fisheries Management Act 1994*.

### 6.1 Legislative compliance

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, three (3) threatened fauna species Grey-headed Flying-fox, Little Bent-winged Bat, and Large Bent-winged Bat, three (3) threatened flora species *Eucalyptus scoparia*, *Eucalyptus nicholii* and *Syzygium paniculatum*, and two (2) TECs, Coastal Upland Swamp and Duffys Forest, were recorded within the study area.

The state assessment of significance (Appendix 4) has concluded that the proposed development will not have a significant impact on any threatened species, populations or TECs. Therefore, a Species Impact Statement should not be required for the proposal.

Offsetting under the Biodiversity Offsets Scheme (BOS) is not required for the proposal as:

- The study area is not located on lands mapped as Biodiversity Values Land.
- The proposed clearing of vegetation is less than the lot size threshold.
- The proposal will not cause any Serious or Irreversible Impacts (SAIL) of threatened biodiversity most at risk of extinction.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, one (1) threatened fauna species Grey-headed Flying-fox (*Pteropus poliocephalus*), no protected migratory bird species, two (2) threatened flora species, *Eucalyptus scoparia* and *Syzygium paniculatum*, and one (1) TEC, Coastal Upland Swap, listed under this Act were recorded within the study area.

The proposal was not considered to have a significant impact on matters of national environmental significance. As such a referral to Department of Environment and Energy should not be required.

In respect of matters relative to the *Fisheries Management Act 1994*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint and there are no matters requiring further consideration under this Act.

### 6.2 Potential ecological impacts

The direct, indirect and cumulative ecological impacts have been considered in respect to recorded biodiversity, threatening processes and extent of impact as a result of the proposed works:

### **6.2.1 BC Reg Prescribed impacts**

The proposal is not expected to cause any prescribed impacts (subject to subclause (2) of the BC Reg).

### **6.2.2 Direct impacts**

The other direct impacts of the proposal within the development footprint are considered as:

- Removal of 0.03ha PCT1841 (moderate-good) Smooth-barked Apple – Turpentine – Blackbutt tall open forest
- Removal of 0.01 ha PCT 1783 (poor-planted) Red Bloodwood – Scribbly gum / Old man Banksia
- Subsequent removal of threatened fauna species foraging habitat including:
  - a) Seasonal flowering resources for Grey-headed Flying-fox.
  - b) Air space and prey species habitat for recorded Large Bent-winged Bat and Little Bent-winged Bat.

### **6.2.3 Indirect impacts**

The potential indirect impacts of the proposal are considered as:

- Reduced cross-site movements by small bird species such as passerines.
- Edge effects such as weed incursions caused from soil disturbance, repeated clearing and landscaping species becoming a nuisance in the adjacent remnant bushland.
- Increased spill-over from noise, activity and lighting effects into the adjacent quality natural habitat areas.
- Increased soil nutrients from changes to runoff that may provide further opportunities for weed plumes.
- Concentrated stormwater runoff from solid surfaces and subsequent increased flows.

### **6.2.4 Cumulative impacts**

The potential cumulative impacts (combined results of past, current and future activities) of the proposal are considered as:

- Increased risk of weed invasion and fungal mobilisation or infections
- Cumulative loss of native vegetation within the locality
- Increased varied human presence and activity within the remaining natural habitat areas of the adjacent bushland remnant.
- Edge effects from inappropriate use of remaining native vegetation areas such as additional clearing, dumping of materials, dumping of faecal, food or general waste and building refuse.

## **6.3 Avoidance actions**

The following avoidance actions have been undertaken to either avoid or minimise impacts on biodiversity values:

- The position of the proposed toilet block has been modified to avoid impacts to Duffys Forest vegetation (DWG not available at the time of completion of this reporting)

- Development has been located to maximise usage of already cleared areas, and to minimise impacts on native vegetation.
- Proposal has avoided any further buildings or vegetation loss to the northern aspect to protect the nearby Coastal Upland Swamp.
- Retention of hollow-bearing trees.

#### **6.4 Mitigation measures**

The following mitigation measures are recommended to avoid, minimise or ameliorate the above potential ecological impacts, address threatening processes and to guide a more positive ecological outcome for threatened species and their associated habitats.

- (a) Landscaping within the property is to use locally occurring native species commensurate the existing vegetation.
- (b) A vegetation management plan is prepared to protect and restore surrounding sensitive vegetation communities and the riparian corridor.
- (c) Priority areas for sediment and erosion control.
- (d) Standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment onsite found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with anti-fungal herbicides.

# Appendix 1

## Fauna Survey Effort

**Table A1.1 – Fauna survey effort**

| <b>Fauna group</b>         | <b>Date</b> | <b>Weather conditions</b>                         | <b>Survey technique(s)</b>                            | <b>Time effort (24hr)</b> |
|----------------------------|-------------|---|---|---------------------------|
| <b>Diurnal birds</b>       | 6/4/20      | 5/8 cloud, 16km SE, previous shower, temp 18°C    | Diurnal census x2                                     | 30mins                    |
|                            |             |   | Diurnal opportunistic                                 | 1hr 10mins 1620 - 1800    |
|                            | 7/4/20      | 8/8 cloud, no wind, no rain, temp 17°C            | Diurnal census x1                                     | 15mins                    |
| <b>Nocturnal birds</b>     | 6/4/20      | 0/8 cloud, no wind, previous shower, temp 18-17°C | Spotlighting/ stag watch                              | 1hr 30mins 1800 - 1930    |
|                            |             |   | Call playback (Section 2.5 species)                   | Commenced @1830           |
|                            |             |   | Roost habitat search                                  | 1hr 10mins 1620-1800      |
| <b>Arboreal mammals</b>    | 6/4/20      | 0/8 cloud, no wind, previous shower, temp 18-17°C | Spotlighting/ stag watch                              | 1hr 30mins 1800 - 1930    |
|                            |             |   | Call playback (Section 2.5 species)                   | Commenced @1830           |
| <b>Terrestrial mammals</b> | 6/4/20      | 0/8 cloud, no wind, previous shower, temp 18-17°C | Spotlighting  | 1hr 30mins 1800 - 1930    |
|                            |             |   | Call playback (Section 2.5 species)                   | Commenced @1830           |
| <b>Bats</b>                | 6/4/20      | 0/8 cloud, no wind, previous shower, temp 18-17°C | Spotlighting/ stag watch                              | 1hr 30mins 1800 - 1930    |
|                            |             |   | Ultrasonic microbat recording (Passive monitoring) x2 | Overnight from 1745       |
| <b>Reptiles</b>            | 6/4/20      | 5/8 cloud, 16km SE, previous shower, temp 18°C    | Diurnal opportunistic / habitat searches              | 1hr 10mins 1620 - 1800    |
| <b>Amphibians</b>          | 6/4/20      | 5/8 cloud, 16km SE, previous shower, temp 18°C    | Diurnal opportunistic / habitat searches              | 1hr 10mins 1620 - 1800    |
|                            | 6/4/20      | 0/8 cloud, no wind, previous shower, temp 18-17°C | Spotlighting / call identification                    | 1hr 30mins 1800 - 1930    |
|                            |             |   | Call-playback (Red-crowned Toadlet)                   | Commenced @ 1845          |



# Appendix 2

## Flora & Fauna Species Lists

**Table A2.1 – Flora species recorded**

| Family                 | Scientific name                                     | Common name                           |
|------------------------|---|---------------------------------------|
| <b>TREES</b>           |   |                                       |
| Fabaceae (Mimosoideae) | <i>Acacia elata</i>                                 | Mountain Cedar Wattle                 |
| Fabaceae (Mimosoideae) | <i>Acacia mearnsii</i>                              | Black Wattle                          |
| Casuarinaceae          | <i>Allocasuarina littoralis</i>                     | Black She-oak                         |
| Myrtaceae              | <i>Angophora costata</i>                            | Smooth-barked Apple                   |
| Arecaceae              | <i>Archontophoenix cunninghamiana</i>               | Bangalow Palm                         |
| Proteaceae             | <i>Banksia integrifolia</i>                         | Coast Banksia                         |
| Sterculiaceae          | <i>Brachychiton acerifolius</i>                     | Illawarra Flame Tree                  |
| Cunoniaceae            | <i>Callicoma serratifolia</i>                       | Black Wattle                          |
| Casuarinaceae          | <i>Casuarina glauca</i>                             | Swamp Oak                             |
| Myrtaceae              | <i>Corymbia maculata</i>                            | Spotted Gum                           |
| Cyatheaceae            | <i>Cyathea cooperi</i>                              | Straw Treefern                        |
| Myrtaceae              | <i>Eucalyptus botryoides</i> <--><br><i>saligna</i> | -                                     |
| <b>Myrtaceae</b>       | <b><i>Eucalyptus nicholii</i></b>                   | <b>Narrow-leaved Black Peppermint</b> |
| Myrtaceae              | <i>Eucalyptus oblonga</i>                           | Stringybark                           |
| Myrtaceae              | <i>Eucalyptus pilularis</i>                         | Blackbutt                             |
| Myrtaceae              | <i>Eucalyptus piperita</i>                          | Sydney Peppermint                     |
| <b>Myrtaceae</b>       | <b><i>Eucalyptus scoparia</i></b>                   | <b>Wallangarra White Gum</b>          |
| Myrtaceae              | <i>Eucalyptus sieberi</i>                           | Silvertop Ash                         |
| Euphorbiaceae          | <i>Glochidion ferdinandi</i>                        | Cheese Tree                           |
| Proteaceae             | <i>Grevillea robusta</i>                            | Silky Oak                             |
| Meliaceae              | <i>Melia azedarach</i>                              | White Cedar                           |
| Moraceae               | <i>Morus alba</i> *                                 | Mulberry                              |
| Pittosporaceae         | <i>Pittosporum undulatum</i>                        | Sweet Pittosporum                     |
| Rosaceae               | <i>Prunus persica</i> *                             | Peach Tree                            |
| Myrtaceae              | <i>Syzygium australe</i>                            | Brush Cherry                          |
| <b>Myrtaceae</b>       | <b><i>Syzygium paniculatum</i></b>                  | <b>Magenta Lilly Pilly</b>            |
| <b>SHRUBS</b>          |   |                                       |
| Fabaceae (Mimosoideae) | <i>Acacia longifolia</i> var. <i>longifolia</i>     | Sydney Golden Wattle                  |
| Fabaceae (Mimosoideae) | <i>Acacia suaveolens</i>                            | Sweet Scented Wattle                  |
| Fabaceae (Mimosoideae) | <i>Acacia terminalis</i>                            | Sunshine Wattle                       |
| Proteaceae             | <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>  | Heath-leaved Banksia                  |
| Myrtaceae              | <i>Callistemon salignus</i>                         | Willow Bottlebrush                    |
| Myrtaceae              | <i>Callistemon viminalis</i>                        | Weeping Bottlebrush                   |
| Theaceae               | <i>Camellia</i> sp. (cultivar)*                     | Camellia                              |
| Cunoniaceae            | <i>Ceratopetalum gummiferum</i>                     | NSW Christmas Bush                    |
| Solanaceae             | <i>Cestrum parqui</i> *                             | Chilean Cestrum                       |
| Malaceae               | <i>Cotoneaster glaucophyllus</i> *                  | Grey-leaved Cotoneaster               |
| Fabaceae (Faboideae)   | <i>Genista monspessulana</i> *                      | Montpellier Broom                     |

| Family                     | Scientific name                                      | Common name                       |
|----------------------------|--|-----------------------------------|
| Proteaceae                 | <i>Grevillea</i> 'Poorinda Royal Mantle'             | -                                 |
| Proteaceae                 | <i>Hakea teretifolia</i>                             | Dagger Hakea                      |
| Euphorbiaceae              | <i>Homalanthus populifolius</i>                      | Bleeding Heart                    |
| Hydrangeaceae              | <i>Hydrangea macrophylla</i> *                       | Hydrangea                         |
| Myrtaceae                  | <i>Kunzea ambigua</i>                                | Tick Bush                         |
| Verbenaceae                | <i>Lantana camara</i> *                              | Lantana                           |
| Myrtaceae                  | <i>Leptospermum petersonii</i> *                     | Lemon Scented Tea-tree            |
| Myrtaceae                  | <i>Leptospermum trinervium</i>                       | Slender Tea-tree                  |
| Oleaceae                   | <i>Ligustrum lucidum</i> *                           | Large-leaved Privet               |
| Oleaceae                   | <i>Ligustrum sinense</i> *                           | Small-leaved Privet               |
| Rutaceae                   | <i>Murraya paniculata</i> *                          | Orange Jessamine                  |
| Ochnaceae                  | <i>Ochna serrulata</i> *                             | Mickey Mouse Plant                |
| Proteaceae                 | <i>Persoonia pinifolia</i>                           | Pine-leaved Geebung               |
| Araceae                    | <i>Philodendron bipinnatifidum</i> *                 | Philodendron                      |
| Malaceae                   | <i>Rhaphiolepis indica</i> *                         | Indian Hawthorn                   |
| Ericaceae                  | <i>Rhododendron</i> sp. (cultivar)*                  | Azalea                            |
| Rosaceae                   | <i>Rubus fruticosus</i> sp. agg.*                    | Blackberry complex                |
| Fabaceae (Cesalpinioideae) | <i>Senna pendula</i> var. <i>glabrata</i> *          | -                                 |
| Solanaceae                 | <i>Solanum mauritianum</i> *                         | Wild Tobacco                      |
| Proteaceae                 | <i>Telopea speciosissima</i>                         | Waratah                           |
| Fabaceae (Faboideae)       | <i>Wisteria sinensis</i> *                           | Chinese wisteria                  |
| Agavaceae                  | <i>Yucca aloifolia</i> *                             | Dagger Plant                      |
| <b>GROUNDCOVERS</b>        |  |                                   |
| Polygonaceae               | <i>Acetosa saggitata</i> *                           | Turkey Rhubarb                    |
| Alliaceae                  | <i>Agapanthus praecox</i> subsp. <i>orientalis</i> * | -                                 |
| Asteraceae                 | <i>Ageratina adenophora</i> *                        | Crofton Weed                      |
| Poaceae                    | <i>Andropogon virginicus</i> *                       | Whisky Grass                      |
| Iridaceae                  | <i>Aristea ecklonii</i> *                            | -                                 |
| Asparagaceae               | <i>Asparagus aethiopicus</i> *                       | Asparagus Fern                    |
| Asteraceae                 | <i>Bidens pilosa</i> *                               | Cobbler's Pegs                    |
| Bromeliaceae               | <i>Bromelia</i> sp.* (Cultivar)                      | Bromeliads                        |
| Crassulaceae               | <i>Bryophyllum delagoense</i> *                      | Mother of Millions                |
| Dicksoniaceae              | <i>Calochlaena dubia</i>                             | Rainbow Fern                      |
| Poaceae                    | <i>Cenchrus clandestinus</i> *                       | Kikuyu                            |
| Gentianaceae               | <i>Centaurium erythraea</i> *                        | Common Centaury                   |
| Apiaceae                   | <i>Centella asiatica</i>                             | Swamp Pennywort                   |
| Poaceae                    | <i>Chloris gayana</i> *                              | Rhodes Grass                      |
| Liliaceae                  | <i>Chlorophytum comosum</i> *                        | Spider Plant                      |
| Asteraceae                 | <i>Cirsium arvense</i> *                             | Perennial Thistle                 |
| Commelinaceae              | <i>Commelina cyanea</i>                              | Scurvy Weed, Native Wandering Jew |
| Asteraceae                 | <i>Conyza bonariensis</i> *                          | Flax-leaf Fleabane                |

| Family               | Scientific name                                     | Common name                                  |
|----------------------|---|--|
| Asteraceae           | <i>Conyza sumatrensis</i> *                         | Tall Fleabane                                |
| Asteraceae           | <i>Coreopsis lanceolata</i> *                       | Coreopsis                                    |
| Poaceae              | <i>Cortaderia selloana</i> *                        | Pampas Grass                                 |
| Apiaceae             | <i>Cyclospermum leptophyllum</i> *                  | Slender Celery                               |
| Poaceae              | <i>Cynodon dactylon</i>                             | Common Couch                                 |
| Cyperaceae           | <i>Cyperus papyrus</i> *                            | Papyrus                                      |
| Phormiaceae          | <i>Dianella caerulea</i> var. <i>caerulea</i>       | Flax Lily                                    |
| Phormiaceae          | <i>Dianella revoluta</i> var. <i>revoluta</i>       | Spreading Flax Lily                          |
| Convolvulaceae       | <i>Dichondra repens</i>                             | Kidney Weed                                  |
| Poaceae              | <i>Ehrharta erecta</i> *                            | Panic Veldtgrass                             |
| Poaceae              | <i>Entolasia marginata</i>                          | Bordered Panic                               |
| Poaceae              | <i>Entolasia stricta</i>                            | Wiry Panic                                   |
| Euphorbiaceae        | <i>Euphorbia peplus</i> *                           | Spurge                                       |
| Cyperaceae           | <i>Gahnia sieberiana</i>                            | Red-fruited Saw-sedge                        |
| Gleicheniaceae       | <i>Gleichenia dicarpa</i>                           | Pouched Coral Fern                           |
| Haloragaceae         | <i>Gonocarpus teucroides</i>                        | Raspwort                                     |
| Zingiberaceae        | <i>Hedychium gardnerianum</i> *                     | Ginger Lily                                  |
| Asteraceae           | <i>Hypochaeris radicata</i> *                       | Flatweed                                     |
| Dennstaedtiaceae     | <i>Hypolepis muelleri</i>                           | Harsh Ground Fern                            |
| Poaceae              | <i>Imperata cylindrica</i>                          | Blady Grass                                  |
| Restionaceae         | <i>Lepyrodia scariosa</i>                           | Scale Rush                                   |
| Liliaceae            | <i>Lilium formosanum</i> *                          | Formosan Lily                                |
| Lobeliaceae          | <i>Lobelia purpurascens</i>                         | Whiteroot                                    |
| Lomandraceae         | <i>Lomandra filiformis</i> subsp. <i>filiformis</i> | Wattle Mat-rush                              |
| Fabaceae (Faboideae) | <i>Medicago polymorpha</i> *                        | Burr Medic                                   |
| Fabaceae/faboideae   | <i>Melilotus indicus</i> *                          | Hexham Scent                                 |
| Poaceae              | <i>Microlaena stipoides</i> var. <i>stipoides</i>   | Weeping Rice Grass                           |
| Malvaceae            | <i>Modiola caroliniana</i> *                        | Red-flowered Mallow                          |
| Davalliaceae         | <i>Nephrolepis cordifolia</i> *                     | Fish-bone Fern                               |
| Alliaceae            | <i>Nothoscordum borbonicum</i> *                    | Onion Weed                                   |
| Poaceae              | <i>Oplismenus aemulus</i>                           | Basket Grass                                 |
| Oxalidaceae          | <i>Oxalis corniculata</i> *                         | Yellow Wood Sorrel,<br>Creeping Oxalis       |
| Poaceae              | <i>Paspalum dilatatum</i> *                         | Paspalum                                     |
| Poaceae              | <i>Phyllostachys aurea</i> *                        | Fishpole Bamboo                              |
| Dennstaedtiaceae     | <i>Pteridium esculentum</i>                         | Bracken                                      |
| Polygonaceae         | <i>Rumex crispus</i> *                              | Curled Dock                                  |
| Cyperaceae           | <i>Schoenus melanostachys</i>                       | Black Bog Rush                               |
| Poaceae              | <i>Setaria parviflora</i> *                         | -  |
| Solanaceae           | <i>Solanum nigrum</i> *                             | Black Nightshade, Black-<br>berry Nightshade |
| Asteraceae           | <i>Soliva sessilis</i> *                            | Bindii                                       |
| Asteraceae           | <i>Sonchus oleraceus</i> *                          | Common Sow-thistle                           |



| Family                                 | Scientific name                     | Common name            |
|--|-------------------------------------|------------------------|
| Poaceae                                | <i>Sporobolus africanus</i> *       | Parramatta Grass       |
| Poaceae                                | <i>Stenotaphrum secundatum</i> *    | Buffalo Grass          |
| Strelitziaceae                         | <i>Strelitzia reginae</i> *         | -                      |
| Asteraceae                             | <i>Taraxacum officinale</i> *       | Dandelion              |
| Commelinaceae                          | <i>Tradescantia fluminensis</i> *   | Wandering Jew          |
| Fabaceae/faboideae                     | <i>Trifolium repens</i> *           | White Clover           |
| Violaceae                              | <i>Viola hederacea</i>              | Ivy-leaved Violet      |
| Xanthorrhoeaceae                       | <i>Xanthorrhoea resinosa</i>        | -                      |
| <b>VINES</b>                           |                                     |                        |
| Basellaceae                            | <i>Anredera cordifolia</i> *        | Madiera Vine           |
| Asclepiadaceae                         | <i>Araujia sericifera</i> *         | Mothvine               |
| Lauraceae                              | <i>Cassytha glabella</i>            | -                      |
| Luzuriagaceae                          | <i>Eustrephus latifolius</i>        | Wombat Berry           |
| Fabaceae/faboideae                     | <i>Glycine clandestina</i>          | Twining Glycine        |
| Araliaceae                             | <i>Hedera helix</i> *               | English Ivy            |
| Dilleniaceae                           | <i>Hibbertia scandens</i>           | Climbing Guinea Flower |
| Oleaceae                               | <i>Jasminum polyanthum</i> *        | Jasmine                |
| Caprifoliaceae                         | <i>Lonicera japonica</i> *          | Japanese Honeysuckle   |
| Passifloraceae                         | <i>Passiflora edulis</i> *          | Common Passionfruit    |
| Fabaceae/faboideae                     | <i>Vicia sativa subsp. sativa</i> * | Common Vetch           |
| <b>WATER PLANTS</b>                    |                                     |                        |
| Restionaceae                           | <i>Empodisma minus</i>              | -                      |
| Onagraceae                             | <i>Ludwigia peruviana</i> *         | -                      |
| <b>EPIPHYTES</b>                       |                                     |                        |
| Aspleniaceae                           | <i>Asplenium australasicum</i>      | Birds Nest Fern        |
| * denotes exotic species               |                                     |                        |
| <b>BOLD</b> denotes threatened species |                                     |                        |

It should be noted that not all garden, cultivar or landscape species have been identified as part of this assessment.

**Table A2.2 – Fauna species recorded**

| Common name  |                        | Scientific name                       | Method observed          |
|--|------------------------|---------------------------------------|--------------------------|
| Birds  |                        |                                       | April 6                  |
| Australian King Parrot   |                        | <i>Alisterus scapularis</i>           | OW                       |
| Australian Raven   |                        | <i>Corvus coronoides</i>              | OW                       |
| Black-faced Cuckoo-shrike  |                        | <i>Coracina novaehollandiae</i>       | O                        |
| Eastern Whipbird   |                        | <i>Psophodes olivaceus</i>            | W                        |
| Galah  |                        | <i>Eolophus roseicapillus</i>         | W                        |
| Laughing Kookaburra  |                        | <i>Dacelo novaeguineae</i>            | O                        |
| Little Wattlebird  |                        | <i>Anthochaera chrysoptera</i>        | OW                       |
| Long-billed Corella  |                        | <i>Cacatua tenuirostris</i>           | OW                       |
| Masked Lapwing   |                        | <i>Vanellus miles</i>                 | OW                       |
| Musk Lorikeet  |                        | <i>Glossopsitta concinna</i>          | OW                       |
| Noisy Miner  |                        | <i>Manorina melanocephala</i>         | OW                       |
| Rainbow Lorikeet   |                        | <i>Trichoglossus haematodus</i>       | OW                       |
| Red Wattlebird   |                        | <i>Anthochaera carunculata</i>        | OW                       |
| Sulphur Crested Cockatoo   |                        | <i>Cacatua galerita</i>               | OW                       |
| Tawny Frogmouth  |                        | <i>Podargus strigoides</i>            | O                        |
| White-browed Scrubwren   |                        | <i>Sericornis frontalis</i>           | OW                       |
| Yellow-faced Honeyeater  |                        | <i>Caligavis chrysops</i>             | OW                       |
| Mammals  |                        |                                       |                          |
| Black Rat *  |                        | <i>Rattus rattus</i>                  | O                        |
| Brown Antechinus   |                        | <i>Antechinus stuartii</i>            | O                        |
| Cat (feral)*   |                        | <i>Felis catus</i>                    | O                        |
| Common Ringtail Possum   |                        | <i>Pseudocheirus peregrinus</i>       | O                        |
| Domesticated Dog *   |                        | <i>Canis lupus familiaris</i>         | O                        |
| Eastern Freetail-bat   |                        | <i>Mormopterus ridei</i>              | U                        |
| Grey-headed Flying-fox <sup>TS</sup>   |                        | <i>Pteropus poliocephalus</i>         | OW                       |
| Gould's Wattled Bat  |                        | <i>Chalinolobus gouldii</i>           | U                        |
| Large Bent-winged Bat <sup>TS</sup>  |                        | <i>Miniopterus orianae oceanensis</i> | U                        |
| Little Bent-winged Bat <sup>TS</sup>   |                        | <i>Miniopterus australis</i>          | U                        |
| Little Forest Bat  |                        | <i>Vespadelus vulturnus</i>           | U                        |
| Rabbit *   |                        | <i>Oryctolagus cuniculus</i>          | O                        |
| Reptiles   |                        |                                       |                          |
| Eastern Water Dragon   |                        | <i>Intellagama lesueurii</i>          | O                        |
| Amphibians   |                        |                                       |                          |
| Common Eastern Froglet   |                        | <i>Crinia signifera</i>               | W                        |
| Striped Marsh Frog   |                        | <i>Limnodynastes peronii</i>          | OW                       |
| Note:    * indicates introduced species<br><sup>TS</sup> indicates threatened species<br><br>All species listed are identified to a high level of certainty unless otherwise noted as:<br><sup>PR</sup> indicates species identified to a 'probable' level of certainty – more likely than not<br><sup>PO</sup> indicates species identified to a 'possible' level of certainty – recorded to a moderate to high level of uncertainty usually applied to a threatened species of note. |                        |                                       |                          |
| E - Nest/roost   | H - Hair/feathers/skin | P - Scat                              | W - Heard call           |
| F - Tracks/scratchings   | K - Dead               | Q - Camera                            | X - In scat              |
| FB - Burrow  | O - Observed           | T - Trapped/netted                    | Y - Bone/teeth/shell     |
| G - Crushed cones  | OW - Obs & heard call  | U - Anabat/ultrasound                 | Z - In raptor/owl pellet |

# Appendix 3

## Threatened & Migratory Flora and Fauna Species Habitat Assessment



**Table A3.1 – Threatened flora species habitat assessment**

| Scientific name<br>DATABASE SOURCE1                            | BC Act | EPBC Act | Growth form and habitat requirements<br><i>Distribution limit</i>   | Recorded on site<br>(✓) | If not recorded on site         |   |  |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|--|--------|----------|---|-------------------------|---------------------------------|---|--|--------------------|--|
|  |        |          |   |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| <i>Acacia bynoeana</i><br>DPIE EPBC                            | E1     | V        | Erect or spreading shrub to 0.3m high growing in heath and dry sclerophyll open forest on sandy soils. Often associated with disturbed areas such as roadsides. <i>Distribution limits N-Newcastle S-Berrima.</i>   | x                       | ✓                               | 1 km SE   | 2008   | ✓                  | ✓  |
| <i>Acacia pubescens</i><br>DPIE EPBC                           | V      | V        | Spreading shrub 1-4m high open sclerophyll growing in open forest and woodlands on clay soils. <i>Distribution limits N-Bilpin S-Georges River.</i>   | x                       | x                               | -   | -  | x                  | x  |
| <i>Acacia terminalis</i> subsp. <i>terminalis</i><br>DPIE EPBC | E1     | E        | Erect shrub to 2m tall, flowers from March to July. Occurs in eucalypt woodland or forest, usually in sandy soil on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms on cliffs. <i>Typically restricted to the Port Jackson and eastern suburbs of Sydney.</i> | x                       | low                             | 6 km E  | 2018   | not likely         | x  |
| <i>Allocasuarina glareicola</i><br>EPBC                        | E1     | E        | Small shrub 1-2m high growing in open sclerophyll forest on lateritic soils derived from tertiary alluviums. <i>Distribution limits Castlereagh NR region.</i>  | x                       | x                               | -   | -  | x                  | x  |
| <i>Allocasuarina portuensis</i><br>DPIE                        | E1     | E        | A shrub of 3-5m tall, similar to other Casuarinaceae species. Grows in tall shrubland on sandstone headland at Nielsen Park, Vaucluse.  | x                       | x                               | -   | -  | x                  | x  |
| <i>Asterolasia buxifolia</i><br>OEH                            | E1     | -        | A spindly shrub with hairy stems to 2 m tall. Known from a single site associated with granite geology in the riparian zone of the Lett River.  | x                       | x                               | -   | -  | x                  | x  |
| <i>Asterolasia elegans</i><br>EPBC                             | E1     | E        | Erect shrub 1-3m high growing in moist sclerophyll forests on Hawkesbury sandstone slopes hillsides. <i>Distribution limits Maroota region.</i>   | x                       | x                               | -   | -  | x                  | x  |

| Scientific name<br>DATABASE SOURCE1         | BC Act | EPBC Act | Growth form and habitat requirements<br><i>Distribution limit</i>   | Recorded on site<br>(✓) | If not recorded on site         |   |  |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|---|--------|----------|---|-------------------------|---------------------------------|---|--|--------------------|--|
|   |        |          |   |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| <i>Caladenia tessellata</i><br>DPIE EPBC    | E1     | V        | Terrestrial orchid. Clay-loam or sandy soils. LHCCREMS guidelines suggest the species grows in Map Unit 34 – Coastal Sand Wallum Woodland - Heath. Flowers in September – November. <i>Distribution limits N-Swansea S-south of Eden.</i> | x                       | x                               | -   | -  | x                  | x  |
| <i>Callistemon linearifolius</i><br>DPIE    | V      | -        | Shrub to 4m high. Dry sclerophyll forest on coast and adjacent ranges. <i>Distribution limits N-Nelson Bay S-Georges River.</i>   | x                       | ✓                               | 2 km NNW  | 2018   | low                | ✓  |
| <i>Chamaesyce psammogeton</i><br>DPIE       | E1     | -        | Prostrate herb. Coastal dunes. <i>Distribution limits N-Tweed Heads S-Jervis Bay.</i>   | x                       | x                               | -   | -  | x                  | x  |
| <i>Cryptostylis hunteriana</i><br>DPIE EPBC | V      | V        | Saprophytic orchid. Grows in swamp heath on sandy soils. <i>Distribution limits N-Gibraltar Range S-south of Eden.</i>  | x                       | x                               | -   | -  | x                  | x  |
| <i>Cynanchum elegans</i><br>EPBC            | E1     | E        | Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. <i>Distribution limits N-Gloucester S-Wollongong.</i>   | x                       | x                               | -   | -  | x                  | x  |
| <i>Darwinia biflora</i><br>DPIE EPBC        | V      | V        | Erect or spreading shrub to 0.8m high. Grows in heath or understorey of woodland on or near shale-capped ridges underlain by Hawkesbury sandstone. <i>Distribution limits N-Gosford S-Cheltenham.</i>                                     | x                       | x                               | -   | -  | x                  | x  |
| <i>Darwinia peduncularis</i><br>DPIE        | V      | -        | Divaricate shrub to 1.5m high. Grows in dry sclerophyll forest on sandstone hillsides and ridges. <i>Distribution limits N-Glen Davis S-Hornsby.</i>  | x                       | x                               | -   | -  | x                  | x  |
| <i>Deyeuxia appressa</i><br>DPIE EPBC       | E1     | E        | Erect grass to 0.9m high. Grows on wet ground. <i>Distribution limits N-Hornsby S-Bankstown.</i>  | x                       | low                             | 5 km W  | 1941   | x                  | x  |

| Scientific name<br>DATABASE SOURCE1                          | BC Act | EPBC Act | Growth form and habitat requirements<br>Distribution limit   | Recorded on site<br>(✓) | If not recorded on site         |  |   |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|--|--------|----------|--|-------------------------|---------------------------------|--|---|--------------------|--|
|  |        |          |  |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br>Notes 1,2 & 3 | Record(s) from recent years<br>(✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| <i>Diuris bracteata</i><br>DPIE                              | E1     | Ext.     | An orchid that grows in dry sclerophyll woodland. Was thought to be extinct until approximately 10yrs ago. <i>Found in the Sydney Basin Bioregion.</i> Flowers in September.   | x                       | x                               | -  | -   | x                  | x  |
| <i>Epacris purpurascens</i> var. <i>purpurascens</i><br>DPIE | V      | -        | Erect shrub to 1.5m high growing in sclerophyll forest and scrub and near creeks and swamps on sandstone. <i>Distribution limits N-Gosford S-Blue Mountains.</i>   | x                       | marginal                        | 5 km NNE   | 2019  | low                | ✓  |
| <i>Eucalyptus camfieldii</i><br>DPIE EPBC                    | V      | V        | Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. <i>Distribution limits N-Norah Head S-Royal NP.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Eucalyptus nicholii</i><br>DPIE                           | V      | -        | This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. <i>It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property.</i>   | ✓ (planted)             | -                               | -  | -   | -                  | ✓  |
| <i>Eucalyptus scoparia</i><br>DPIE                           | E1     | V        | Smooth-barked tree only known from vicinity of Bald Rock.  | ✓ (planted)             | -                               | -  | -   | -                  | ✓  |
| <i>Genoplesium baueri</i><br>DPIE EPBC                       | E1     | E        | A terrestrial orchid that grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Feb–Mar. <i>Distribution limits N – Hunter Valley S – Nowra.</i>   | x                       | x                               | -  | -   | x                  | x  |
| <i>Genoplesium plumosum</i><br>DPIE                          | CE     | E        | Terrestrial Orchid that grows on shallow soils exclusively in heathland, generally dominated by Violet Kunzea ( <i>Kunzea parvifolia</i> ), Common Fringe-myrtle ( <i>Calytrix tetragona</i> ) and parrot-peas ( <i>Dillwynia</i> spp.). Flowers late Feb – Mar. <i>Tallong area and Moreton NP.</i> | x                       | x                               | -  | -   | x                  | x  |



| Scientific name<br>DATABASE SOURCE1                          | BC Act | EPBC Act | Growth form and habitat requirements<br>Distribution limit   | Recorded on site<br>(✓) | If not recorded on site         |  |   |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|--|--------|----------|--|-------------------------|---------------------------------|--|---|--------------------|--|
|  |        |          |  |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br>Notes 1,2 & 3 | Record(s) from recent years<br>(✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| <i>Grammitis stenophylla</i><br>DPIE                         | E1     | -        | A small lithophytic fern with fronds generally <5cm. Occurs in rainforest and wet sclerophyll forest in the coastal divisions of NSW. Usually grown on rocks.  | x                       | x                               | -  | -   | x                  | x  |
| <i>Grevillea caleyi</i><br>DPIE EPBC                         | E1     | E        | Shrub mostly 1-3m high. Grows in laterite. Distribution limits Terrey Hills-Belrose area.  | x                       | ✓                               | 1 km E   | 2019  | ✓                  | ✓  |
| <i>Grevillea juniperina</i> subsp. <i>juniperina</i><br>DPIE | V      | -        | Erect to spreading shrub 0.5-1.5m tall. Grows on laterite and Tertiary alluvium. Distribution limits St Marys-Londonderry-Prospect.  | x                       | x                               | -  | -   | x                  | x  |
| <i>Grevillea shiressii</i><br>DPIE EPBC                      | V      | V        | Shrub 2-5m high. Flowers mainly spring. Grows along creek banks in wet sclerophyll forest. Sandy soil on Hawkesbury Sandstone. Restricted to the Gosford area. CC.   | x                       | xl                              | -  | -   | x                  | x  |
| <i>Haloragis exalata</i> subsp. <i>exalata</i><br>DPIE EPBC  | V      | V        | Shrub to 1.5m high. Grows in damp places near watercourses. Distribution limits N-Tweed Heads S-south of Eden.   | x                       | x                               | -  | -   | x                  | x  |
| <i>Haloragodendron lucasii</i><br>DPIE EPBC                  | E1     | E        | Straggling shrub to 1.5m high. Grows in open forest on sheltered slopes near creeks. Distribution limits Ku-ring-gai Plateau and Mt Wilson.  | x                       | x                               | -  | -   | x                  | x  |
| <i>Hibbertia puberula</i><br>DPIE                            | E1     | -        | Shrublets with branches up to 30cm long. It favours dry sclerophyll woodland or low heath on sandy soils or rarely in clay, with or without rocks underneath. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records are from Hawkesbury River area in Sydney and the Blue Mountains. | x                       | x                               | -  | -   | x                  | x  |

| Scientific name<br>DATABASE SOURCE1      | BC Act | EPBC Act | Growth form and habitat requirements<br>Distribution limit   | Recorded on site<br>(✓) | If not recorded on site         |  |   |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|--|--------|----------|--|-------------------------|---------------------------------|--|---|--------------------|--|
|  |        |          |  |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br>Notes 1,2 & 3 | Record(s) from recent years<br>(✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| <i>Hibbertia spanantha</i><br>DPIE EPBC  | CE     | CE       | Grows in forest with canopy species including <i>E. pilularis</i> , <i>E. resinifera</i> , <i>C. gummifera</i> and <i>A. costata</i> . The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowers Oct-Nov with odd flowers throughout the year. Substrate is identified as a light clay occurring on a shale sandstone soil transition. | x                       | x                               | -  | -   | x                  | x  |
| <i>Hibbertia superans</i><br>DPIE        | E1     | -        | Small spreading shrub to 0.3m high. Grows on sandstone, usually in or near SSTF. <i>Distribution limits N-Glenorie S-Kellyville disjunct Mt Boss.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Kunzea rupestris</i><br>DPIE EPBC     | V      | V        | Shrub to 1.5m high. Grows in cracks and fissures on Hawkesbury Sandstone rock platforms. <i>Distribution limits N-Maroota S-Glenorie.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Lasiopetalum joyceae</i><br>DPIE EPBC | V      | V        | Erect shrub to 2m high. Grows in heath and open forest on Hawkesbury sandstone. <i>Distribution limits Hornsby Plateau.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Leptospermum deanei</i><br>DPIE EPBC  | V      | V        | Shrub to 5m high. Grows on forested slopes. <i>Distribution limits near watershed of Lane Cove River.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Melaleuca biconvexa</i><br>DPIE EPBC  | V      | V        | Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. <i>Distribution limits N-Port Macquarie S-Jervis Bay.</i>   | x                       | x                               | -  | -   | x                  | x  |
| <i>Melaleuca deanei</i><br>DPIE EPBC     | V      | V        | Shrub to 3m high. Grows in heath on sandstone. <i>Distribution limits N-Gosford S-Nowra.</i>   | x                       | x                               | -  | -   | x                  | x  |
| <i>Microtis angusii</i><br>DPIE EPBC     | E1     | E        | Terrestrial orchid which is known from one population at Ingleside. Associated with the Duffy's Forest vegetation community. Flowers May-Oct.  | x                       | x                               | -  | -   | x                  | x  |

| Scientific name<br>DATABASE SOURCE1                           | BC Act | EPBC Act | Growth form and habitat requirements<br>Distribution limit  | Recorded on site<br>(✓) | If not recorded on site         |  |   |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|---|--------|----------|---|-------------------------|---------------------------------|--|---|--------------------|--|
|   |        |          |   |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br>Notes 1,2 & 3 | Record(s) from recent years<br>(✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| <i>Persicaria elatior</i><br>EPBC                             | V      | V        | Herb to 90cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. <i>Varied distribution from SE NSW to QLD.</i> | x                       | x                               | -  | -   | x                  | x  |
| <i>Persoonia hirsuta</i><br>DPIE EPBC                         | E1     | E        | Erect to decumbent shrub. Grows in dry sclerophyll forest and woodland on Hawkesbury sandstone with infrequent fire histories. <i>Distribution limits N-Glen Davis S-Hill Top.</i>            | x                       | ✓                               | 3 km S   | 2007  | unlikely           | x  |
| <i>Persoonia mollis</i> subsp. <i>maxima</i><br>DPIE EPBC     | E1     | E        | Erect to prostrate shrub. Grows in moist to wet sclerophyll forests on Hawkesbury sandstone. <i>Distribution limits N-Cowan S-Hornsby.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Pimelea curviflora</i> var. <i>curviflora</i><br>DPIE EPBC | V      | V        | Woody herb or sub-shrub to 0.2-1.2m high. Grows on Hawkesbury Sandstone near shale outcrops. <i>Distribution Sydney.</i>  | x                       | ✓                               | 2.5 km NE  | 2017  | low                | ✓  |
| <i>Pimelea spicata</i><br>EPBC                                | E1     | E        | Decumbent or erect shrub to 0.5m high. Occurs principally in woodland on soils derived from Wianamatta Shales. <i>Distribution limits N-Lansdowne S-Shellharbour.</i>                         | x                       | x                               | -  | -   | x                  | x  |
| <i>Prasophyllum fuscum</i><br>DPIE                            | CE     | V        | Terrestrial orchid up to 45cm tall. Flowers from Oct-Dec and <i>restricted in distribution to the Georges River and Wingecaribee Swamp near Burrawang at an altitude of 50-200m.</i>          | x                       | x                               | -  | -   | x                  | x  |
| <i>Prostanthera densa</i><br>DPIE                             | V      | V        | Erect shrub 0.5-2m. Grows in sclerophyll forest and shrubland. <i>Distribution limits N-Nelson Bay S-Beecroft Peninsula.</i>  | x                       | x                               | -  | -   | x                  | x  |
| <i>Prostanthera junonis</i><br>DPIE EPBC                      | E1     | E        | Small shrub. Grows in sclerophyll forest and heath in shallow soil on sandstone. <i>Distribution limits Somersby region.</i>  | x                       | x                               | -  | -   | x                  | x  |



| Scientific name<br>DATABASE SOURCE1        | BC Act | EPBC Act | Growth form and habitat requirements<br><i>Distribution limit</i>  | Recorded on site<br>(✓) | If not recorded on site         |   |  |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|--|--------|----------|--|-------------------------|---------------------------------|---|--|--------------------|--|
|  |        |          |  |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years<br>(✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| <i>Prostanthera marifolia</i><br>DPIE EPBC | CE     | CE       | Erect shrub to 0.3m high. Woodland dominated by Eucalyptus sieberi and Corymbia gummifera. In deeply weathered clay soil with ironstone nodules. <i>Has been recorded previously in the Sydney Harbour region.</i>               | x                       | x                               | -   | -  | x                  | x  |
| <i>Rhodamnia rubescens</i><br>DPIE         | E4A    | -        | Shrub to small tree to 25m tall. Widespread in warmer rainforest and on rainforest margins on range of volcanically derived and sedimentary soils. Mainly coastal areas; north from Batemans Bay. Flowers late winter to spring. | x                       | x                               | -   | -  | x                  | x  |
| <i>Sarcochilus hartmannii</i><br>DPIE      | V      | V        | An orchid which grows on volcanic rocks, often in shallow soil in sclerophyll forest or exposed sites usually at an elevation above 500m. <i>Distribution – north from the Richmond River in the far north of NSW.</i>           | x                       | x                               | -   | -  | x                  | x  |
| <i>Syzygium paniculatum</i><br>DPIE EPBC   | V      | V        | Small tree. Subtropical and littoral rainforest on sandy soil. <i>Distribution limits N-Forster S-Jervis Bay.</i>  | ✓                       | -                               | -   | -  | -                  | ✓  |
| <i>Tetratheca glandulosa</i><br>DPIE       | V      | -        | Spreading shrub to 0.2m high. Sandy or rocky heath or scrub. <i>Distribution limits N-Mangrove Mountain S-Port Jackson.</i>  | x                       | ✓                               | 0.5 km NE   | 2019   | ✓                  | ✓  |
| <i>Tetratheca juncea</i><br>EPBC           | V      | V        | Prostrate shrub to 1m high. Dry sclerophyll forest and heath. <i>Distribution limits N-Bulahdelah S-Port Jackson.</i>  | x                       | low                             | x   | x  | x                  | x  |
| <i>Thesium australe</i><br>EPBC            | V      | V        | Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. <i>Distribution limits N-Tweed Heads S-south of Eden.</i>  | x                       | x                               | -   | -  | x                  | x  |
| <i>Triplarina imbricata</i><br>DPIE        | E1     | E        | A shrub to 2.8m tall, flowers from Nov-Dec. Occurs in heath, often in damp places along creek lines; coast and adjacent ranges. <i>Known from the Tabulum and Nymboida districts in NE NSW.</i>                                  | x                       | x                               | -   | -  | x                  | x  |

| Scientific name<br>DATABASE SOURCE1 | BC Act  | EPBC Act | Growth form and habitat requirements<br>Distribution limit   | Recorded on site<br>(✓) | If not recorded on site         |  |   |                    | Further consideration required<br>(✓)<br>Refer to Appendix 3 |
|-------------------------------------|---|----------|--|-------------------------|---------------------------------|--|---|--------------------|--|
|                                     |   |          |  |                         | Suitable habitat present<br>(✓) | Nearby and / or high number of record(s)<br>(✓)<br>Notes 1,2 & 3 | Record(s) from recent years<br>(✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| <i>Wilsonia backhousei</i><br>DPIE  | V   | -        | Perennial subshrub with procumbent branches. Grows in coastal saltmarshes. <i>Wilsonia backhousei</i> is salt tolerant and is found in intertidal saltmarshes and, more rarely, on seacliffs. In New South Wales <i>Wilsonia backhousei</i> is scattered along the coast, reaching a northern limit at Wamberal Lagoon. In the Sydney region there has been a considerable decline in the abundance of the species over the last 100yrs, largely as a result of loss of habitat. Distribution limits N-Sydney S-South of Eden. | x                       | x                               | -  | -   | x                  | x  |
| DPIE                                | - Denotes species listed within 10km of the subject site on the <i>Atlas of NSW Wildlife</i>  |          |  |                         |                                 |  |   |                    |  |
| EPBC                                | - Denotes species listed within 10km of the subject site in the <i>EPBC Act</i> habitat search  |          |  |                         |                                 |  |   |                    |  |
| V                                   | - Denotes vulnerable listed species under the relevant Act  |          |  |                         |                                 |  |   |                    |  |
| E or E1                             | - Denotes endangered listed species under the relevant Act  |          |  |                         |                                 |  |   |                    |  |
| E4A or CE                           | - Denotes critically endangered listed species under the relevant Act   |          |  |                         |                                 |  |   |                    |  |
| NOTE:                               | 1. This field is not considered if no suitable habitat is present within the subject site<br>2. 'records' refer to those provided by the <i>Atlas of NSW Wildlife</i><br>3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle |          |  |                         |                                 |  |   |                    |  |

**Table A3.2 – Threatened fauna species habitat assessment**

| Common name<br><i>Scientific name</i><br><small>Database source</small> | BC Act | EPBC Act | Preferred habitat<br><i>Distribution limit</i>  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|---|--------|----------|---|----------------------|------------------------------|--|---|--------------------|--|
|   |        |          |   |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><small>Notes 1,2 &amp; 3</small> | Record(s) from recent years (✓)<br><small>Notes 1,2 &amp; 3</small> | Potential to occur |  |
| Giant Burrowing Frog<br><i>Heleioporus australiacus</i><br>DPIE EPBC    | V      | V        | Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. <i>Distribution limit: N-Near Singleton S-South of Eden.</i>  | x                    | x                            | -  | -   | x                  | x  |
| Stuttering Frog<br><i>Mixophyes balbus</i><br>EPBC                      | E      | V        | Terrestrial inhabitant of rainforest and wet sclerophyll forests. <i>Distribution limit: N-near Tenterfield S-South of Bombala.</i>   | x                    | x                            | -  | -   | x                  | x  |
| Red-crowned Toadlet<br><i>Pseudophryne australis</i><br>DPIE            | V      | -        | Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non-breeding periods. <i>Distribution limit: N-Pokolbin. S-near Wollongong.</i> | x                    | Marginal                     | ✓  | ✓   | Low                | ✓  |
| Green and Golden Bell Frog<br><i>Litoria aurea</i><br>DPIE EPBC         | E      | V        | Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. <i>Distribution limit: N-Byron Bay S-South of Eden.</i>   | x                    | x                            | -  | -   | x                  | x  |
| Littlejohn's Tree Frog<br><i>Litoria littlejohnii</i><br>EPBC           | V      | V        | Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. <i>Distribution limit: N-Hunter River S-Eden.</i>    | x                    | x                            | -  | -   | x                  | x  |



| Common name<br>Scientific name<br>Database source              | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|  |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Rosenberg's Goanna<br><i>Varanus rosenbergi</i><br>DPIE        | V      | -        | Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops. <i>Distribution limit: N-Nr Broke. S-Nowra Located in scattered patches near Sydney, Nowra and Goulburn.</i> | x                    | x                            | -  | -   | x                  | x  |
| Broad-headed Snake<br><i>Hoplocephalus bungaroides</i><br>EPBC | E      | V        | Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. <i>Distribution limit: N-Mudgee Park. S-Nowra.</i>   | x                    | x                            | -  | -   | x                  | x  |
| Cotton Pygmy-goose<br><i>Nettapus coromandelianus</i><br>DPIE  | E      | -        | An aquatic species found in tropical to subtropical coastal lagoons, swamps and large bodies of calm fresh water with abundant vegetation. <i>Distribution limit: N-Tweed Heads. S-Pambula.</i>  | x                    | x                            | -  | -   | x                  | x  |
| Wompoo Fruit-dove<br><i>Ptilinopus magnificus</i><br>DPIE      | V      | -        | Inhabits large undisturbed patches of lowland and adjacent highland rainforest and moist eucalypt forests where it feeds on fruit. <i>Distribution limit: N-Tweed Heads. S-Sydney.</i>   | x                    | x                            | -  | -   | x                  | x  |
| Rose-crowned Fruit-dove<br><i>Ptilinopus regina</i><br>DPIE    | V      | -        | Occurs in dense rainforests with a substantial understorey where it feeds entirely on fruit. <i>Distribution limit: N-Tweed Heads. S-Wollongong.</i>   | x                    | x                            | -  | -   | x                  | x  |

| Common name<br>Scientific name<br>Database source                  | BC Act | EPBC Act | Preferred habitat<br>Distribution limit   | Recorded on site (✓) | If not recorded on site      |   |  |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|---|----------------------|------------------------------|---|--|--------------------|--|
|  |        |          |   |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br>Notes 1,2 & 3 | Record(s) from recent years (✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| Superb Fruit-dove<br><i>Ptilinopus superbus</i><br>DPIE            | V      | -        | Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. <i>Distribution limit: N-Border Ranges National Park. S-Batemans Bay.</i>  | x                    | x                            | -   | -  | x                  | x  |
| White-bellied Sea Eagle<br><i>(Haliaeetus leucogaster)</i><br>DPIE | V      | -        | Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. <i>Sedentary; dispersive. N-Tweed Heads. S-South of Eden.</i>   | x                    | x                            | -   | -  | x                  | x  |
| Little Eagle<br><i>Hieraaetus morphnoides</i><br>DPIE              | V      | -        | Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. <i>Distribution limit - N-Tweed Heads. S-South of Eden.</i>   | x                    | Marginal                     | x   | ✓  | Not likely         | x  |
| Square-tailed Kite<br><i>Lophoictinia isura</i><br>DPIE            | V      | -        | Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. <i>Distribution limit: N-Goondiwindi. S-South of Eden.</i> | x                    | Sub-optimal                  | ✓   | ✓  | Low                | x  |
| Eastern Osprey<br><i>Pandion cristatus</i><br>DPIE                 | V      | -        | Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>  | x                    | x                            | -   | -  | x                  | x  |
| Bush Stone-curlew<br><i>Burhinus grallarius</i><br>DPIE            | E      | -        | Utilises open forests and savannah woodlands, sometimes dune scrub, savannah and mangrove fringes. <i>Distribution limit: N-Border Ranges National Park. S-Near Nowra.</i>  | x                    | x                            | -   | -  | x                  | x  |

| Common name<br>Scientific name<br>Database source                | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|  |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Gang-gang Cockatoo<br><i>Callocephalon fimbriatum</i><br>DPIE    | V      | -        | Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. <i>Distribution limit: mid north coast of NSW to western Victoria.</i> | x                    | Marginal                     | x  | ✓   | Unlikely           | ✓  |
| Glossy Black-Cockatoo<br><i>Calyptorhynchus lathamii</i><br>DPIE | V      | -        | Open forests with <i>Allocasuarina</i> species and hollows for nesting. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>   | x                    | Sub-Optimal                  | ✓  | ✓   | ✓                  | ✓  |
| Little Lorikeet<br><i>Glossopsitta pusilla</i><br>DPIE           | V      | -        | Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>   | x                    | Sub-Optimal                  | ✓  | ✓   | ✓                  | ✓  |
| Swift Parrot<br><i>Lathamus discolor</i><br>DPIE EPBC            | E      | E        | Inhabits eucalypt forests and woodlands with winter flowering eucalypts. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>  | x                    | Sub-Optimal                  | ✓  | ✓   | Low                | ✓  |
| Turquoise Parrot<br><i>Neophema pulchella</i><br>DPIE            | V      | -        | Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. <i>Distribution limit: N-Near Tenterfield. S-South of Eden.</i>   | x                    | Marginal                     | x  | ✓   | Unlikely           | ✓  |
| Superb Parrot<br><i>Polytelis swainsonii</i><br>DPIE             | V      | V        | Inhabits open woodland and riverine forests of inland NSW. <i>Distribution limit: N-Near Walgett. S-South of Deniliquin.</i>   | x                    | x                            | -  | -   | x                  | x  |



| Common name<br>Scientific name<br>Database source                               | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|---|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|   |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Barking Owl<br><i>Ninox connivens</i><br>DPIE                                   | V      | -        | Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. <i>Distribution limit: N-Border Ranges National Park. S-Eden.</i>  | x                    | Sub-Optimal                  | ✓  | ✓   | Low                | ✓  |
| Powerful Owl<br><i>Ninox strenua</i><br>DPIE                                    | V      | -        | Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. <i>Distribution limits: N-Border Ranges National Park. S-Eden.</i>   | x                    | Marginal                     | ✓  | ✓   | Unlikely           | ✓  |
| Masked Owl<br><i>Tyto novaehollandiae</i><br>DPIE                               | V      | -        | Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. <i>Distribution limit: N-Border Ranges National Park. S-Eden.</i>  | x                    | Sub-Optimal                  | x  | ✓   | Unlikely           | ✓  |
| Sooty Owl<br><i>Tyto tenebricosa</i><br>DPIE                                    | V      | -        | Tall, dense, wet forests containing trees with very large hollows. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>  | x                    | x                            | -  | -   | x                  | x  |
| White-throated Needletail <sup>MS</sup><br><i>Hirundapus caudacutus</i><br>EPBC | -      | V        | Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies often forage along favoured hilltops and timbered ranges. Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i> | x                    | Marginal                     | x  | x   | Unlikely           | ✓  |
| Brown Treecreeper<br><i>Climacteris picumnus victoriae</i><br>DPIE              | V      | -        | Occupies eucalypt woodlands, open woodland lacking a dense understorey with fallen dead timber. <i>Distribution limit: (Sub species victoriae) Central NSW west of Great Div. Cumberland Plains, Hunter Valley, Richmond, Clarence, and Snowy River Valleys.</i>                         | x                    | Marginal                     | ✓  | ✓   | Unlikely           | ✓  |

| Common name<br>Scientific name<br>Database source                       | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |   |  |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|---|--------|----------|--|----------------------|------------------------------|---|--|--------------------|--|
|   |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br>Notes 1,2 & 3 | Record(s) from recent years (✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| Eastern Bristlebird<br><i>Dasyornis brachypterus</i><br>EPBC            | E      | E        | Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>  | x                    | x                            | -   | -  | x                  | x  |
| Regent Honeyeater<br><i>Xanthomyza phrygia</i><br>DPIE EPBC             | E4A    | CE       | Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. <i>Distribution limit: N-Urbanville. S-Eden.</i>   | x                    | Marginal                     | ✓   | x  | Unlikely           | x  |
| Painted Honeyeater<br><i>Grantiella picta</i><br>EPBC                   | V      | V        | A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. <i>Distribution limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.</i> | x                    | x                            | -   | -  | x                  | x  |
| Black-chinned Honeyeater<br><i>Meliphreptus gularis gularis</i><br>DPIE | V      | -        | Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence. <i>Distribution limit: N-Cape York Pen. Qld. S-Victoria H. Mt Lofty Ra &amp; Flinders Ra. SA.</i>   | x                    | x                            | -   | -  | x                  | x  |
| Varied Sittella<br><i>Daphoenositta chrysoptera</i><br>DPIE             | V      | -        | Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>   | x                    | Marginal                     | x   | ✓  | Unlikely           | ✓  |

| Common name<br>Scientific name<br>Database source                   | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|---|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|   |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Dusky Woodswallow<br><i>Artamus cyanopterus cyanopterus</i><br>DPIE | V      | -        | Found in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Prefers habitat with an open understorey. Often observed in farmland tree patches or roadside remnants. <i>Widespread in eastern, southern and south-western Australia.</i> | x                    | Marginal                     | x  | x   | Not-likely         | x  |
| Scarlet Robin<br><i>Petroica boodang</i><br>DPIE                    | V      | -        | Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>  | x                    | Marginal                     | x  | ✓   | Unlikely           | ✓  |
| Diamond Firetail<br><i>Stagonopleura guttata</i><br>DPIE            | V      | -        | Found in eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. <i>Distribution limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.</i>  | x                    | x                            | -  | -   | x                  | x  |
| Spotted-tailed Quoll<br><i>Dasyurus maculatus</i><br>DPIE EPBC      | V      | E        | Dry and moist open forests containing rock caves, hollow logs or trees. <i>Distribution limit: N-Mt Warning National Park. S-South of Eden.</i>  | x                    | x                            | -  | -   | x                  | x  |



| Common name<br>Scientific name<br>Database source                 | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|---|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|   |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Southern Brown Bandicoot<br><i>Isoodon obesulus</i><br>DPIE EPBC  | E      | E        | Utilises a range of habitats containing thick ground cover - open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland.<br><i>Distribution limit: N-Kempsey. S-South of Eden.</i>  | x                    | Sub - optimal                | ✓  | ✓   | Unlikely           | ✓  |
| Brush-tailed Rock-wallaby<br><i>Petrogale penicillata</i><br>EPBC | E      | V        | Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. <i>Distribution limit: N-North of Tenterfield. S-Bombala.</i>  | x                    | x                            | -  | -   | x                  | x  |
| Koala<br><i>Phascolarctos cinereus</i><br>DPIE EPBC               | V      | V        | Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees.<br><i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>  | x                    | x                            | -  | -   | x                  | x  |
| Eastern Pygmy Possum<br><i>Cercatetus nanus</i><br>DPIE           | V      | -        | Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs. <i>Distribution limit: N-Tweed Heads. S-Eden.</i> | x                    | Marginal                     | ✓  | ✓   | Unlikely           | ✓  |
| Yellow-bellied Glider<br><i>Petaurus australis</i><br>DPIE        | V      | -        | Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>   | x                    | Marginal                     | x  | x   | Not likely         | x  |

| Common name<br>Scientific name<br>Database source                        | BC Act | EPBC Act | Preferred habitat<br>Distribution limit  | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|--|----------------------|------------------------------|--|---|--------------------|--|
|  |        |          |  |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| Squirrel Glider<br><i>Petaurus norfolcensis</i><br>DPIE                  | V      | -        | Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. <i>Distribution limit: N-Tweed Heads. S-Albury.</i>  | x                    | Marginal                     | x  | x   | Unlikely           | ✓  |
| Greater Glider<br><i>Petauroides volans</i><br>DPIE EPBC                 | -      | V        | Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows <i>Distribution limit: N-Border Ranges National Park. S- South of Eden.</i> | x                    | x                            | -  | -   | x                  | x  |
| Parma Wallaby<br><i>Macropus parma</i><br>DPIE                           | V      | -        | Inhabits rainforests and wet and dry sclerophyll forests with a dense understorey and associated grassy patches. <i>Distribution limit: N-Border Ranges National Park. S-Morton National Park.</i>   | x                    | x                            | -  | -   | x                  | x  |
| Grey-headed Flying-fox<br><i>Pteropus poliocephalus</i><br>DPIE EPBC     | V      | V        | Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. <i>Distribution limit: N-Tweed Heads. S-Eden.</i>  | ✓                    | -                            | -  | -   | Recorded           | ✓  |
| Yellow-bellied Sheathtail-bat<br><i>Saccolaimus flaviventris</i><br>DPIE | V      | -        | Rainforests, sclerophyll forests and woodlands. <i>Distribution limit: N-North of Walgett. S-Sydney.</i>   | x                    | Sub-optimal                  | x  | ✓   | Unlikely           | ✓  |

| Common name<br>Scientific name<br>Database source                      | BC Act | EPBC Act | Preferred habitat<br>Distribution limit   | Recorded on site (✓) | If not recorded on site      |  |   |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|---|----------------------|------------------------------|--|---|--------------------|--|
|  |        |          |   |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br><i>Notes 1,2 &amp; 3</i> | Record(s) from recent years (✓)<br><i>Notes 1,2 &amp; 3</i> | Potential to occur |  |
| East-coast Freetail Bat<br><i>Micronomus norfolkensis</i><br>DPIE      | V      | -        | Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. <i>Distribution limit: N-Woodenbong. S-Pambula.</i>                    | x                    | Sub-optimal                  | ✓  | ✓   | Low                | ✓  |
| Large-eared Pied Bat<br><i>Chalinolobus dwyeri</i><br>DPIE EPBC        | V      | V        | Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. <i>Distribution limit: N-Border Ranges National Park. S-Wollongong.</i> | x                    | Sub-optimal                  | ✓  | ✓   | Low                | ✓  |
| Eastern False Pipistrelle<br><i>Falsistrellus tasmaniensis</i><br>DPIE | V      | -        | Recorded roosting in caves, old buildings and tree hollows. <i>Distribution limit: N-Border Ranges National Park. S-Pambula.</i>  | x                    | Marginal                     | x  | ✓   | Unlikely           | ✓  |
| Little Bent-winged Bat<br><i>Miniopterus australis</i><br>DPIE         | V      | -        | Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. <i>Distribution limit: N-Border Ranges National Park. S-Sydney.</i>                                  | ✓                    | -                            | -  | -   | Recorded           | ✓  |
| Large Bent-winged Bat<br><i>Miniopterus orianae oceanensis</i><br>DPIE | V      | -        | Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>                                  | ✓                    | -                            | -  | -   | Recorded           | ✓  |



| Common name<br>Scientific name<br>Database source              | BC Act | EPBC Act | Preferred habitat<br>Distribution limit   | Recorded on site (✓) | If not recorded on site      |   |  |                    | Considered in assessment of significance test (✓)<br>(Refer to Appendix 2) |
|--|--------|----------|---|----------------------|------------------------------|---|--|--------------------|--|
|  |        |          |   |                      | Suitable habitat present (✓) | Nearby and/or high number of record(s) (✓)<br>Notes 1,2 & 3 | Record(s) from recent years (✓)<br>Notes 1,2 & 3 | Potential to occur |  |
| Southern Myotis<br><i>Myotis macropus</i><br>DPIE              | V      | -        | Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>   | x                    | Marginal                     | ✓   | ✓  | Unlikely           | ✓  |
| Greater Broad-nosed Bat<br><i>Scoteanax rueppellii</i><br>DPIE | V      | -        | Inhabits areas containing moist river and creek systems, especially tree lined creeks. <i>Distribution limit: N-Border Ranges National Park. S-Pambula.</i>   | x                    | Marginal                     | x   | ✓  | Unlikely           | ✓  |
| New Holland Mouse<br><i>Pseudomys novaehollandiae</i><br>EPBC  | -      | V        | Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recolonise of regenerating burnt areas. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i> | x                    | Marginal                     | x   | x  | Not likely         | x  |
| The Golden Sun Moth<br><i>Synemon plana</i><br>EPBC            | E      | -        | Inhabits natural treeless grasslands containing <i>Austrodanthonia carphoides</i> . <i>Distribution limit: Southern Tablelands and South West Slopes.</i>   | x                    | x                            | -   | -  | x                  | x  |
| Dural Land Snail<br><i>Pommerhelix duralensis</i><br>EPBC      | E      | E        | Occurs on shale-sandstone transitional forest landscapes within the Blue Mountains, Penrith, The Hills, Wollondilly, Hornsby and Parramatta LGA's. Occurs in low abundance and shelters under rocks or inside curled-up bark, beneath leaves and light woody debris. <i>Distribution limit: St Albans to Mulgoa with most records from The Hills LGA.</i>                         | x                    | x                            | -   | -  | x                  | x  |

A detailed assessment in accordance with Section 1.7 of the *EPA Act* will be completed for these species in Appendix 4 of this report.

Table A3.3 provides an assessment of potential habitat within the subject site for nationally *protected* migratory fauna species recorded within 10 km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A3.3.

**Table A3.3 – Migratory fauna habitat assessment**

| Common name<br><i>Scientific name</i>                        | Preferred habitat<br><i>Migratory breeding</i>   | Suitable habitat present<br>(✓) | Recorded on site<br>(✓) | Comments |
|--|--|---------------------------------|-------------------------|----------|
| Oriental or Horsfield's Cuckoo<br>( <i>Cuculus optatus</i> ) | It mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground.  | x                               | x                       | -        |
| Spectacled Monarch<br>( <i>Monarcha trivirgatus</i> )        | Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. <i>Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept/Oct to May. Uncommon in southern part of range.</i>  | x                               | x                       | -        |
| Black-faced Monarch<br>( <i>Monarcha melanopsis</i> )        | Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. <i>Summer breeding migrant to coastal south east Australia, otherwise uncommon.</i>   | x                               | x                       | -        |
| Rainbow Bee-eater<br>( <i>Merops ornatus</i> )               | Open woodlands with sandy, loamy soil; sandridges, sandspits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves, rainforest, woodlands, golf courses. <i>Breeding resident in northern Australia. Summer breeding migrant to south east and south west Australia.</i>   | ✓                               | x                       | -        |
| Yellow Wagtail<br>( <i>Motacilla flava</i> )                 | The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.   | x                               | x                       | -        |
| Satin Flycatcher<br>( <i>Myiagra cyanoleuca</i> )            | Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. <i>Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.</i>  | ✓                               | x                       | -        |
| Rufous Fantail<br>( <i>Rhipidura rufifrons</i> )             | Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. <i>Breeding migrant to south east Australia over warmer months. Altitudinal migrant in north east NSW in mountain forests during warmer months.</i> | x                               | x                       | -        |
| Fork-tailed Swift<br>( <i>Apus pacificus</i> )               | Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. <i>Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.</i>  | ✓                               | x                       | -        |

# Appendix 4

## Test of Significance

Section 7.2 of the *BC Act* requires a determination as to whether a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Henceforth this is referred to as the 'test of significance'. For the purposes of this part, development or an activity is likely to significantly affect threatened species if:

- (a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in Section 7.3, or
- (b) the development exceeds the threshold if the BOS applies to the impacts of the development on biodiversity values, or
- (c) it is carried out in a declared area of outstanding biodiversity value.

Section 7.3 of the *BC Act* provides the terms of the test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

The following test of significance relies on the biodiversity assessment provided in this report and should be read making reference to the relevant discussion on each threatened species or their habitats, endangered population and ecological community.

Flora investigations and fauna habitat assessments of the study area have resulted in the identification of suitable habitat for the following threatened species and populations with varying potential to occur. Species recorded or with a considered potential to occur have been noted. The potential for any direct or indirect impacts on these species has also been considered and noted.

### ***Threatened flora***

| Scientific name             | BC Act | Potential to occur | Potential impact      |
|-----------------------------|--------|--------------------|-----------------------|
| <i>Syzygium paniculatum</i> | V      | planted            | no impact             |
| <i>Eucalyptus scoparia</i>  | E1     | planted            | 3 specimens (planted) |

### ***Threatened ecological communities***

Coastal Upland Swamp and Duffys Forest - no impacts on either.

### ***Threatened fauna***

| Common name                     | BC Act | Potential to occur | Potential impact                                |
|---------------------------------|--------|--------------------|---|
| Grey-headed Flying-fox          | V      | Recorded           | Direct – on recorded seasonal foraging habitat  |
| Little Bent-winged Bat          | V      | Recorded           | None anticipated                                |
| Large Bent-winged Bat           | V      | Recorded           | None anticipated                                |
| Glossy Black-Cockatoo           | V      | ✓                  | Direct – on potential foraging habitat          |
| Little Lorikeet                 | V      | ✓                  | Direct – on potential seasonal foraging habitat |
| Red-crowned Toadlet             | V      | Low                | Indirect – Low potential breeding habitat       |
| Square-tailed Kite              | V      | Low                | None anticipated                                |
| Swift Parrot                    | E      | Low                | None anticipated                                |
| Barking Owl                     | V      | Low                | Indirect – unlikely potential foraging          |
| Eastern Coastal Free-tailed Bat | V      | Low                | Direct – on unlikely roosting habitat           |
| Large-eared Pied Bat            | V      | Low                | None anticipated                                |
| Gang-gang Cockatoo              | V      | Unlikely           | Indirect – unlikely potential foraging          |
| Turquoise Parrot                | V      | Unlikely           | Indirect – unlikely potential foraging          |
| Powerful Owl                    | V      | Unlikely           | Indirect – unlikely potential foraging          |



| Common name                    | BC Act | Potential to occur | Potential impact                                     |
|--------------------------------|--------|--------------------|--|
| Masked Owl                     | V      | Unlikely           | Indirect – unlikely potential foraging               |
| Brown Treecreeper              | V      | Unlikely           | None anticipated                                     |
| Regent Honeyeater              | E4A    | Unlikely           | None anticipated                                     |
| Varied Sittella                | V      | Unlikely           | Indirect – unlikely potential foraging               |
| Scarlet Robin                  | V      | Unlikely           | Indirect – unlikely potential foraging               |
| Southern Brown Bandicoot       | E      | Unlikely           | Indirect – unlikely potential foraging               |
| Eastern Pygmy Possum           | V      | Unlikely           | Direct – unlikely potential habitat                  |
| Squirrel Glider                | V      | Unlikely           | Direct – unlikely potential denning/foraging habitat |
| Yellow-bellied Sheath-tail-bat | V      | Unlikely           | None anticipated                                     |
| Eastern False Pipistrelle      | V      | Unlikely           | Direct – on unlikely roosting habitat                |
| Southern Myotis                | V      | Unlikely           | Direct – on unlikely roosting habitat                |
| Greater Broad-nosed Bat        | V      | Unlikely           | Direct – on unlikely roosting habitat                |

### **Endangered populations**

None

### **BC ACT 2016 - SECTION 7.3 – TEST OF SIGNIFICANCE**

Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats. The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

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

The direct and indirect impacts of the proposal are considered within Section 6.2.

With consideration to the relative direct and indirect impacts on all threatened species with varying potential to occur, it is considered that the proposal is unlikely to disrupt the life cycle for any of these listed species such that a viable local population would be placed at risk of extinction. Species recorded present during survey, previously recorded nearby or with high potential to occur and requiring further discussion given potential impacts are further discussed in detail below.

### **Summary of threatened species recorded**

#### ***Eucalyptus nicholii***

This species is a small to medium sized tree with rough bark that is persistent to the small branches. Grows in woodland in the Northern Tablelands of NSW from Walcha to Glen Innes. Often found growing on porphyry or granitic soils. This species is commonly planted as a street or parkland tree throughout NSW. A detailed search observed a singular specimen of this species. This individual will not be impacted by the proposal.

### ***Eucalyptus scoparia***

This species is a tree to 15m tall with smooth white powdery bark, island type oil glands in the long narrow leaves, white flowers, and hemispherical to campanulate cup shaped fruits 4–6 mm wide. This species is confined to granitic soils in the mountains of south-eastern Queensland in the vicinity of Wallangarra. This species is commonly planted as a street or parkland tree throughout NSW. Three (3) planted individuals of this species are likely to be impacted by the proposal.

The specimens occur well outside of its natural habitat and appears to have been planted as a landscaping tree. As this species occurs outside its natural population distribution it is not considered to be a viable local population within the guidelines of the NPWS (NPWS Information Circular No 2, 1996). It is considered that the action proposed is not 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.

### ***Syzygium paniculatum***

Several individuals of *S. paniculatum* are present within the subject lot, two of which are located within the study area. None of these individuals will be impacted by the proposal.

### **Grey-headed Flying-fox**

Grey-Headed Flying-foxes are canopy feeding frugivores and nectarivores, inhabiting a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. This species roosts in camps, which may contain tens of thousands of individuals.

Camps are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy (Tidemann 1998). Camps can be found in riparian rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas. Loyalty to a site is high and some camps in NSW have been used for over a century (NSW NPWS 2001). Some camps are used at the same time every year by hundreds of thousands of flying-foxes while others are used sporadically by a few hundred individuals (Strahan 1995). Generally foraging is within 20km of camps but individuals are known to commute up to 50km to a productive food source.

Grey-headed Flying-foxes were recorded during recent April 2020 survey flying over the study area heading in a north-easterly direction during the late dusk period. The subject site provides only seasonal foraging habitat for the Grey-headed Flying-fox represented as natural and planted myrtaceous trees. No suitable roosting or subsequent breeding habitat is present.

Foraging habitat present within the subject site will be almost entirely removed. Foraging habitat is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

### **Little Bent-winged Bat & Large Bent-winged Bat**

These two species are considered here together because of their similar roosting/breeding habitat requirements and subsequent assessment outcome.

The Little Bent-winged Bat forages below the canopy within open forests and woodlands, feeding on small insects (Dwyer 1995b). This species roosts in caves, tunnels, tree hollows and occasionally old buildings (Dwyer 1995b). Caves are an important resource for this

species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995b). One record exists of this species utilising a tree hollow however hollows are not currently considered as preferred habitat for this species (pers. com. Brad Law).

The Large Bent-winged Bat forages above and below the canopy within open forests and woodlands, feeding on small flying insects, predominantly moths (Dwyer 1995). The Large Bent-winged Bat is known to roost in a range of habitats including stormwater channels, under bridges, occasionally in buildings, old mines and, in particular, caves (Dwyer 1995). Caves are an important resource for this species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995). Roost sites in tree hollows have not been reported within the literature reviewed. This species has not been identified as utilising culverts for maternity roosts. Maternity roosts rather are occupied by up to 100 000 females with only 12 maternity roosts known throughout the complete range (Hoy & Hall 2008).

The Little Bent-winged Bat and Large Bent-winged Bat were recorded foraging over the study area during April 2020 survey. It is considered that the subject site provides suitable foraging only habitat for the Little Bent-winged Bat and Large Bent-winged Bat. It is expected that anywhere between 1 and 10 individual bats of each species would routinely utilise the study area for foraging. It is expected that only one or two individual bats would routinely utilise the study area for foraging.

No important roosting or breeding habitat is likely present within the study area. Roosting locations are expected to occur throughout the locality and many of these are likely within man-made structures.

Given the highly mobile nature of these species, the absence of any important habitat, their known ability to move across and utilise some urban landscapes and that the proposed development will not inhibit local movements and dispersal, the Little Bent-winged Bat and Large Bent-winged Bat will not be likely significantly impacted by the proposed development.

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

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

Two (2) TECs – CUS and DF, were observed within the study area outside the development footprint. The proposal will not adversely affect the extent of either of these TECs.

**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,***

No TECs will be modified by the proposal.

**c) *In relation to the habitat of threatened species or ecological community:***

It is considered that the habitat attributes of the subject site provide known or potential habitat for *Eucalyptus scoparia*, *Eucalyptus nicholii*, *Syzygium paniculatum*, Grey-headed Flying-fox, Little Bent-winged Bat, Large Bent-winged Bat, Glossy Black-Cockatoo, Little Lorikeet, Red-crowned Toadlet, Square-tailed Kite, Swift Parrot, Barking Owl, Eastern Coastal Free-tailed Bat, Large-eared Pied Bat, Gang-gang Cockatoo, Turquoise Parrot, Powerful Owl, Masked Owl, Brown Treecreeper, Regent Honeyeater, Varied Sittella, Scarlet

Robin, Southern Brown Bandicoot, Eastern Pygmy Possum, Squirrel Glider, Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis and Greater Broad-nosed Bat.

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

The proposal will directly impact 0.04 ha of remnant and planted native vegetation.

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

The subject site is located beyond the outer edge of any contiguous natural vegetation. The habitat present is fragmented within a local urban setting approximately 300m from quality natural local bushland habitat with no habitat continuing beyond the study area, therefore the proposal will not fragment or isolate areas of habitat.

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

The proposal will not impact on any naturally occurring threatened plants or on any EECs.

In respect to threatened fauna species recorded or with potential to occur the proposed area of impact is not likely of high quality, of any breeding importance or central to the home range requirements of any species such that behaviour or ecology of these species will be significantly altered in any way.

The subject site is not part of a corridor and will not fragment or isolate any habitats for threatened species.

Overall, the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population and ecological communities in the locality is considered to be minimal.

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

The subject site is not within any declared area of outstanding biodiversity value. Therefore the proposal will not have any adverse effects on any declared area of outstanding biodiversity value (either directly or indirectly).

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

A key threatening process is defined as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

The current list of key threatening processes, and whether the proposed activity is recognised as a threatening process, is shown below.



| Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)           | Is the development or activity proposed of a class of development or activity that is recognised as a threatening process? |          |          |
|--|--|----------|----------|
|  | Likely   | Possible | Unlikely |
| Aggressive exclusion of birds by Noisy Miners ( <i>Manorina melanocephala</i> )  |  |          | ✓        |
| Alteration of habitat following subsidence due to longwall mining  |  |          | ✓        |
| Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands  |  |          | ✓        |
| Anthropogenic Climate Change   | ✓  |          |          |
| Bushrock removal   |  |          | ✓        |
| Clearing of native vegetation  | ✓  |          |          |
| Competition and habitat degradation by feral goats   |  |          | ✓        |
| Competition and grazing by the feral European Rabbit ( <i>Oryctolagus cuniculus</i> )  |  |          | ✓        |
| Competition from feral honeybees   |  |          | ✓        |
| Death or injury to marine species following capture in shark control programs on ocean beaches   |  |          | ✓        |
| Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments   |  |          | ✓        |
| Forest Eucalypt dieback associated with over-abundant psyllids and bell miners   |  |          | ✓        |
| High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition |  |          | ✓        |
| Herbivory and environmental degradation caused by feral deer   |  |          | ✓        |
| Importation of red imported fire ants into NSW   |  |          | ✓        |
| Infection by <i>Psittacine circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations                   |  |          | ✓        |
| Infection of frogs by amphibian chytrid causing the disease chytridiomycosis   |  |          | ✓        |
| Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae                      |  | ✓        |          |
| Infection of native plants by <i>Phytophthora cinnamomi</i>  |  | ✓        |          |
| Introduction of the large earth bumblebee ( <i>Bombus terrestris</i> )   |  |          | ✓        |
| Invasion and establishment of exotic vines and scramblers  |  |          | ✓        |
| Invasion and establishment of Scotch Broom ( <i>Cytisus scoparius</i> )  |  |          | ✓        |
| Invasion and establishment of the Cane Toad ( <i>Bufo marinus</i> )  |  |          | ✓        |
| Invasion, establishment and spread of <i>Lantana camara</i>  |  |          | ✓        |
| Invasion of native plant communities by bitou bush & boneseed <i>Chrysanthemoides monilifera</i>   |  |          | ✓        |
| Invasion of native plant communities by exotic perennial grasses   |  | ✓        |          |

| Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process) | Is the development or activity proposed of a class of development or activity that is recognised as a threatening process? |          |          |
|--|--|----------|----------|
|  | Likely   | Possible | Unlikely |
| Invasion of native plant communities by African Olive ( <i>Olea europaea</i> subsp. <i>cuspidata</i> )                               |  |          | ✓        |
| Invasion of the Yellow Crazy Ant ( <i>Anoplolepis gracilipes</i> )   |  |          | ✓        |
| Loss of Hollow-bearing trees   |  |          | ✓        |
| Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants               |  | ✓        |          |
| Loss and/or degradation of sites used for hill-topping by butterflies  |  |          | ✓        |
| Predation and hybridisation by feral dogs ( <i>Canis lupus familiaris</i> )  |  |          | ✓        |
| Predation by the European Red Fox ( <i>Vulpes vulpes</i> )   |  |          | ✓        |
| Predation by the Feral Cat ( <i>Felis catus</i> )  |  |          | ✓        |
| Predation by <i>Gambusia holbrooki</i> Girard, 1859 (plague minnow or mosquito fish)   |  |          | ✓        |
| Predation by the Ship Rat ( <i>Rattus rattus</i> ) on Lord Howe Island   |  |          | ✓        |
| Predation, habitat degradation, competition & disease transmission from Feral pigs ( <i>Sus scrofa</i> )                             |  |          | ✓        |
| Removal of dead wood and dead trees  | ✓  |          |          |

The above key threatening processes have been considered in reference to the proposal. It was considered that the proposal may contribute to a small degree to a number these processes as described below. It is considered that the proposal will have only a minor or cumulative on any of the following key threatening processes. Some mitigation measures have been listed under each process to minimise or reduce such impacts upon those processes.

### Summary of “likely” or “possible” Key Threatening Processes

This section identifies what mitigation measures can be implemented to address threatening processes.

#### *Human-caused Climate Change*

The proposal will require the removal of a small amount of vegetation which will result in a negative or positive contribution to climate change. Vegetation is considered to act as a sink for a range of greenhouse gases but in particular Carbon Dioxide. The maintenance of native vegetation cover is a key strategy to combat the contributing impacts of the proposed action on Climate Change. Increased risk of bushfire, flooding and storms are to be considered as part of the proposed action. This issue requires total systems management including consideration of energy use throughout the lifecycle of the proposed action including all aspects of the actions processes, materials supply and production. Whilst almost insignificant in size, the proposal is part of the accumulative effect and thus should be considered as contributing to this threatening process.

### *Clearing of native vegetation*

0.04 ha of native vegetation will be removed as part of the proposal. This include the loss of nine (9) surveyed remnant trees and a few planted specimens. The loss of native vegetation will not fragment or isolate habitat for threatened species, however is has been recommended that the loss of remnant trees be replanted within the streetscape to compensate for any losses.

### *Infection of native plants by *Phytophthora cinnamomi**

The proposal may temporarily increase the risk of fungal infection on site as it may be spread via vehicular movement and relocation of soil and vegetation. Consequently, standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres or tracks. Any equipment found to contain soil or vegetation material from offsite is to be cleaned in a quarantined work area or wash station and treated with anti-fungal pesticides prior to commencing work.

### *Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae*

'Myrtle Rust' may be spread via machinery, animals and humans as well as by environmental factors such as wind. The presence of machinery and construction works is likely to slightly increase the potential for spread of this key threatening process. Similar protocols as to *Phytophthora cinnamomi* should be applied.

### *Invasion of native plant communities by exotic perennial grasses*

The proposal could potentially be a class of development recognised as a threatening process due to the presence of exotic perennial grasses within the site such as *Ehrharta erecta* (Panic Veldtgrass), *Paspalum dilatatum* (Paspalum), *Cenchrus clandestinus* (Kikuyu), *Sporobolus africanus* (Parramatta Grass) and *Stenotaphrum secundatum* (Buffalo Grass). These species may result in possible incursions of exotic perennial grasses if exotic lawn is utilised as part of the landscaping and allowed to spread into adjoining bushlands. It is therefore recommended that native ground covers be utilised as part of the future landscaping works and weed control is applied to reduce spread and establishment of exotic perennial grasses into remnant native vegetation.

### *Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants*

The invasion and establishment of escaped garden plants is likely where such species are used for landscaping. It is recommended that non-invasive and locally-occurring species are used for landscaping purposes throughout the site. The implementation of a weed control program will help control any escaped garden plants.

### *Removal of dead wood and dead trees*

The proposal will require the removal of a small amount of deadwood and as such is of a class of development recognised as a threatening process. Threatened fauna species with potential habitat within the development footprint and likely dependent on dead wood or dead trees include Varied Sittella, Dusky Woodswallow and Scarlet Robin. These species have not been recorded to date within the study area. Given the low-quality habitat associated with deadwood and dead trees present within the development areas, the removal of dead

wood and dead trees is not considered likely to impact on threatened species or the biodiversity of the local area.



# Appendix 5 - SAll (Species)

# SERIOUS AND IRREVERSIBLE IMPACT ASSESSMENT – Threatened Species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAII) are outlined under Section 10.2.3 of the BAM (2017). They have been applied to the Little Bent-winged Bat and Large Bent-winged Bat which were recorded:

***(a) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII***

No specific measures are considered necessary to apply to these species given that no important habitat will be likely directly or indirectly impacted.

***(b) The size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification***

Due to the migratory nature of these species to breeding caves within inland regions of the state, the local population is difficult to predict at any time. These species is expected to be well represented in the locality with regular recordings.

***(c) The extent to which the impact exceeds any threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact 46 Biodiversity Assessment Method***

No breeding habitat will be impacted for these species and no such habitat is present within the remaining subject site.

***(d) The likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:***

***(i) An estimate of the change in habitat available to the local population as a result of the proposed development***

The habitat for these species will remain virtually unchanged. These species is known to forage along streetlights and around developed landscapes.

***(ii) The proposed loss, modification, destruction or isolation of the available habitat used by the local population, and***

The proposal will remove single trees which are unlikely to support prey species habitat. Otherwise the habitat is foraging airspace which will remain virtually unchanged.

***(iii) Modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development. BioNet Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and***

***habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development***

No habitat important to the life-cycle of these species will be impacted.

***(e) The likely impact on the ecology of the local population. At a minimum, address the following:***

***(i) for Fauna:***

- ***Breeding*** – No breeding habitat will be impacted
- ***Foraging*** – No foraging habitat will be impacted
- ***Roosting, and*** – No likely roosting will be impacted
- ***Dispersal or movement pathways*** – These species is highly mobile over urban landscapes. The proposal will not inhibit or reduce the local movement pathways.

***(ii) for Flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:***

- ***Pollination cycle*** – N/A
- ***Seedbanks*** – N/A
- ***Recruitment, and*** – N/A
- ***Interactions with other species*** – N/A  
***(E.g. pollinators, host species, mycorrhizal associations)***

***(f) A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development***

The proposal will not likely cause any fragmentation or isolation of habitat for the local populations.

***(g) The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range***

All individuals in the locality, region and extending out to this part of the state are part of the same population for these species.

***(h) The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population***

No such threats are likely to arise from the development.

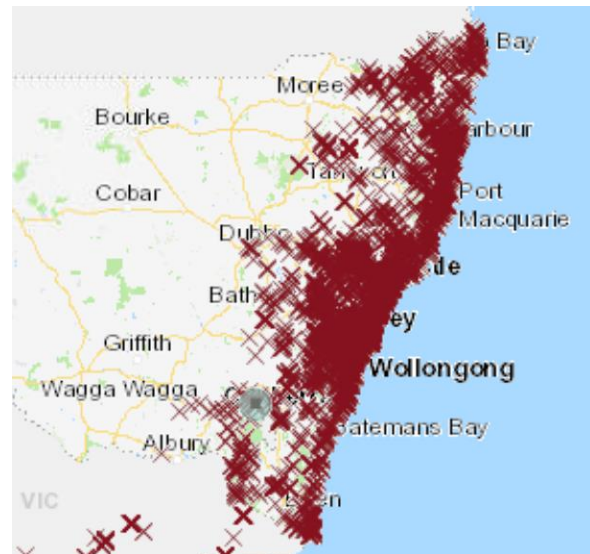
***(i) An estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion***

This is difficult to predict for these species however each disperses from breeding locations throughout the eastern (mostly north-eastern) third of the state and foraging extent is expected to be relatively evenly represented in the reserve system in these parts of NSW, as well as the subsequent IBRA region and the IBRA subregions.

Maps have been provided below sourced from each Species Action Statement (OEH 2020) showing conservation areas and recordings.



Little Bent-winged Bat



Large Bent-winged Bat

***(j) The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.***

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.
- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

None of the above measure are considered of relevance to the proposal. No roosting sites have been identified or are expected within the subject site.



# Appendix 6 - EPBC significance assessment criteria

# EPBC Act Significance Assessment Criteria

Under the *EPBC Act* an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. The following significant impact criteria were sourced from the *EPBC Act* Policy Statement 1.1 (May 2006):

## CRITICALLY ENDANGERED AND ENDANGERED SPECIES

### Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

#### >> What is a population of a species?

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations; or
- a population, or collection of local populations, that occurs within a particular bioregion.

#### >> What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*.

## VULNERABLE SPECIES

### Significant impact criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

#### >> What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

## CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

### Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established; or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community.

## MIGRATORY SPECIES

### Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

#### >> What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

- a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or
- c) Habitat utilised by a migratory species which is at the limit of the species range; and/or
- d) Habitat within an area where the species is declining.

#### >> What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

#### >> What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.