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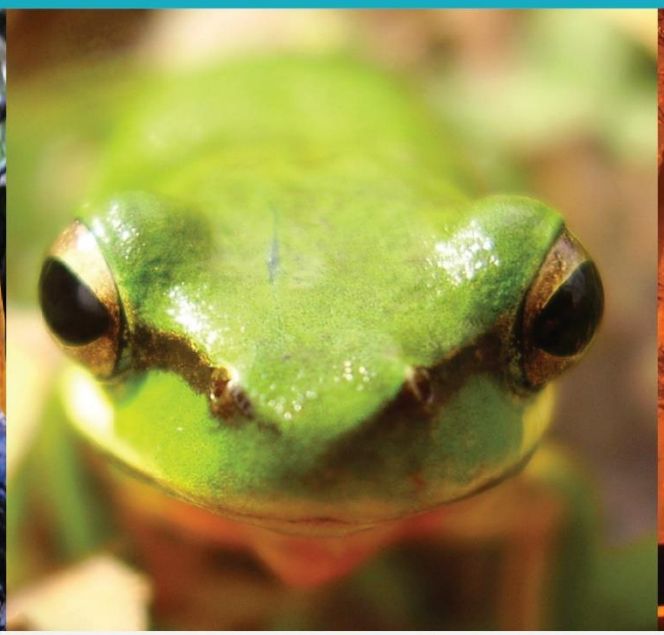


# ECOLOGICAL ASSESSMENT REPORT

Proposed Rezoning

LOT 281 DP 659927 & LOT 282 DP 755242

106 Wyee Road & 1496 Hue Hue Road

Wyee

7 February 2024

(REF: HIG01EAR - WYEE)

# ECOLOGICAL ASSESSMENT REPORT

**Proposed Rezoning**

LOT 281 DP 659927 and LOT 282 DP 755242, 106 Wyee Road and 1496 Hue Hue Road, Wyee

| | |
|---|---|
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| File: | HIG01EAR - WYEE |

*Request an online quote 24/7*



*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 is to be confirmed by a registered surveyor.*

# LIST OF ABBREVIATIONS

| | |
|---|---|
| APZ | Asset Protection Zone |
| BAM | Biodiversity Assessment Method (2020) |
| BAR | Biodiversity Assessment Report |
| *BC Act* | *Biodiversity Conservation Act (2016)* |
| *BC Reg* | *Biodiversity Conservation Regulation (2017)* |
| 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 |
| *CM Act* | *Coastal Management Act 2016* |
| DAWE | Commonwealth Department of Agriculture, Water and the Environment (superseded by DCCEEW) |
| DCCEEW | Commonwealth Department of Climate Change, Energy, the Environment and Water |
| 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 OEH from April 2011) |
| DEWHA | Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC) |
| DOEE | Commonwealth Department of Environment & Energy (superseded by DAWE) |
| DPE | NSW Department of Planning and Environment |
| DPIE | NSW Department of Planning, Industry and Environment (superseded by DPE) |
| EEC | Endangered Ecological Community |
| EPA | Environment Protection Authority |
| *EP&A Act* | *Environmental Planning and Assessment Act (1979)* |
| *EPBC Act* | *Environment Protection and Biodiversity Conservation Act (1999)* |
| *FM Act* | *Fisheries Management Act* |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| *LLS Act* | *Local Land Services Act (2013)* |
| NES | National Environmental Significance |
| *NPW Act* | *National Parks and Wildlife Act (1974)* |
| NRAR | Natural Resources Access Regulator (NSW) |
| NSW DPI | NSW Department of Industry and Investment |
| OEH | Office of Environment and Heritage (superseded by DPIE from August 2019) |
| PCT | Plant Community Type |
| PFC | Projected Foliage Cover |
| RFS | NSW Rural Fire Service |
| 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 |
| TEC | Threatened Ecological Community |
| TPZ | Tree Preservation Zone |
| *TSC Act* | *Threatened Species Conservation Act (1995) – Superseded by the Biodiversity Conservation Act (2016)* |
| VMP | Vegetation Management Plan |

# EXECUTIVE SUMMARY

*Travers bushfire & ecology (TBE)* has been engaged to undertake an ecological assessment within LOT 281 DP 659927 & LOT 282 DP 755242, at 106 Wyee Road & 1496 Hue Hue Road, Wyee within the Lake Macquarie Local Government Area (LGA) as shown in Figure 1-1. These lots are subject to a proposed rezoning application and will hereafter be referred to as the 'study area.' This biodiversity assessment is in accordance with Lake Macquarie Council and state government requirements for a Stage 1 Biodiversity Assessment Method (BAM) assessment to identify, in particular, whether the development will trigger the Biodiversity Offset Scheme (BOS). 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 future clearing of 0.16 ha of native vegetation is less than the area clearing threshold of 0.5 ha.
- The Test of Significance concludes a not-significant impact on the relative entities being tested, and
- No AOBV will be impacted by the rezoning or future DA.

There are no offsets required in accordance with the BOS and no portion of the land is identified for conservation. Measures have been provided to avoid and mitigate impacts on biodiversity.

## Proposed rezoning

The site is subject to a planning proposal to rezone the study area from Rural RU4 Primary Production Small Lots to E1 Local Centre to enable the development of a supermarket with supporting retail business uses.

## Recorded biodiversity

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species and provisions of the *Biodiversity Conservation Act 2016*, the threatened fauna species East Coast Free--tailed Bat (*Micronomus norfolkensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Southern Myotis (*Myotis Macropus*) and Eastern Cave Bat (*Vespadelus troughtoni*) were identified, no threatened flora species, no endangered populations and no threatened ecological communities (TECs) were recorded within the study area.

In respect of matters required to be considered under the *EPBC Act*, no threatened fauna species, no threatened flora species and no TECs listed under this Act were recorded within the development footprint.

In respect of matters relative to the *FM Act*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint.

## Impact summary

*Travers bushfire & ecology* concludes:

- The proposal is not impacting on lands mapped as Biodiversity Values Land.
- The proposed future clearing of 0.16 ha of native vegetation is less than the area clearing threshold of 0.5 ha.
- No areas of outstanding biodiversity value (AOBV) will be impacted by the rezoning or future development.

*Significance of Impact*

The state assessment of significance (Appendix 3) has concluded that the proposed development will not likely have a significant impact on any threatened species, populations or TECs. Therefore, (a) a Species Impact Statement is not required for the proposal and (b) biodiversity offsetting is not required under this test.

## Suitability of the proposed rezoning

The proposal will have a very small effect on threatened fauna species and will impact a small amount of native vegetation (0.16 ha) which is not mapped as containing biodiversity values. From an ecological perspective, these impacts will not affect breeding potential for any recorded species therefore only having a small cumulative impact on potential foraging habitat.

There are no significant habitat features that will be affected by the rezoning, such as the loss of breeding hollows for large forest owls, riparian zone impacts, removal of rock habitat or loss or impact to regional fauna corridors.

Given the above, it is considered that the proposal to rezone the two (2) lots for future business use is suitable. This report should be updated at the time the proponent seeks to lodge a DA for the site which would include additional survey as identified in the report including stag-watching of the identified hollows as part of the DA submission or as a condition of consent.

There was a question posed as to whether any of the site should be zoned for conservation. Whilst hollow-bearing trees were noted (3 in total), it is possible they could be sectionally dismantled under the supervision of a fauna ecologist, with the hollow sections retained for future use in other projects, or laid on the site within landscaped garden beds as a refuge for ground-dwelling fauna. The small remnant on site provides no connectivity and the plant community type does not represent a threatened ecological community, so it doesn't warrant significant protection. No threatened flora species were observed during the site visit. As such, the entire site is capable of development, provided some mitigation measures are in place during the tree-felling phase of works.

## Mitigation measures

The mitigation measures that should be considered on the provision of future development on site are detailed in section 5.3 of the report and in **Table 5-2**.

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## Appendices

# 1. BACKGROUND

Travers bushfire & ecology has been engaged to prepare an ecological report for the proposed rezoning of LOT 281 DP 659927 & LOT 282 DP 755242, at 106 Wyee Road & 1496 Hue Hue Road, Wyee, within Lake Macquarie local government area (LGA). The extent of these lots is shown in **Figure 1-1**and will hereafter be referred to as the 'study area'.

For the purposes of this assessment, it will be assumed that the proposed rezoning and potential impacts extend to the full extent of the study area. Asset protection zones (APZ's) will need to be considered for a development application (DA) as the site is within a bushfire prone area according to the mapping provided by the Rural Fire Service (RFS).

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


***Figure 1-1 – Study area (red)***

## 1.1 Proposed rezoning

The site is subject to a planning proposal to rezone the study area from Rural RU4 Primary Production Small Lots to E1 Local Centre to enable the development of a supermarket with supporting retail business uses.


*Figure 1-2 - Current zoning of LOT 281 DP 659927 & LOT 282 DP 755242*

*(Source: NSW Planning Portal)*

The rezoning proposal includes rezoning from RU4 to E1.

Following are the objectives of Zone E1 in accordance with Lake Macquarie LEP (2014):

- To provide a range of retail, business and community uses that serve the needs of people who live in, work in, or visit the area.
- To encourage investment in local commercial development that generates employment opportunities and economic growth.
- To enable residential development that contributes to a vibrant and active local centre and is consistent with the Council's strategic planning for residential development in the area.
- To encourage business, retail, community, and other non-residential land uses on the ground floor of buildings.
- To encourage employment opportunities in accessible locations.

Permitted with consent includes the following:

Amusement centres; Boarding houses; Centre-based child care facilities; Commercial premises; Community facilities; Entertainment facilities; Function centres; Hostels; Hotel or motel accommodation; Information and education facilities; Local distribution premises; Medical centres; Oyster aquaculture; Places of public worship; Public administration buildings; Recreation facilities (indoor); Residential flat buildings; Respite day care centres; Service stations; Shop top housing; Tank-based aquaculture; Veterinary hospitals; Any other development not specified in item 2 or 4.

The future DA of a supermarket with supporting retail businesses is permissible under this change in zoning.

## 1.2 Site description

**Table 1-1** provides a summary of the planning, cadastral, topographical, and disturbance details of the development footprint.

*Table 1-1 – Site features*

| | |
|---|---|
| **Location** | 106 Wyee Road & 1496 Hue Hue Road Wyee, LOT 281 DP 659927 & LOT 282 DP 755242, Wyee. |
| **Area** | Approximately 1.5 ha |
| **Development footprint** | 1.5 ha |
| **Local government area** | Lake Macquarie |
| **Zoning** | RU4 – Primary Production Small Lots |
| **Grid reference** | 358278E 6328174N MGA-56 |
| **Elevation** | Approximately 16-22m AHD |
| **Topography** | Situated on a very slight northwest aspect |
| **Geology and soils** | Geology: Narrabeen Group – Clifton Subgroup – Munmorah Conglomerate Formation: Conglomerate, pebbly sandstone, grey green and grey siltstone and slay stone.<br>Soils: The study area is located on the Doyalson soil landscape. Do1 – Brown loose loamy sand, Do2 – hard setting bleach yellowish brown clayey sand, Do3 – Earthy bright yellowish brown sandy clay loam, Do4 – Earthy light grey clay, Do5 – Strongly pedal clay. |
| **Catchment, drainage and steam order** | There are no creek lines or drainages within the site. The study area is located upon a knoll that would generally drain into either Mannering Creek or Swampy Creek |
| **Existing land use** | There is an existing rural residential house on the property. The site is zoned RU4 – Primary Production Small Lots. |
| **Connectivity features** | There is very poor connectivity to the development footprint. There is existing residential development to the east, south and west which there are some industrial type developments to the north. There are some residual trees within the development area and surrounding lots. |

# 2. FLORA

## 2.1 Survey methodology

A botanical survey was undertaken on 21 November, over a time frame of approximately two (2) hrs.

The botanical survey included a random meander in accordance with Cropper (1993) to gain a full species list of the plants within the site, and then one (1) quadrat of 0.1 ha was undertaken in accordance with the Biodiversity Assessment Method 2020 (BAM) within the site. A review of the *Bionet Atlas of NSW Wildlife* (DPE 2023) was undertaken prior to the site visit to determine threatened species previously recorded within 10 km of the development footprint, and relevant target searches were undertaken as suited, generally as near linear transects underneath or adjacent to remnant canopy vegetation.

All naturally occurring species were identified to species level where possible and are listed in Appendix 1.

## 2.2 Vegetation communities

The *Lower Hunter and Central Coast Regional Vegetation Mapping* (LHCCREMs 2003) maps the following vegetation communities nearby the site:

- Coastal Plains Smooth-barked Apple Woodland
- Coastal Plains Scribbly Gum Woodland
- Riparian Melaleuca Swamp Woodland

NSW State Vegetation Type Maps (DPE 2022) provided below in **Figure 2-1** maps the following vegetation communities within the site:

- PCT 3244 Lower North Spotted Gum – Mahogany - Ironbark Sheltered Forest, and
- PCT 3583 Hunter Coast Lowland Scribbly Gum Forest.


*Figure 2-1 – STVM (DPE 2022)*

Field verification of the study area found the following vegetation communities:

- PCT 3583 Hunter Coast Lowland Scribbly Gum Forest,
- Planted Vegetation, and
- Exotic-dominated grassland.

Details of these vegetation communities are provided below in Table 2-1.

*Table 2-1 – Observed vegetation communities*

| Community | Location within site and condition | Canopy | Midstory | Ground layer | Area (ha) | Conservation status | |
|---|---|---|---|---|---|---|---|
| | | | | | | *BC Act* | *EPBC* |
| **PCT 3583 Hunter Coast Lowland Scribbly Gum Forest** | In the northeast of the site. Poor condition with high exotic presence in ground storey. | *Angophora costata, Eucalyptus resinifera, Eucalyptus saligna, Corymbia maculata* | *Acacia terminalis, Acacia longifolia* | *Dichelachne micrantha, Cynodon dactylon, Cyperus gracilis, Parsonsia straminea, Hardenbergia violacea, Themeda triandra* | 0.16 | *No associated TEC* | *No associated TEC* |
| **Exotic-dominated grassland** | Occupies most of the site where the property has been used for animal grazing and pasture | Absent | Absent | Dominated by exotic species including *Paspalum dilatatum, Briza subaristata, Cenchrus clandestinus, Plantago lanceolata, Senecio madagascariensis, Verbena bonariensis, Modiola caroliniana Lotus subbiflorus, Trifolium repens.* Some native species are present generally at less than 5% cover. | 1.18 | No | No |
| **Planted Native Vegetation** | Occupies a small portion of the northeast corner as a hedge | Absent | *Acmena smithii* | Absent | 0.01 | No | No |
| **Planted exotic vegetation** | Planted vegetation occurs around some of the dwellings | *Corymbia torreliana, Liquidambar styraciflua, Tibouchina granulosa, Metrosideros excelsa* | *Hydrangea macrophylla, Grevillea hybrid, Callistemon viminalis, Nerium oleander, Strelitzia reginae* | As per exotic-dominated grassland with *Wisteria floribunda, Nephrolepis cordifolia* | 0.07 | No | No |

*Photo 1 – PCT 3583 Hunter Coast Lowland Scribbly Gum Forest in poor condition*

*Photo 2 – Exotic dominated grassland*

***Photo 3 – Planted vegetation around the dwellings with exotic dominated grass ground cover***

## 2.3 Threatened flora species

*BC Act* – A search of the *Bionet Atlas of NSW Wildlife* (DPE, 2023) indicated a list of species that have been recorded within a 10 km radius of the development footprint. These species are listed in Table A1-1 (Appendix 2) and are considered for potential habitat within the development footprint.

*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 development footprint. These species have also been listed in Table A1-1*Table A2.1 – Threatened flora species habitat assessment (Appendix 2)* for consideration of potential to occur.

Based on the habitat assessment within Table A1-1 (Appendix 2) it is considered that the development footprint provides potential habitat for the threatened flora species listed in Table 2-2. These species will be considered in the Test of Significance within Appendix 3.

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

| Scientific name | *BC Act* | *EPBC Act* | Potential to occur |
|---|---|---|---|
| *Acacia bynoeana* | V | V | Low |
| *Angophora inopina* | V | V | Low |
| *Genoplesium insigne* | E4A | CE | Low – highly unlikely |

| Scientific name | *BC Act* | *EPBC Act* | Potential to occur |
|---|---|---|---|
| *Tetratheca juncea* | V | V | Low |

All threatened species in both the BioNet (NSW) and *EPBC Act* coordinate search (National) were considered to have low potential suitable habitat within the study area because of previous clearing and landscaping works, past and ongoing land management practices, unsuitable soils / geology, unsuitable previous vegetation type or large distance to known specimens.

The state Test of Significance Assessment (Appendix 3) and a review of *EPBC* Significance Impact Criteria (Appendix 4) has concluded that the proposed development will not have a significant impact on threatened flora species or TECs. Therefore, (a) a Species Impact Statement is not required in respect to flora for the proposal and (b) biodiversity offsetting is not required.

## 2.4 Endangered flora populations

Two (2) endangered flora population occurs within City of Lake Macquarie LGA. These populations are:

- *Eucalyptus parramattensis* C.Hall *subsp. parramattensis in Wyong and Lake Macquarie local government areas,* and
- *Cymbidium canaliculatum population in the Hunter Catchment.*

No specimens of *Eucalyptus parramattensis* C.Hall *subsp. parramattensis in Wyong and Lake Macquarie local government areas* were observed within the study area during the flora survey. Therefore, it is considered that these endangered populations do not occur within the study area.

The population of *Cymbidium caniculatum* occurs in the Hunter Catchment. The site is approximately 32 km south from the known area and is therefore considered that this population is unlikely to occur within the study area.

## 2.5 Threatened ecological communities

There is no TEC associated with PCT 3583 - Hunter Coast Lowland Scribbly Gum Forest.

# 3. FAUNA

## 3.1 Survey / Habitat assessment

A fauna survey was undertaken within the subject site and nearby surrounds on 21st November 2023. This survey included an afternoon diurnal survey and threatened species habitat assessment.

The fauna habitat assessment was undertaken to identify the habitat types available, the quality thereof, and to note any specific or important habitat features. A habitat tree assessment was also undertaken at this time. Particular note was taken to search for the following potential threatened fauna species habitat:

- Observations for presence of potential *Allocasuarina* trees for foraging by Glossy Black-Cockatoo.
- Hollow-bearing trees present.
- Presence of any raptor nests.
- Terrestrial shelters, burrows and/or hollows.
- Connectivity potential to and from the site, and
- Presence of drainages for frog species habitat.

Diurnal fauna survey included:

- Frog and reptile habitat searches.
- Opportunistic bird call and activity survey between census points.
- Mammal activity searches (scats, scratches, diggings, burrows, etc.).
- Placement of small and large arboreal and terrestrial hair tubes targeting mammals.
- Surveillance cameras at baited stations, and
- Habitat tree survey.

Weather conditions at the time of diurnal survey were 4/8 cloud, no wind, no rain, 18-26°C between 14:50 – 16:00.

Fauna survey effort and results are provided in Figure 3-1. All fauna species recorded during survey within the development footprint and nearby surrounds are listed in Table A1-2 (Appendix 1).

## 3.2 Habitat features

The following notable habitat features were observed present:

- Three (3) habitat trees containing good quality small-medium hollows, each showing signs of use.
- Year-round nectar producing tree species, principally *Eucalyptus* sp.
- A dam providing foraging habitat for Southern Myotis.

Hollow-bearing trees were surveyed during the fauna survey with a total of three (3) trees containing hollows within the development footprint area. These trees were found to contain two (2) small hollows (0–10 cm in size) and two medium hollows (10–15 cm in size) that will require future removal. Hollow-bearing trees were not stag-watched during the fauna survey.

No significant habitat trees were recorded on site and none of the recorded hollows are considered suitable for threatened large forest owls or cockatoos. However, the recorded hollows may be suitable for hollow-dependent threatened species with considered potential to occur including East-coast Freetail Bat, Southern Myotis, Eastern False Pipistrelle, Greater Broad-nosed Bat and Squirrel Glider. Of these species East-coast Freetail Bat and four species complexes that contain threatened, Southern Myotis, Eastern False Pipistrelle, Greater Broad-nosed Bat were identified during survey and such hollows may be utilised for roosting and breeding.

For the future DA, it is recommended that stag-watching be undertaken to identify the potential hollow use, and that future hollow removal is undertaken at an appropriate time when the affected species is not breeding or when it's likely to have young utilising the hollow. Hollow removal is to be conducted under the presence of a fauna ecologist who can relocate any animals should they still be using the hollow at the time of its dismantling. If the hollow is in good condition, the hollow shall be salvaged and retained by ecologist for future re-use in a conservation project or vegetation management plan.

Hollow-bearing tree data for the development footprint is provided below in Table 3-1.

***Table 3-1 - Hollow-bearing tree data***

| Tree Number | Common name | Scientific name | DBH (cm) | Height | Spread | Vigour | Hollow description and fauna use |
|---|---|---|---|---|---|---|---|
| HT01 | Smooth-Barked Apple | *A. costata* | 71 & 38 | 14 | 6 | 61 | 1 x 10-15 cm trunk hollow |
| HT02 | Smooth-Barked Apple | *A. costata* | 39 & 42 | 13 | 6 | 75 | 2 x 5-10 cm branch hollows |
| HT03 | Red Bloodwood | *C. gummifera* | 66 | 14 | 8 | 75 | 10 cm vertical trunk slit |

## 3.3 Threatened fauna species

*BC Act* – A search of the *Bionet Atlas of NSW Wildlife* (DPE, 2023) provided a list of threatened fauna species previously recorded within a 10 km radius of the development footprint. These species are listed in **Table 1-1** (Appendix 2) and are considered for potential habitat within the study area.

*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 10 km radius of the development footprint.

In accordance with Table A1-2 (Appendix 2) the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the study area. The state listed species will be considered in the Test of Significance (Appendix 3):

***Table 3-2 – Threatened fauna species with suitable habitat present***

| Common name | *BC Act* | *EPBC Act* | Potential to occur |
|---|---|---|---|
| Eastern Coastal Free-tailed Bat | V | - | Recorded |

| Common name | *BC Act* | *EPBC Act* | Potential to occur |
|---|---|---|---|
| Eastern False Pipistrelle | V | - | Recorded (possible) |
| Greater Broad-nosed Bat | V | - | Recorded (possible) |
| Southern Myotis | V | - | Recorded (probable) |
| Little Lorikeet | V | - | High |
| Squirrel Glider | V | - | Moderate |

The state Test of Significance assessment (Appendix 3) and a review of *EPBC* Significance Impact Criteria (Appendix 4) has concluded that the proposed development will not have a significant impact on threatened fauna species. Therefore, (a) a Species Impact Statement is not required in respect to fauna for the proposal and (b) biodiversity offsetting is not required (under this threshold).

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

## 3.4 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 development footprint. The habitat potential of migratory species is considered in Table A1-2 (Appendix 2). The habitat potential of threatened migratory species are instead considered with other threatened species in Table A1-2 (Appendix 2).

No nationally protected migratory bird species were recorded present within the study area during the survey. Migratory species protected under the *EPBC Act* do not likely contain any breeding habitat or habitat otherwise of importance within the study area. Therefore, these species will not likely offer a constraint to the proposal.

## 3.5 Endangered fauna populations

There are no known endangered fauna populations within Lake Macquarie LGA.

## 3.6 State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Koala Habitat Protection

Chapter 4 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Koala Habitat Protection) applies to land within LGAs listed under Schedule 2 of the Policy. As the study area falls under the City of Lake Macquire LGA, it is considered that Koala SEPP 2021 applies to this development proposal.

Land to which this policy applies in accordance with Section 4.4 of the SEPP 2021 is as follows:

*(1) This Chapter applies to each local government area listed in Schedule 2.*

*(2) The whole of each local government area is—*

*(a) in the koala management area specified in Schedule 2 opposite the local government area, or*

*(b) if more than 1 koala management area is specified, in each of those koala management areas.*

*(1) Despite subsection (1), this Chapter does not apply to—*

*(a) land dedicated or reserved under the National Parks and Wildlife Act 1974, or acquired under Part 11 of that Act, or*

*(b) land dedicated under the Forestry Act 2012 as a State forest or a flora reserve, or*

*(c) land on which biodiversity certification has been conferred, and is in force, under Part 8 of the Biodiversity Conservation Act 2016, or*

*(d) land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 2—*

*(i) Zone RU1 Primary Production,*

*(ii) Zone RU2 Rural Landscape,*

*(iii) Zone RU3 Forestry.*

The land is listed in Schedule 2 City of Lake Macquarie LGA and is zoned RU4, therefore SEPP 2021 applies. Please Note that SEPP 2020 applies in lands zoned as RU1, RU2 and RU3 in accordance with SEPP 2020.

There is currently no approved Koala Plan of Management (KPoM) for the LGA that this site is located in. Therefore, before council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on Koalas or Koala habitat.

If the council is satisfied that the development is likely to have low or no impact on Koalas or Koala habitat, the council may grant consent to the development application. If the council is satisfied that the development is likely to have a higher level of impact on Koalas or Koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a Koala assessment report for the development.

As of November 2023, a total of four Koala sightings have been documented within a 10-kilometer radius of the study, three of which occurred in the past 18 years. The most recent Koala observation was in 2018, located around 4.5km to the South near Doyalson Link Rd in Wallarah. Additionally, two other sightings were documented as rehabilitation records in Mandalong and Doyalson in 2021 and 2017, respectively.

Under Schedule 2 of SEPP 2021, The City of Lake Macquarie falls within the Central Coast Koala Management Area. Five (5) tree species were recorded in the study area which are considered to be Koala use tree species within this Management Area under Schedule 2 of Koala SEPP 2021. These species are *Angophora costata, Corymbia gummifera, Corymbia maculata*, *Eucalyptus resinifera*, *Eucalyptus saligna*. No Spot Assessment Technique (SAT) survey was undertaken.

It is considered that this study area does not comprise Core Koala Habitat.


*Figure 3-1 – Flora & fauna survey effort and results*

## 3.7 Connectivity

The subject site is located at the intersection of Hue Hue Road and Wyee Road along the southeastern and northeastern boundary, with these roads acting as a barrier for terrestrial fauna. The site is not part of contiguous bushland to the north and south and the residual trees within the site may provide fragmented stepping stones to the larger areas of contiguous bushland.

There is limited vegetation within the site with a few large remnant trees and primarily exotic planted vegetation with minimal understorey plants and an exotic grass ground layer. This vegetation may provide inter-connectivity within the site.

Vegetation within the study area is not part of a significant or regional fauna movement corridor.

Figure 3-2 below shows an overview of the site's contribution to local connectivity.

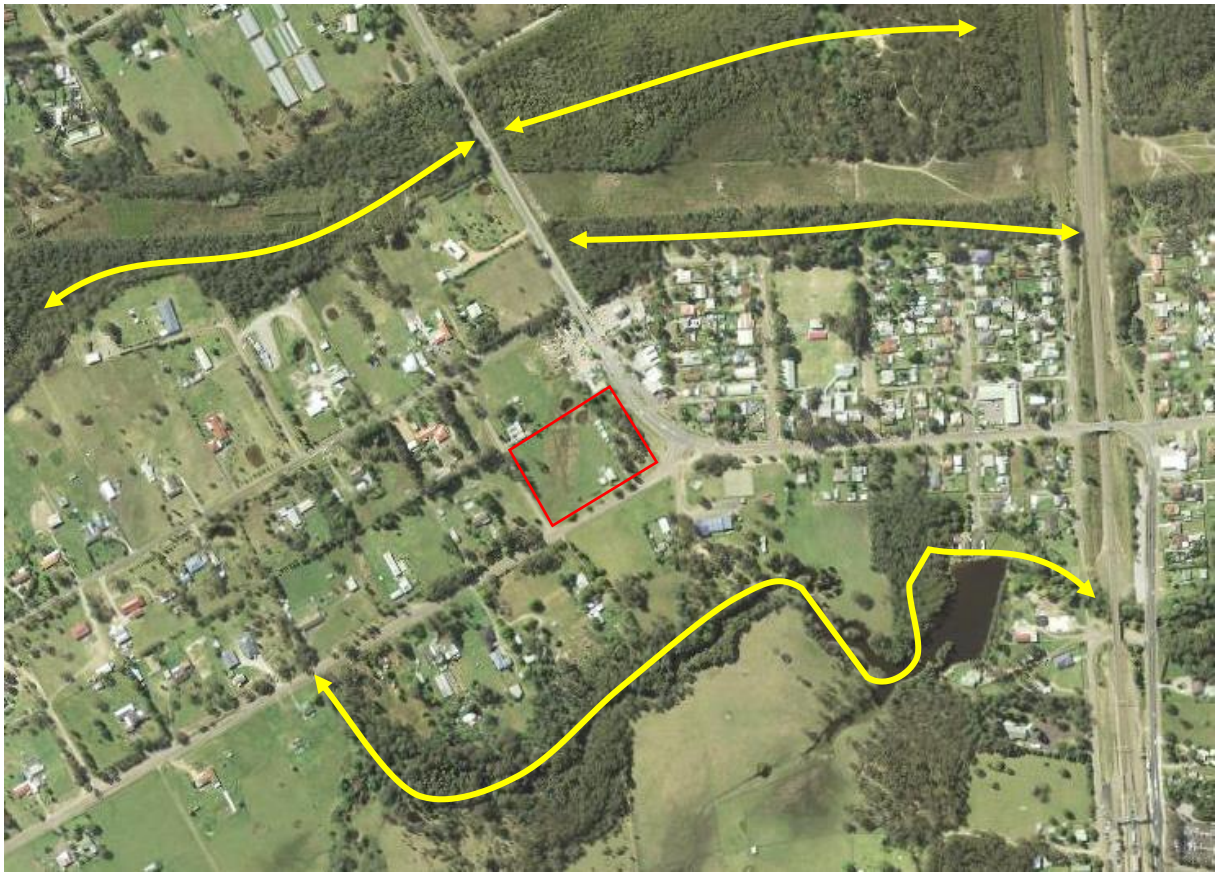

*Figure 3-2 – Local connectivity*

# 4. WATERCOURSES & WETLANDS

## 4.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC 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 DPE - Office of Water in their general terms of approval. 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.
- Castlereagh Swamp Woodland Community.
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and Southeast Corner bioregions.
- Coastal Upland Swamp in the Sydney Basin bioregion.
- Coolibah–Black Box woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands bioregions.
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner bioregions.
- Kurri sand swamp woodland in the Sydney Basin Bioregion.
- Lagunaria swamp forest on Lord Howe Island.
- Maroota Sands swamp forest.
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion.
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin, and Southeast Corner bioregions.
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin, and Southeast Corner bioregions.
- The shorebird community occurring on the relict tidal delta sands at Taren Point.
- Upland wetlands of the drainage divide of the New England Tableland Bioregion, and
- Wingecarribee Swamp.

No endangered wetland communities were present within the study area and therefore a referral to NRAR is not required for impacts on waterfront land.

## 4.2 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.

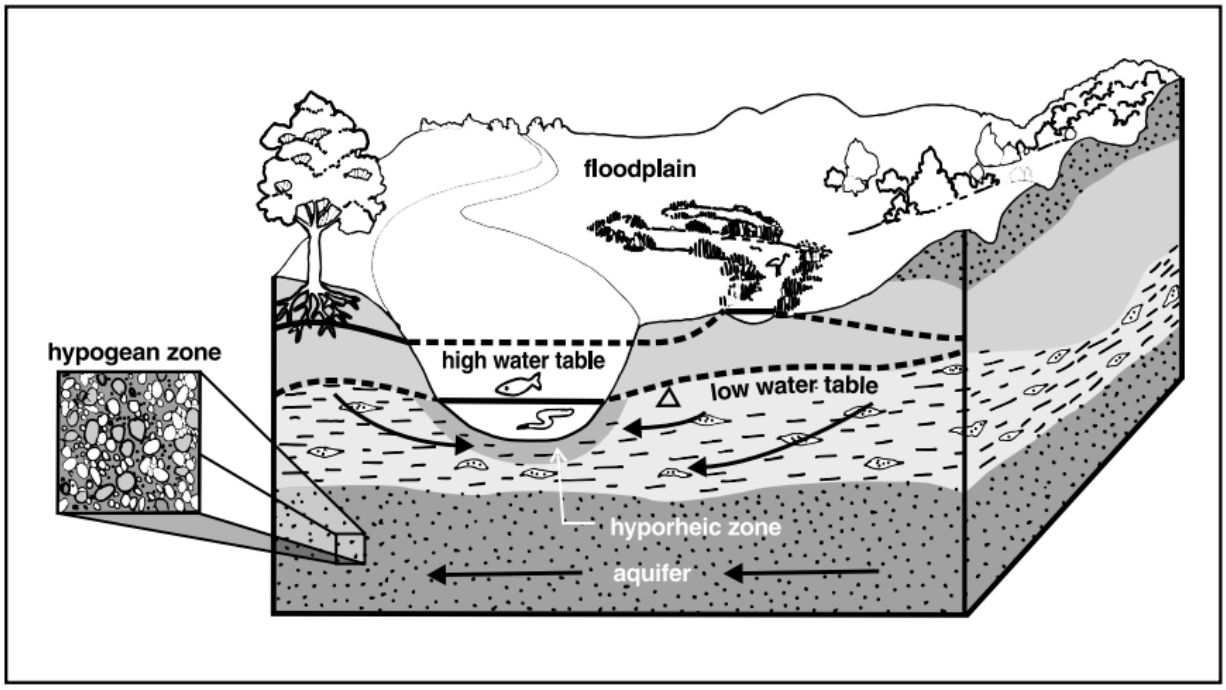


*Figure 4-1 – Alluvial groundwater system discharging into a river*

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).

Groundwater Dependent Ecosystems (GDEs) were not observed within the study area and therefore the policy does not require any further consideration. A referral to NRAR is not required for impacts on waterfront land.

## 4.3 Watercourse assessment

The proposed development will not impact on watercourses or drainage lines (Figure **4**-**2**). A referral to NRAR is therefore not required for impacts on waterfront land.


*Figure 4-2 – Watercourses mapped onsite (Red - study area)*
*(Source: Water Management (general) Regulation 2018 Hydroline spatial data 1.0)*

## 4.4 Coastal wetlands

The NSW DPE *Coastal Wetlands and Littoral Rainforests Area Map*

(https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU) identifies that the site is not mapped as “coastal wetlands” or “proximity area for coastal wetlands” (Figure 4-3) as the nearest wetland is 300m away from the site. Further consideration of this SEPP is therefore not required.

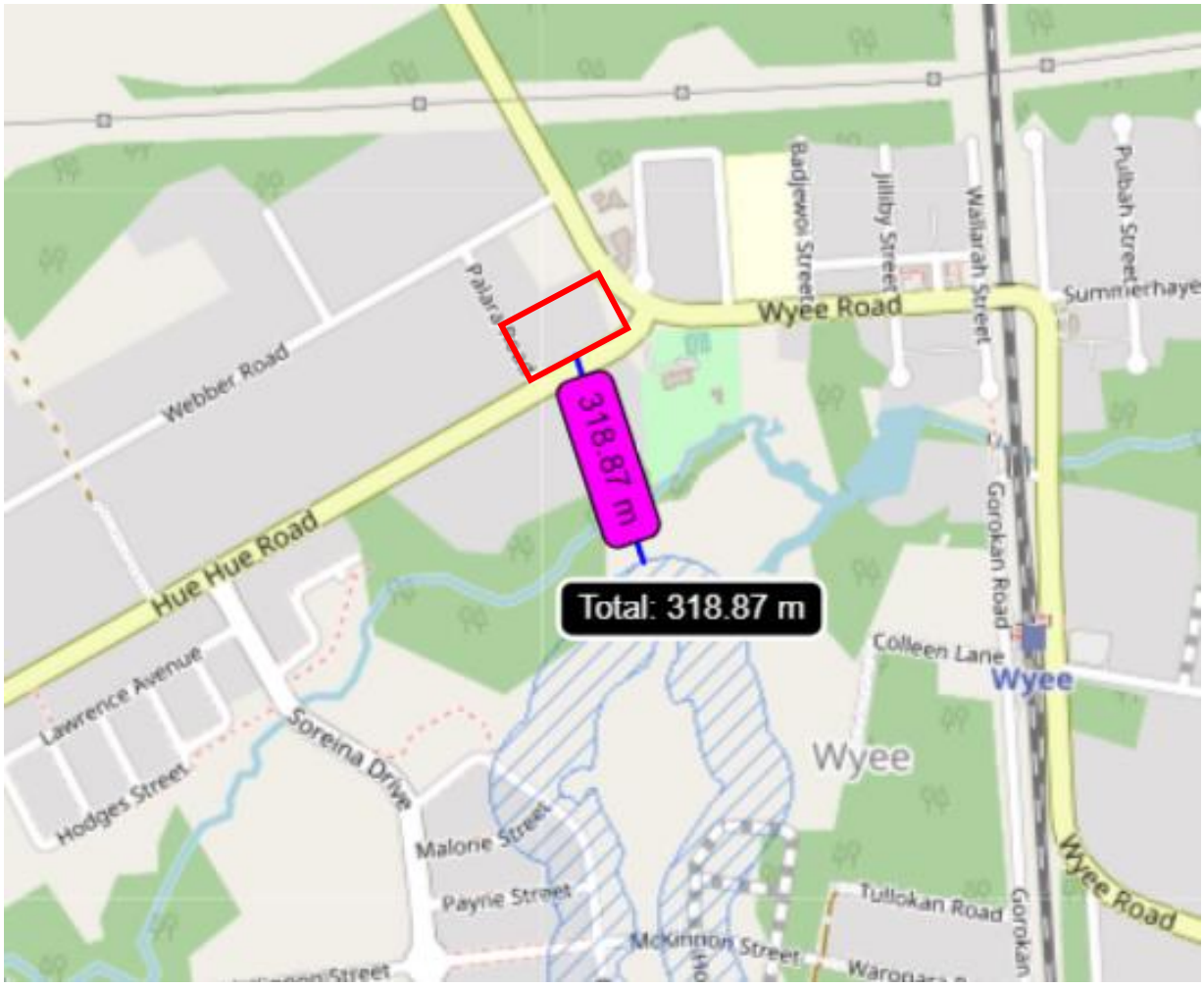


*Figure 4-3 – Coastal wetlands area map*

*(solid blue - coastal wetlands; hatched blue - proximity area for coastal wetlands).*

# 5. BIODIVERSITY IMPACT ASSESSMENT

## 5.1 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 Biodiversity Assessment Method (BAM).

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 BAM.

The BOS applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act (EP&A Act 1979*) that triggers the BOS threshold or is likely to significantly affect threatened species based on the Test of Significance in Section 7.3 (Appendix 3) of the *Biodiversity Conservation Act (BC Act 2016).*
- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment (DPIE) and the environment agency head determine that the project is not likely to have a significant impact.
- biodiversity certification proposals.
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent.
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*, and
- activities assessed and determined under Part 5 of the *EP&A Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the BOS threshold and the Test of Significance (where relevant) when submitting their application to the consent authority.

## 5.2 Threshold assessment

The BOS applies to local development (assessed under Part 4 of the *EP&A Act 1979* that is likely to significantly affect threatened species. Local development is likely to significantly affect threatened species and require a biodiversity development assessment report (Section 7.7 of the *BC Act 2016* if impacts either:

- exceed the BOS threshold (*BC Act*, Section 7.4); the threshold includes clearing on land within the Biodiversity Values Map or clearing of an area that exceeds the threshold.
- are carried out on an Area of Outstanding Biodiversity Value (AOBV), and
- are likely to significantly affect threatened species, ecological community.

The BOS includes three (3) elements to the threshold test – an area trigger, a Biodiversity Values Map trigger, and the Test of Significance. If impacts exceed at least one of these triggers, the BOS applies to the proposed clearing.

### 5.2.1 Biodiversity Values Map

Biodiversity Values land has not been mapped within the study area – an offset is not required under this trigger. Figure 5-1 below shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

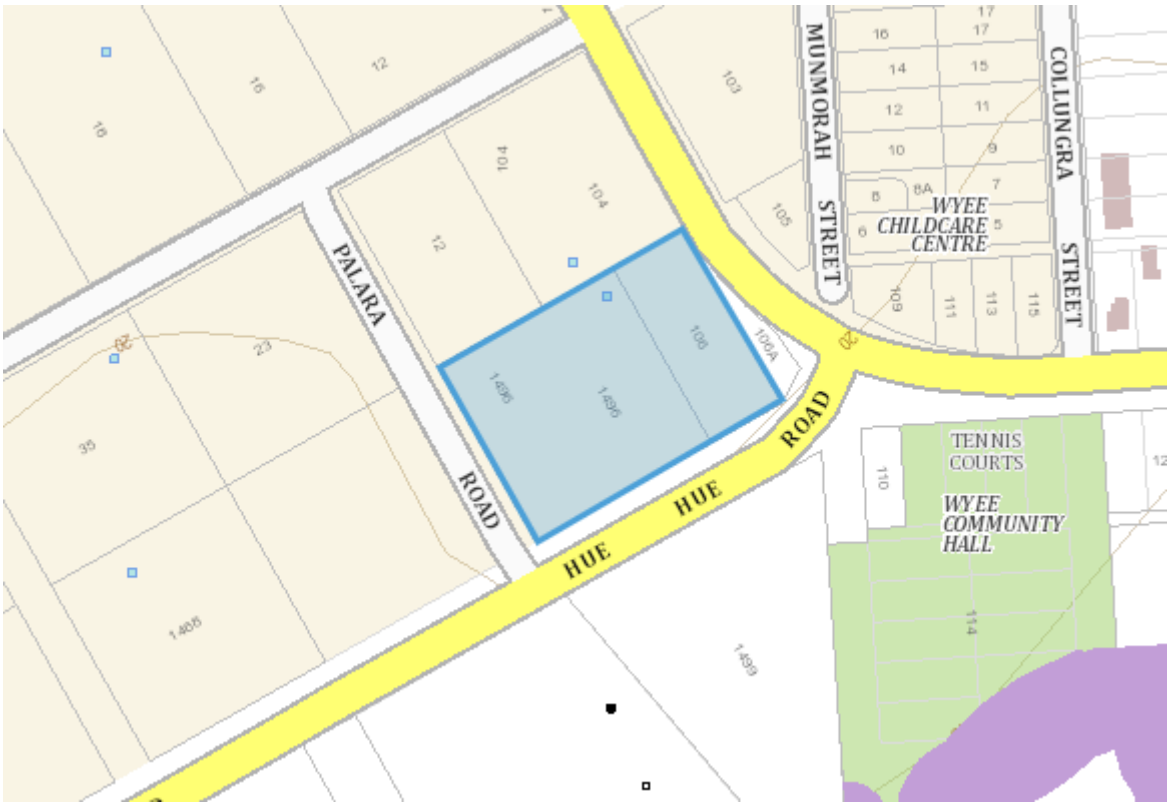


***Figure 5-1 – Biodiversity values land (purple) relative to the development footprint (blue)***

*(Source: DPE – Biodiversity Values Map – November 2023)*

### 5.2.2 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).

*Table 5-1 – BOS entry threshold report*

| Biodiversity Values Map and Threshold Report | | |
|---|---|---|
| **Date of Report Generation** | | 14/11/2023 3:32 PM |
| **Biodiversity Values (BV) Map Threshold - Results Summary** | | |
| 1 | **Does the development Footprint intersect with BV mapping?** | no |
| 2 | **Was ALL of the BV Mapping within the development footprinted added in the last 90 days?** (dark purple mapping only, no light purple mapping present) | no |
| 3 | **Date of expiry of dark purple 90 day mapping*** | N/A |
| 4 | **Is the Biodiversity Values Map threshold exceeded?** | no |
| **Area Clearing Threshold - Results Summary** | | |
| 5 | **Size of the development or clearing footprint** | 13,866.6 sqm |
| 6 | **Native Vegetation Area Clearing Estimate (NVACE)** | 11,915.0 sqm |
| 7 | **Method for determining Minimum Lot Size** | LEP |
| 8 | **Minimum Lot Size** (10,000sqm = 1ha) | 10,000 sqm |
| 9 | **Area Clearing Threshold** (10,000sqm = 1ha) | 5,000 sqm |
| 10 | **Is the Area Clearing Threshold exceeded?** | yes |
| **Is the proposed development assessed above the Biodiversity Offsets Schema (BOS) threshold?** Exceeding the BOS threshold will require completion of a Biodiversity Development Assessment Report (BDAR). More details provided on page 2. | | **yes** |

Table 5-1 identifies that the BOS entry threshold report has determined the area threshold based on the minimum lot size of 1 ha, and the area clearing threshold for which the BOS applies is 0.5 ha. Clearing of 'native vegetation' that exceeds 0.5 ha will require a biodiversity offset to be obtained. Note that 'native vegetation' includes planted native species. Whilst this tool advises that the 0.5 ha clearing threshold would be exceeded (note – unsure why this is the case given the online mapping does not cover this amount of area), that is not the case. On the assumption that all vegetation will be impacted, this amounts to 0.16 ha of remnant vegetation which is below the 0.5 ha area clearing threshold.

### 5.2.3 Test of Significance

Proponents are also required to carry out a Test of Significance for all local development proposals that **do not exceed** the BOS thresholds. The Test of Significance is intended to provide standardised and transparent consideration of threatened species, ecological communities, and their habitats, through the development assessment process.

In the context of a Part 4 development (not including major projects) if the Test of Significance assessment indicates that there will be a significant impact, the proponent **must carry out a** BDAR.

The outcomes of the assessment must be provided to the consent authority to decide whether a significant affect is likely.

A detailed Test of Significance has been applied to *Acacia bynoeana, Angophora inopina, Genoplesium insigne, Tetratheca juncea,* Little Lorikeet, Eastern Coastal Free-tailed Bat, Little Bent-winged Bat and Large Bent-winged Bat, within Appendix 3, in accordance with Section

7.2 of the *BC Act*. The Test of Significance for threatened entities has concluded a non-significant impact.

### 5.2.4 Areas of Outstanding Biodiversity Value (AOBV)

Areas of Outstanding Biodiversity Value are special areas with irreplaceable biodiversity values that are important to the whole of New South Wales, Australia or globally.

The relevant legislative provisions for AOBV are Part 3, *BC Act* 2016 and Part 3, *BC reg.* 2017.

AOBV declarations in New South Wales include the following:

- *Gould's Petrel – critical habitat declaration.*
- *Little penguin population in Sydney's North Harbour – critical habitat declaration.*
- *Mitchell's Rainforest Snail in Stotts Island Nature Reserve – critical habitat declaration, and*
- *Wollemi Pine – critical habitat declaration.*

None of the above occur within the development footprint or will be indirectly impacted.

## 5.3 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.

*Table 5-2 - Proposed mitigation measures*

| Action / Technique | Outcome | Timing / Frequency | Responsibility |
|---|---|---|---|
| (a) Sediment and erosion control measures in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines. | Maintain integrity of nearby bushland habitat and natural topsoil soil by preventing deposition | Prior to any clearing works. Ongoing during all exposed soil stages until landscaping is completed | Project Ecologist / Contractors |
| (b) Stag-watching is to be undertaken on the habitat trees prior to their removal. | To understand what species are currently utilising the hollows, if any. Be able to plan the best time for dismantling depending upon the hollows' use. | At least 2 weeks prior to removal | Fauna ecologist |
| (c) Temporary fencing – placed against any trees being retained as part of the final landscape to protect tree root zones. | To ensure that important habitat features such as hollows, are dismantled in a sensitive manner | Prior to construction / habitat clearance | Project Ecologist / Contractors |
| (d) Dam dewatering to be supervised by a fauna ecologist. | To ensure that if in use by any aquatic species, these can be relocated or euthanised as per what the licence allows | Immediately prior to land clearance | Fauna ecologist |

| Action / Technique | Outcome | Timing / Frequency | Responsibility |
|---|---|---|---|
| (e) Management of hollows and hollow-dependent fauna:<br>• The felling of hollow-bearing trees is to be conducted under the supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken, particularly for threatened species. Hollows of high quality or with fauna recorded residing within should be dismantled for relocation and all hollows should be inspected for occupation, signs of previous activity and potential for reuse. | Protection of hollow-dependent wildlife | At time of removal | Project Ecologist |
| • Subsequent hollows of retention value are to be relocated to nearby conserved habitat areas. If these are placed as on ground habitat and are not reattached to a new recipient tree then they are to be replaced with appropriately sized nest boxes affixed to a retained tree. | Maintain quality denning / hollow shelter opportunities | At time of removal | Project Ecologist |
| • If a threatened species is found to be occupying the hollow at the time of removal, then this hollow section is to be reattached to a recipient tree within the nearby conservation areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist. | Priority protection of hollow-dependent threatened species | At time of removal | Project Ecologist |
| (f) Management of any other displaced fauna | Prevent direct impacts on nesting and terrestrial native fauna species | Prior to and during habitat removal / Adaptive management required | Project Ecologist |
| (g) If any fauna species, a nest, or roost is located during development works, then works should cease until safe relocation can be advised by a contact fauna ecologist | Prevent direct impacts on nesting and terrestrial native fauna species | At time of removal / Adaptive management required | Project Ecologist / Contractors |

| Action / Technique | Outcome | Timing / Frequency | Responsibility |
|---|---|---|---|
| (h) Landscaping to utilise predominately locally endemic species with a focus on those that naturally occur in PCT 3583. | Replacing native vegetation with similar vegetation that naturally occurs in the locality will have lesser impacts on native wildlife and will continue to provide some degree of habitat and food resources for local species. In addition, the plants utilised will have lesser effects on nearby areas of native bushland through garden escapes and dumping of green waste | Post construction prior to occupancy. | Project Ecologist / Contractors |

## 5.4 Avoidance and minimisation actions

Given the pre-existing level of disturbance, landscape plantings and maintenance and absence of TEC's, threatened plants or high-quality vegetation, only limited avoidance and minimisation actions have been considered.

In future DA's retention of the three (3) hollows should be considered as a part of the development design. Where these features cannot be retained, stag-watching is to be undertaken prior to construction works to identify if hollows are currently being utilised. A fauna ecologist it to be present during the removal of any hollows as described in Section 5.3.

Dam dewatering is to be supervised by a fauna ecologist to transfer animals to a suitable nearby environment or to euthanise them as per the licencing requirements. Finally, replanting of locally occurring native plant species focussing on those within PCT 3583 will limit impacts on foraging values for local fauna and reduce the potential for garden escapes into nearby bushland areas.

## 5.5 Ecological impacts

The prescribed, direct, indirect, and cumulative ecological impacts have been considered in respect to the recorded biodiversity, threatening processes, and extent of impact as a result of the proposed works. They will need to be considered at development application stage for any future development on the site.

Prescribed impacts that will need to be considered as a result of the DA stage are prescribed (subject to subclause (2) of the *BC Reg*) as biodiversity impacts to be assessed under the BOS. The prescribed potential impacts relevant to the development proposal are as follows:

- Human made structures.
- Non-native vegetation.
- Vehicle strikes on threatened species of animals or on animals that are part of a TEC, and
- The consequences of these prescribed impacts are minor, particularly given that each of them may be ameliorated through appropriate management measures which are tabulated in Section 5.3.

The likely impact on native vegetation by the proposal and subsequent DA would be impacts to 0.16 ha of remnant native vegetation identified as PCT 3583, which is not currently listed as a threatened ecological community.

No threatened flora or endangered flora populations were detected during the survey and considering the long history of mowing and understorey maintenance, the likelihood of any threatened flora species was considered exceptionally low.

Threatened fauna (microbats) were detected during the survey. Those species of microbats detected are all highly mobile and, considering the size of the hollows found on site, the hollows are more likely suited to small mammals and small-medium sized bird species than for microbats.

# 6. CONCLUSION

An ecological survey and assessment has 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 Recorded biodiversity

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species and provisions of the *Biodiversity Conservation Act 2016*, one (1) threatened fauna species, East Coast Freetail Bat (*Micronomus norfolkensis*), and four (4) species complexes that contain threatened species Southern Myotis (*Myotis Macropus*) with probable certainty, Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), and Eastern Cave Bat (*Vespadelus troughtoni*) with possible certainty, were identified. No threatened flora species, no endangered populations and no TECs were recorded within the study area.

## 6.2 Impact summary

The state Test of Significance (Appendix 3) concluded that the proposed development will not have a significant impact on any threatened species, populations or TECs. Therefore, (a) a Species Impact Statement is not required for the proposal and (b) biodiversity offsetting is not required.

## 6.3 Biodiversity Offsets Scheme (BOS) – Threshold assessment

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 future clearing of 0.16 ha of native vegetation is less than the area clearing threshold of 0.5 ha.
- The Test of Significance concludes a not-significant impact on the relative entities being tested, and
- No AOBV will be impacted by the rezoning or future DA.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, no threatened fauna species, no protected migratory bird species, no threatened flora species, and no TECs were recorded within the study area.

The proposal was not considered to have a significant impact on OR be constrained by matters of national environmental significance. As such, a referral to Department of Climate Change, Energy, the Environment and Water (DCCEEW) is unlikely to 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.

## 6.4 Suitability of the proposed rezoning and future survey

The proposal is to rezone the lands from RU4 to E1 for commercial usage. The site is located at the intersection of two (2) local main roads, across from a service station, nearby Wyee Nursery (garden centre) and within a few hundred metres of other commercial premises, community hall and school. Being on the corner of some local main roads would provide the site very good exposure with consistent traffic.

The site has only minor ecological constraints that would hinder future development of the site.

In review of the vegetation, the remnant occupies 0.16 ha and is not part of a threatened ecological community, being very well represented throughout the Lake Macquarie and former Wyong LGA. No threatened flora was observed or considered to have a high likelihood of occurrence given the historical management of the land.

Threatened fauna were detected although all species are highly mobile. Most hollow dependent microbats require small sized hollows for breeding. Those observed on site were mostly in the 5 - 10 cm range which is more suited to small mammals such as possums and small-medium birds such as Lorikeets.

The recorded threatened fauna species include (to probably / possible level):

- East Coast Freetail Bat (*Micronomus norfolkensis*).
- Southern Myotis (*Myotis macropus*).
- Greater Broad-nosed Bat (*Scoteanax rueppellii*), and
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

This report recommends a stag watching survey be undertaken to determine the use of hollows, and if they cannot be retained, Section 5.3 describes some mitigation measures than may be imposed as a condition of consent. The existing small dam may be dewatered for future development and standard dam dewatering protocols apply (Section 5.3).

The site is not located within an important vegetated corridor that would be utilised heavily for fauna movement. The existing remnant and planted trees only provide a small stepping stone across the fragmented landscape.

It is unlikely that a future DA would impact the above-listed species breeding capacity such that it would place these at risk of local extinction, therefore not considered a significant impact as per the Test of Significance (Appendix 3).

The rezoning is not within an area subject to matters pertaining to the *Fisheries Act.* In addition, no riparian zones or waterfront land have been identified within the study area.

Future development of the site needs to consider the following:

- The potential retention of hollows or necessary mitigation measures to ensure that fauna is not injured during the removal and construction phase.
- That dam dewatering follows appropriate guidelines to ensure it is conducted in an environmentally sensitive manner.
- Theat native landscaping focuses on species from PCT 3583, and
- Provides fauna foraging resources in the landscaping.

It is recommended that future survey of the site include a target search for Squirrel Gliders as they can utilise fragmented urban landscapes, and to review the hollows for fauna occupation prior to their removal.

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# Appendix 1. Flora & Fauna Species Lists

*Table A1-1 – Flora species recorded*

| Family | Scientific name | Common name |
|---|---|---|
| **TREES** | | |
| Myrtaceae | *Angophora costata* | Sydney Red Gum |
| Myrtaceae | *Corymbia gummifera* | Red Blood Wood |
| Myrtaceae | *Corymbia maculata* | Spotted Gum |
| Myrtaceae | *Corymbia torelliana* | Cadaghi |
| Lauraceae | *Cinnamomum camphora** | Camphor Laurel |
| Myrtaceae | *Eucalyptus resinifera* | Red Mahogany |
| Myrtaceae | *Eucalyptus saligna* (planted) | Sydney Blue Gum |
| Proteaceae | *Grevillea robusta* | Silky Oak |
| Altinginaceae | *Liquidambar styraciflua** | Liquid Ambar |
| Myrtaceae | *Lophostemon confertus* | Brush Box |
| Myrtaceae | *Metrosideros excelsa** | New Zealand Christmas Tree |
| Fagaceae | *Quercus* sp. * | Oak |
| Melastomaceae | *Tibouchina granulosa** | Tibouchina |
| Cupressaceae | *Thujia occidentalis** | Northern White Cedar |
| **SHRUBS** | | |
| Faboideae/Mimosoideae | *Acacia terminalis* | Sunshine Wattle |
| Faboideae/Mimosoideae | *Acacia longifolia* | Sydney Golden Wattle |
| Myrtaceae | *Acmena smithii* | Lilly Pilly |
| Myrtaceae | *Gaudium trinervium* | Flaky-barked Tea-Tree |
| Proteaceae | *Grevillea* sp. hybrid | Grevillea |
| Hydrangeacea | *Hydrangea macrophylla** | Hydrangea |
| Fabaceae/Faboideae | *Indigofera decora** | Summer Wisteria |
| Apocyanaceae | *Nerium oleander** | Oleander |
| Rosaceae | *Rubus fruiticosus agg.* * | Blackberry |
| Pinaceae | *Pinus* sp.* | |
| Strelitziaceae | *Strelitzia reginae** | Bird of Paradise |
| **GROUNDCOVERS** | | |
| Amaryllidaceae | *Agapanthus africanus** | African Lily |
| Asparagaceae | *Agave attenuata** | Fox Tail Agave |
| Poaceae | *Andropogon virginicus** | Whisky Grass |
| Poaceae | *Aristida vagans* | Three-awned Speargrass |
| Asparagaceae | *Asparagus aethiopicus** | Ground Asparagus |
| Ericaceae | *Azalea* sp.* | |
| Poaceae | *Briza minor** | Shivery Grass |
| Poaceae | *Briza subaristata** | |
| Poaceae | *Cenchrus clandestinus** | Kikuyu |
| Apiaceae | *Centella asiatica* | Indian Pennywort |
| Asteraceae | *Coreopsis lanceolata** | Coreopsis |
| Asteraceae | *Conyza bonariensis** | Flaxleaf Fleabane |
| Cyperaceae | *Cyperus gracilis* | Slender Flat-sedge |

| Family | Scientific name | Common name |
|---|---|---|
| Asphodelaceae | *Dianella* sp. | Flax Lilly |
| Poaceae | *Dilachne micrantha* | Shorthair Plume Grass |
| Poaceae | *Ehrharta erecta** | Panic Veldtgrass |
| Cyperaceae | *Eleocharis sphacelata* | |
| Poaceae | *Eragrostis brownii* | Browns Love Grass |
| Goodeniaceae | *Goodenia bellidifolia* | |
| Asteraceae | *Hypochaeris radicata** | Cat's Ear |
| Poaceae | *Lachnogrostis filiformis* | |
| Fabaceae/Faboideae | *Lotus subbiflorus** | Hairy Bird's Foot Trefoil |
| Hypopoxidaceae | *Molineria capitulata** | Palm Grass |
| Malvaceae | *Modiola caroliniana** | Red-flowered Mallow |
| Poaceae | *Paspalum dilatatum** | Dallis Grass |
| Plantaginaceae | *Plantago lanceolata** | Ribwort |
| Rubiaceae | *Richardia humistrata** | |
| Asteraceae | *Senecio madagascariensis** | Fireweed |
| Asteraceae | *Sida rhombifolia** | Paddys Lucerne |
| Poaceae | *Themeda triandra* | Kangaroo Grass |
| Fabaceae | *Trifolium repens** | White Clover |
| Verbenaceae | *Verbena bonariensis** | Purpletop |
| **VINES** | | |
| Fabaceae | *Hardenbergia violacea* | False Sarsparilla |
| Apocynaceae | *Parsonsia straminea* | Monkey Rope |
| Fabaceae | *Wisteria floribunda** | Wisteria |
| **FERNS** | | |
| Nephrolepidaceae | *Nephrolepsis cordifolia** | Fishbone Fern |
| Polypodiaceae | *Platycerum bifurcatum* | Elk Horn |
| Dennstaedtiaceae | *Pteridium esculentum* | Common Braken |
| * denotes exotic species<br>TS denotes threatened species | | |

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

***Table A1-2 – Fauna species recorded***

| Common name | Scientific name | Method observed |
|---|---|---|
| **Birds** | | Nov 2023 |
| Australian Magpie | *Cracticus tibicen* | O W |
| Australian Wood Duck | *Chenonetta jubata* | O W |
| Bell Miner | *Manorina melanophrys* | W |
| Chestnut Teal | *Anas castanea* | O |
| Common Myna * | *Sturnus tristis* | O W |
| Grey Butcherbird | *Cracticus torquatus* | O W |
| Laughing Kookaburra | *Dacelo novaeguineae* | O W |
| Long-billed Corella | *Cacatua tenuirostris* | O W |
| Magpie-lark | *Grallina cyanoleuca* | O W |
| Masked Lapwing | *Vanellus miles* | O W |
| Noisy Miner | *Manorina melanocephala* | O W |

| Common name | Scientific name | Method observed |
|---|---|---|
| Pied Butcherbird | *Cracticus nigrogularis* | O W |
| Pied Currawong | *Strepera graculina* | O W |
| Purple Swamphen..... | *Porphyrio porphyrio* | O W |
| Red-browed Finch | *Neochmia temporalis* | O W |
| Welcome Swallow | *Hirundo neoxena* | O W |
| **Mammals** | | |
| Eastern Coastal Free-tailed Bat[TS] | *Micronomus norfolkensis* | U |
| Eastern Broad-nosed Bat or Greater Broad-nosed Bat [TS] | *Scotorepens orion* or *Scoteanax rueppellii* | U[PO] |
| Eastern Broad-nosed Bat or Eastern False Pipistrelle[TS] | *Scotorepens orion* or *Falsistrellus tasmaniensis* | U[PO] |
| Eastern False Pipistrelle [TS] | *Falsistrellus tasmaniensis* | U[PO] |
| Eastern Freetail-bat | *Ozimops ridei* | U |
| Gould's Wattled Bat | *Chalinolobus gouldii* | U |
| Horse * | *Equus caballus* | O |
| Little Forest Bat or Eastern Cave Bat | *Vespadelus vulturnus* or *Vespadelus troughtoni* | U[PO] |
| Unidentified Long-eared Bat or Southern Myotis[TS] | *Nyctophilus* or *Myotis macropus* | U[PR] |
| **Reptiles** | | |
| Delicate Skink | *Lampropholis delicata* | O |
| Grass Skink | *Lampropholis guichenoti* | O |

Note:
* indicates introduced species
[TS] indicates threatened species
[MS] indicates Migratory species
All species listed are identified to a high level of certainty unless otherwise noted as:

[PR] indicates species identified to a 'probable' level of certainty – more likely than not
[PO] indicates species identified to a 'possible' level of certainty – low-moderate level of confidence

| | | | |
|---|---|---|---|
| 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 2. Threatened Flora & Fauna Habitat Assessment

*Table A2.1 – Threatened flora species habitat assessment (Appendix 2)*

| Scientific name DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n) Notes 1,2 & 3 | Record(s) from recent years (y/n) Notes 1,2 & 3 | Potential to occur | |
| *Acacia bynoeana* DPE EPBC | E1 | V | Erect or spreading shrub to 0.3 m high growing in heath and dry sclerophyll open forest on sandy soils. Often associated with disturbed areas such as roadsides. *Distribution limits N-Newcastle S-Berrima.* | no | yes | yes | yes | low | yes |
| *Angophora inopina* DPE EPBC | V | V | Small tree in open sclerophyll forest growing on deep sandy soils with associated lateritic outcrops. *Distribution limits N-Wyee S-Gorokan with a disjunct population near Karuah.* | no | yes | yes | yes | low | yes |
| *Asperula asthenes* DPE EPBC | V | V | Decumbent herb with weak branches often trailing to 30 cm. Grows in damp places, often along river banks between Taree and Bulahdelah. | no | no | yes | yes | low | no |
| *Callistemon linearifolius* DPE | V | - | Shrub to 4 m high. Dry sclerophyll forest on coast and adjacent ranges. *Distribution limits N-Nelson Bay S-Georges River.* | no | no | yes | yes | no | no |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |
| *Corunastylis sp. Charmhaven*<br>DPE EPBC | CE | CE | Terrestrial orchid currently only known from the Wyong Shire of NSW in the Gorokan/Charmhaven area. It occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include *Allocasuarina littoralis, Leptospermum juniperinum, Melaleuca nodosa, Callistemon linearis* and *Schoenus brevifolius.* Flowers likely in Feb-Mar. | no | no | yes | yes | low | no |
| *Corybas downlingii*<br>DPE | E1 | - | An orchid that forms clonal colonies and typically grows in gullies in tall open forest on well-drained gravelly soil at elevations of 10-200 m. *Known from 4 localities including Port Stephens (2 localities), Bulahdelah and Freemans Waterhole.* | no | no | yes | yes | low | no |
| *Cryptostylis hunteriana*<br>DPE EPBC | V | V | Saprophytic orchid. Grows in swamp heath on sandy soils. *Distribution limits N-Gibraltar Range S-south of Eden.* | no | no | yes | yes | low | no |
| *Diuris praecox*<br>DPE EPBC | V | V | Terrestrial orchid. Grows in sclerophyll forest near the coast. *Distribution limits N-Nelson Bay S-Ourimbah.* | no | no | no | no | no | no |
| *Eucalyptus camfieldii*<br>DPE EPBC | V | V | Stringybark to 10 m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. *Distribution limits N-Norah Head S-Royal NP.* | no | no | no | no | no | no |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |
| *Eucalyptus parramattensis subsp. decadens*<br>DPE EPBC | V | V | Red gum to 15 m high. Grows in dry open forest on sandy to clay soils often in lowly elevated moist sites. *Distribution limits N-Port Macquarie S-Kurri Kurri.* | no | no | no | no | no | no |
| *Genoplesium insigne*<br>DPE EPBC | E1 | CE | Terrestrial orchid. Found in *Themeda* patches among shrubs and sedges in heathland and forest. *Known from 3 localities in Wyong-Charmhaven area.* Occurs in vegetation dominated by Scribbly Gum, Red Bloodwood, Smooth-barked Apple and Black She-oak at Charmhaven. Flowers Sept-Oct. | no | marginal | yes | yes | low – unlikely given the existing disturbance | yes |
| *Grevillea parviflora subsp. parviflora*<br>DPE EPBC | V | V | Open to erect shrub to 1 m. Grows in woodland on light clayey soils. *Distribution limits N-Cessnock S-Appin.* | no | no | yes | yes | low | no |
| *Hakea archaeoides*<br>DPE EPBC | V | V | Multi stemmed shrub or tree growing to 7 m tall. Restricted to near-coastal ranges, above 230 m altitude, between Taree and Wauchope. | no | no | no | no | no | no |
| *Leionema lamprophyllum subsp. fractum*<br>DPE EPBC | E4a | - | A shrub growing to 1.5m tall occurring in sparse heathland or very open low woodland in skeletal sandy soils on exposed rocky terrain. *Currently known only from the Broken Back Range near Cessnock.* | no | no | no | no | no | no |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |
| *Macadamia integrifolia*<br>EPBC | - | V | The species was known to occur in north-east New South Wales and was collected from Camden Haven, and there are specimens also from Lismore. This species grows in remnant rainforest, including complex mixed notophyll forest, and prefers partially open areas such as rainforest edges. | no | no | yes | yes | Only as a planted specimen | no |
| *Maundia triglochinoides*<br>DPE | V | - | A reed-like herb which grows in swamps and shallow fresh water on clay. *Distribution Limits N-Qld border S-Wyong.* | no | no | yes | yes | low | no |
| *Melaleuca biconvexa*<br>DPE 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. *Distribution limits N-Port Macquarie S-Jervis Bay.* | no | no | yes | yes | low | no |
| *Melaleuca groveana*<br>DPE | V | - | Shrub or tree 2-5, rarely 10 m high. Grows in heath, often on exposed sites. *Distribution limits N-Werrikimbee NP S-Yengo NP.* | no | no | no | no | no | no |
| *Microtis angusii*<br>DPE EPBC | E1 | E | Terrestrial orchid which is known from one population at Ingleside. Associated with the Duffy's Forest vegetation community. Flowers May-Oct. | no | no | no | no | no | no |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |
| *Persicaria elatior*<br>DPE EPBC | V | V | Herb to 90 cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. *Varied distribution from SE NSW to QLD.* | no | no | yes | yes | no | no |
| *Rhizanthella slateri*<br>DPE EPBC | V | E | Underground orchid that is poorly known. Grows in sclerophyll forests. Usually only seen if the soil is disturbed. Flowers in Oct – Nov. | no | no | no | no | no | no |
| *Rhodamnia rubescens*<br>DPE EPBC | E4A | CE | Shrub or small tree to 25 m high found in rainforest and riparian vegetation along the coast and up to 600 m ASL. Flowers in late winter through to spring, with a peak in October, and fruits typically begin to appear in December in the Sydney region. Distribution limits N-Tweed Heads S-Batemans Bay. | no | no | yes | yes | no | no |
| *Rhodomyrtus psidioides*<br>DPE EPBC | E4A | CE | Pioneer species found in littoral, warm temperate and subtropical rainforest, and wet sclerophyll forest often near creeks and drainage lines. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Distribution N – Maryborough Qld, S – Broken Bay NSW. | no | no | yes | yes | no | no |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |
| *Rutidosis heterogama*<br>DPE EPBC | V | V | Erect herb to 30 cm. Grows mostly in heath, often along roadsides. *Distribution limits N-Maclean S-Hunter Valley.* | no | no | no | no | no | no |
| *Syzygium paniculatum*<br>DPE EPBC | V | V | Small tree. Subtropical and littoral rainforest on sandy soil. *Distribution limits N-Forster S-Jervis Bay.* | no | no | yes | yes | Only as a planted specimen | no |
| *Tetratheca juncea*<br>DPE EPBC | V | V | Prostrate shrub to 1 m high. Dry sclerophyll forest and heath. *Distribution limits N-Bulahdelah S-Port Jackson.* | no | yes | yes | yes | low | yes |
| *Thelymitra adorata*<br>DPE EPBC | E4a | CE | Currently known from a few localised occurrences in the area bounded by the towns of Wyong, Warnervale and Wyongah on the New South Wales Central Coast, Occurs from 10-40 m a.s.l. in grassy woodland or occasionally derived grassland in well-drained clay loam or shale derived soils. The vegetation type in which the majority of populations occur (including the largest colony) is a Spotted Gum - Ironbark Forest with a diverse grassy understorey and occasional scattered shrubs. | no | no | yes | yes | low | no |

| | | |
|---|---|---|
| DPE | - | Denotes species listed within 10 km of the development footprint on the *Bionet Atlas of NSW Wildlife* |
| EPBC | - | Denotes species listed within 10 km of the development footprint in the *EPBC Act* habitat search |

| Scientific name<br>DATABASE SOURCE | *BC Act* | *EPBC Act* | Growth form and habitat requirements<br>Distribution limit | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance test (✓)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present (y/n) | Nearby and / or high number of record(s) (y/n)<br>Notes 1,2 & 3 | Record(s) from recent years (y/n)<br>Notes 1,2 & 3 | Potential to occur | |

| | |
|---|---|
| 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: | This field is not considered if no suitable habitat is present within the development footprint.<br>'records' refer to those provided by the *Bionet Atlas of NSW Wildlife*.<br>'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle. |

*Table A2.2 – Threatened fauna species habitat assessment (Appendix 2)*

| Common name *Scientific name* Database source | *BC Act* | *EPBC Act* | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| Wallum Froglet *Crinia tinnula* DPE | V | - | Found in acidic paperbark swamps and wallum country with dense groundcover. Breeds in temporary and permanent pools and ponds of high acidity. *Distribution limit: N-Tweed Heads S-Kurnell.* | No | Marginal | 44 | 0 | Low | No |
| Giant Barred Frog *Mixophyes iteratus* DPE EPBC | E | E | Terrestrial inhabitant of rainforest and open forests. *Distribution limit: N-Border Ranges National Park. S-Narooma.* | No | Yes | 1 | 0 | Low | No |
| Stephens' Banded Snake *Hoplocephalus stephensii* DPE | V | - | A nocturnal and partly arboreal species that inhabits open and closed forest communities sheltering under bark, in hollows and under exfoliating slabs of granite. *Distribution limit: N-Border Ranges National Park. S-Gosford.* | No | No | 1 | 0 | Low | No |
| Rose-crowned Fruit-dove *Ptilinopus regina* DPE | V | - | Occurs in dense rainforests with a substantial understorey where it feeds entirely on fruit. *Distribution limit: N-Tweed Heads. S-Wollongong.* | No | No | 1 | 0 | Low | No |
| Superb Fruit-dove *Ptilinopus superbus* DPE | V | - | Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. *Distribution limit: N-Border Ranges National Park. S-Batemans Bay.* | No | No | 1 | 0 | Low | No |
| Black-necked Stork *Ephippiorhynchus asiaticus* DPE | E | - | Occurs in tropical to warm temperate terrestrial wetlands, estuarine and littoral habitats such as mangroves, tidal mudflats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams and sewerage ponds. *Distribution limit: N-Tweed Heads. S-Nowra.* | No | No | 1 | 0 | Low | No |
| Black Bittern *Ixobrychus flavicollis* | V | - | Found in shadowy, leafy waterside trees such as callistemons, casuarinas, paperbarks, eucalypts, mangroves and willows along tidal | No | No | 2 | 0 | Low | No |

| Common name *Scientific name* Database source | BC Act | EPBC Act | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| DPE | | | creeks, freshwater and brackish streams and ponds, sheltered mudflats and oyster slats. *Distribution limit: N-Tweed Heads. S-South of Eden.* | | | | | | |
| White-bellied Sea Eagle (*Haliaeetus leucogaster*) DPE | V | - | Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. *Sedentary; dispersive. N-Tweed Heads. S-South of Eden.* | No | Sub-Optimal | 19 | 0 | Low | No |
| Little Eagle *Hieraaetus morphnoides* DPE | V | - | Utilises plains, foothills, open forests, woodlands and scrublands, river red gums on watercourses and lakes. *Distribution limit - N-Tweed Heads. S-South of Eden.* | No | No | 1 | 0 | Low | No |
| Square-tailed Kite *Lophoictinia isura* DPE | 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. *Distribution limit: N-Goondiwindi. S-South of Eden.* | No | No | 2 | 0 | Low | No |
| Eastern Osprey *Pandion cristatus* DPE | V | - | Utilises waterbodies including coastal waters, inlets, lakes, estuaries, and offshore islands with a dead tree for perching and feeding. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | No | 4 | 0 | Low | No |
| Black Falcon *Falco subniger* DPE | V | - | Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops, occasionally over towns and cities. *N-Tweed Heads. S-South of Eden* | No | No | 1 | 0 | Low | No |
| Red Knot *Calidris canutus* DPE EPBC | - | E | The red knot is a small to medium migratory shorebird. During the non-breeding season in Australasia, the red knot mainly inhabit intertidal mudflats, sandflats, and sandy beaches of sheltered coasts and sometimes on | No | No | 1 | 0 | Low | No |

| Common name<br>*Scientific name*<br>Database source | *BC Act* | *EPBC Act* | Preferred habitat<br>*Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| | | | sandy ocean beaches or shallow pools on exposed rock platforms. They are occasionally seen on terrestrial saline wetlands near the coast and on sewage ponds and saltworks | | | | | | |
| Red-backed Button-quail<br>*Turnix maculosus*<br>DPE | V | - | Inhabits grasses, sedges near water, grassy woodlands, rainforest edges, black soil plains, spinifex, cereal crops, Lucerne and gardens. *Distribution limit: N-Tweed Heads. S-Manning River, casual visitor further south.* | No | No | 1 | 0 | Low | No |
| Sooty Oystercatcher<br>*Haematopus fuliginosus*<br>DPE | V | - | Exclusively coastal in distribution foraging along rocky coastlines and estuaries. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | No | 1 | 0 | Low | No |
| Curlew Sandpiper<br>*Callidris ferruginea*<br>DPE | E | CE | Mainly coastal, but many inland feeding along tidal mudflats, salt marsh, salt fields, fresh, brackish or saline wetlands and sewerage ponds. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | No | 1 | 0 | Low | No |
| Eastern Curlew<br>*Numenius madagascariensis*<br>DPE | - | CE | Primarily coastal especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Often recorded among saltmarsh and on mudflats fringed by mangroves and also in coastal saltworks and sewage farms. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | No | 1 | 0 | Low | No |
| Gang-gang Cockatoo<br>*Callocephalon fimbriatum*<br>DPE | V | - | Prefers wetter forests and woodlands from sea level to > 2,000 m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. *Distribution limit: mid north coast of NSW to western Victoria.* | No | No | 2 | 0 | Low | No |

| Common name *Scientific name* Database source | *BC Act* | *EPBC Act* | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| Glossy Black-Cockatoo *Calyptorhynchus lathami* DPE | V | - | Open forests with *Allocasuarina* species and hollows for nesting. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Sub-Optimal | 15 | 0 | Low – no *Allocasuarinas* present | No |
| Little Lorikeet *Glossopsitta pusilla* DPE | V | - | Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Marginal | 21 | 0 | Moderate | Yes |
| Swift Parrot *Lathamus discolour* DPE EPBC | E | E | Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | No | Sub-Optimal | 2 | 0 | Area Not Mapped | No |
| Turquoise Parrot *Neophema pulchella* DPE | V | - | Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. *Distribution limit: N-Near Tenterfield. S-South of Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Barking Owl *Ninox connivens* DPE | V | - | Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. *Distribution limit: N-Border Ranges National Park. S-Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Powerful Owl *Ninox strenua* DPE | V | - | Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. *Distribution limits: N-Border Ranges National Park. S-Eden.* | No | Sub-Optimal | 9 | 0 | Low | No |
| Masked Owl *Tyto novaehollandiae* DPE | V | - | Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. *Distribution limit: N-Border Ranges National Park. S-Eden.* | No | Sub-Optimal | 7 | 0 | Low | No |
| Sooty Owl *Tyto tenebricosa* | V | - | Tall, dense, wet forests containing trees with very large hollows. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | No | Sub-Optimal | 2 | 0 | Low | No |

| Common name<br>*Scientific name*<br>Database source | *BC Act* | *EPBC Act* | Preferred habitat<br>*Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| DPE | | | | | | | | | |
| White-throated Needletail [MS]<br>*Hirundapus caudacutus*<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. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Marginal | 8 | 0 | Low | No |
| Brown Treecreeper<br>*Climacteris picumnus victoriae*<br>DPE | V | - | Occupies eucalypt woodlands, open woodland lacking a dense understorey with fallen dead timber. *Distribution limit: (Sub species victoriae) Central NSW west of Great Div. Cumberland Plains, Hunter Valley, Richmond, Clarence, and Snowy River Valleys.* | No | Sub-Optimal | 2 | N/A | Low | No |
| Pilotbird<br>*Pycnoptilus floccosus*<br>EPBC | - | V | Strictly terrestrial, living on the ground in dense forests with heavy undergrowth. *Distribution limits: N-Newcastle, S-Melbourne.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Speckled Warbler<br>*Chthonicola sagittata*<br>DPE | V | - | Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Regent Honeyeater<br>*Xanthomyza Phrygia*<br>DPE EPBC | E4A | CE | Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.* | No | Sub-Optimal | 15 | 0 | Area Not Mapped | No |
| White-fronted Chat<br>*Epithianura albifrons*<br>DPE | V | - | Found in open damp ground, grass clumps, fencelines, heath, samphire saltmarshes, mangroves, dunes, saltbush plains. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |

| Common name *Scientific name* Database source | BC Act | EPBC Act | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| Grey-crowned Babbler *Pomatostoomus temporalis temporalis* DPE | V | - | Found in dry open forests, woodland scrubland, farmland with isolated trees. Distribution Limit mostly west of Great Dividing Range except Hunter Valley. *Distribution limit: N-Qld widespread. S-Mornington Pen. E-se SA.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Varied Sittella *Daphoenositta chrysoptera* DPE | V | - | Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | No | Sub-Optimal | 14 | 1 | Low | No |
| Dusky Woodswallow *Artamus cyanopterus cyanopterus* DPE | 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. *Widespread in eastern, southern and south-western Australia.* | No | Sub-Optimal | 3 | 0 | Low | No |
| Scarlet Robin *Petroica boodang* DPE | V | - | Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Diamond Firetail *Stagonopleura guttata* DPE | 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. *Distribution limit:* | No | Sub-Optimal | 1 | 0 | Low | No |

| Common name *Scientific name* Database source | *BC Act* | *EPBC Act* | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| | | | *N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.* | | | | | | |
| Spotted-tailed Quoll *Dasyurus maculatus* DPE EPBC | V | E | Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution limit: N-Mt Warning National Park. S-South of Eden.* | No | Sub-Optimal | 4 | 0 | Low | No |
| Koala *Phascolarctos cinereus* DPE EPBC | V | V | Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution limit: N-Tweed Heads. S-South of Eden.* | No | Marginal | 5 | 0 | Low | No |
| Eastern Pygmy Possum *Cercatetus nanus* DPE | 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. *Distribution limit: N-Tweed Heads. S-Eden.* | No | Sub-Optimal | 3 | 0 | Low | No |
| Yellow-bellied Glider *Petaurus australis* DPE | V | - | Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | No | Sub-Optimal | 5 | 0 | Low | No |
| Squirrel Glider *Petaurus norfolcensis* DPE | V | - | Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. *Distribution limit: N-Tweed Heads. S-Albury.* | No | Marginal | 106 | 0 | Moderate | Yes |
| Grey-headed Flying-fox *Pteropus poliocephalus* DPE 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. *Distribution limit: N-Tweed Heads. S-Eden.* | No | Optimal (Foraging Only) | 38 | 1 | Low | Yes |
| Yellow-bellied Sheathtail-bat | V | - | Rainforests, sclerophyll forests and woodlands. *Distribution limit: N-North of Walgett. S-Sydney.* | No | No | 3 | 0 | Low | No |

| Common name *Scientific name* Database source | *BC Act* | *EPBC Act* | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| *Saccolaimus flaviventris* DPE | | | | | | | | | |
| Eastern Cave Bat *Vespadelus troughtoni* DPE | V | - | Inhabits drier open forests and woodlands. Roosts in well-lit parts of caves and mineshafts. *Distribution limit: Along GDR from N-Tweed Heads. S-Kempsey.* | Yes-(possible | Marginal (Foraging Only) | 0 | 0 | Low | Yes |
| Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* DPE | V | - | Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. *Distribution limit: N-Woodenbong. S-Pambula.* | Yes | Optimal | 46 | 0 | Recorded | Yes |
| Large-eared Pied Bat *Chalinolobus dwyeri* DPE 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. *Distribution limit: N-Border Ranges National Park. S-Wollongong.* | No | Sub-Optimal | 7 | 0 | Low | No |
| Eastern False Pipistrelle *Falsistrellus tasmaniensis* DPE | V | - | Recorded roosting in caves, old buildings and tree hollows. *Distribution limit: N-Border Ranges National Park. S-Pambula.* | Yes-(possible) | Marginal | 14 | 0 | High | Yes |
| Golden-tipped Bat *Kerivoula papuensis* DPE | V | - | Rainforest and adjoining moist open forest habitats, roosting in tree hollows and dense vegetation. *Distribution limit: N-Border Ranges Nation Park. S-South of Eden.* | No | Sub-Optimal | 1 | 0 | Low | No |
| Little Bent-winged Bat *Miniopterus australis* DPE EPBC | V | - | Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. *Distribution limit: N-Border Ranges National Park. S-Sydney.* | No | Marginal (Foraging Only) | 59 | 0 | Moderate | Yes |

| Common name<br>*Scientific name*<br>Database source | *BC Act* | *EPBC Act* | Preferred habitat<br>*Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n)<br>Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| Large Bent-winged Bat<br>*Miniopterus orianae oceanensis*<br>DPE EPBC | V | - | Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | No | Marginal (Foraging Only) | 27 | 0 | Moderate | Yes |
| Southern Myotis<br>*Myotis macropus*<br>DPE | V | - | Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. *Distribution limit: N-Border Ranges National Park. S-South of Eden.* | Yes (probable) | Marginal | 26 | 0 | High | Yes |
| Greater Broad-nosed Bat<br>*Scoteanax rueppellii*<br>DPE | V | - | Inhabits areas containing moist river and creek systems, especially tree lined creeks. *Distribution limit: N-Border Ranges National Park. S-Pambula.* | Yes-(possible) | Marginal | 20 | 1 | High | Yes |
| Eastern Chestnut Mouse<br>*Pseudomys gracilicaudatus*<br>DPE | V | - | Inhabits heathland including dense wet heath and swampy areas, occasionally in woodland with grassy understorey. *Distribution limit: N-Border Ranges National Park. S-Brisbane Water National Park.* | No | Sub-Optimal | 2 | 0 | No | No |

| | |
|---|---|
| DPE | - Denotes *BC Act* listed species within 10 km of the development footprint on the *Bionet Atlas of NSW Wildlife* |
| EPBC | - Denotes *EPBC Act* listed species within 5 km of the development footprint in the *Protected Matters Search Tool* (PMST) |
| TBE | - Denotes additional species considered by *Travers bushfire & ecology* to have potential habitat based on regional knowledge and other records |
| 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 |
| No or Low potential to occur | These categories represent an “unlikely” chance of occurrence and are therefore not included in the Test of Significance. |
| Moderate or High | These categories represent an at least somewhat “likely” chance of occurrence and are therefore included in the Test of Significance. |

| Common name *Scientific name* Database source | BC Act | EPBC Act | Preferred habitat *Distribution limit* | Recorded on site (y/n) | If not recorded on site | | | | Considered in Test of Significance (y/n) Refer to Appendix 3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Suitable habitat present | # records within 10km in previous 20 years | # records within ~500m in previous 20 years | Potential to occur | |
| potential to occur | | | | | | | | | |

A detailed assessment in accordance with Section 1.7 of the *EPA Act* will be completed for these species in Appendix 3 of this report.

Table A2.3 provides an assessment of potential habitat within the study area for nationally *protected* migratory fauna species recorded within 10 km on the *EPBC Act* Protected Matters Tool.

***Table A2.3 – Protected migratory bird habitat assessment (Appendix 2)***

| Common name *Scientific name* | Preferred habitat *Migratory breeding* | Suitable habitat present (y/n) | Recorded on site (y/n) | Comments |
|---|---|---|---|---|
| Oriental Cuckoo (*Cuculus optatus*) | 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. | | | |
| White-throated Needletail (*Hirundapus caudacutus*) | 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.* | Yes | No | See Section 3.4 for assessment. |
| Black-faced Monarch (*Monarcha melanopsis*) | Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. *Summer breeding migrant to coastal southeast Australia, otherwise uncommon.* | No | No | See Section 3.4 for assessment. |
| Spectacled Monarch (*Monarcha trivirgatus*) | Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. *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.* | No | No | - |
| Satin Flycatcher (*Myiagra cyanoleuca*) | Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south-east Australia and Tasmania over warmer months, winters in northeast Qld.* | No | No | - |

| **Common name**<br>***Scientific name*** | **Preferred habitat**<br>***Migratory breeding*** | **Suitable habitat present (y/n)** | **Recorded on site (y/n)** | **Comments** |
|---|---|---|---|---|
| Rufous Fantail<br>(*Rhipidura rufifrons*) | Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. *Breeding migrant to south-east Australia over warmer months. Altitudinal migrant in north-east NSW in mountain forests during warmer months.* | Yes | No | See Section 3.4 for assessment. |
| Yellow Wagtail<br>(*Motacilla flava*) | 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. | No | No | - |

# Appendix 3. Test of Significance

Flora and fauna survey and habitat assessments of the study area have resulted in the identification of suitable habitat for the following threatened biodiversity that was recorded present or considered otherwise with varying potential to occur. The potential for any direct or indirect impacts on species has been considered and noted.

*Table A3.1 – Threatened flora impact summary (Appendix 3)*

| Scientific name | *BC Act* | Potential to occur | Potential habitat impact |
|---|---|---|---|
| *Acacia bynoeana* | E | Low | Removal of 0.16 ha of potential habitat |
| *Angophora inopina* | V | Low | Removal of 0.16 ha of potential habitat |
| *Genoplesium insigne* | CE | Low | Removal of 0.16ha of unlikely habitat |
| *Tetratheca juncea* | V | Low | Removal of 0.16 ha of potential habitat |

*Table A3.2 – Threatened fauna impact summary (Appendix 3)*

| Common name | *BC Act* | Potential to occur | Potential habitat impact |
|---|---|---|---|
| Eastern Coastal Free-tailed Bat | V | Recorded | Direct – On potential foraging / roosting / breeding habitat |
| Southern Myotis | V | Recorded (probable) | Direct – On potential foraging / roosting / breeding habitat |
| Greater Broad-nosed Bat | V | Recorded (possible) | Direct – On potential foraging / roosting / breeding habitat |
| Eastern False Pipistrelle | V | Recorded (possible) | Direct – On potential foraging / roosting / breeding habitat |
| Grey-headed Flying-fox | V | High | Direct – On potential foraging habitat |
| Squirrel Glider | V | Moderate | Direct – On potential foraging / denning / breeding habitat |
| Little Lorikeet | V | Moderate | Direct – On potential foraging / breeding habitat |
| Little Bent-winged Bat | V | Moderate | Direct - On potential foraging habitat |
| Large Bent-winged Bat | V | Moderate | Direct - On potential foraging habitat |

### *Endangered populations*

- No endangered fauna populations were considered.
- No endangered flora populations were considered given that the ones assessed in Section 2.4 of the main document were absent from the site.

### *Threatened ecological communities (TEC)*

- No TECs were observed. PCT 3583 is not a TEC.

# *BC ACT* 2016 - SECTION 7.3

# TEST OF SIGNIFICANCE

As outlined in Section 7.2 of the *BC Act* 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 (AOBV).

With respect to (a) above, and outlined in Section 7.3 of the *BC Act,* the following *Test of Significance* is a set of five main considerations, with sub-considerations for determining whether proposed development or activity 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 5.5.

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**

***Acacia bynoeana***

A semi-prostrate shrub to a metre high. Found occurring in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The species occurs in heath or dry sclerophyll forest on sandy soils.

Potential habitat occurs within the study area however no specimens were recorded onsite.

The area of remnant vegetation is highly disturbed and underscrubbed with regular management that hinders native regrowth.

The nearest recorded specimen is recorded approximately 3 km away limiting the potential of reproduction and seed dispersal. It is unlikely that the proposal will have a significant impact on the species such that it may be placed at risk of extinction.

***Angophora inopina***

A small tree to 8 m, often multi-stemmed. This species is similar to *A. bakeri* but with broader leaves and shorter petioles. Only known from the Wallarah Creek catchment from Charmhaven to Wyee where it occurs in woodland of *Eucalyptus haemastoma* and *Corymbia gummifera*.

Potential habitat occurs onsite, and a large number of proximal records exist nearby, however, no specimens were recorded onsite. The nearest recorded specimen is recorded 2.6 km away,

limiting the potential of reproduction and seed dispersal, and as a result can be concluded that the proposal is not likely to have a significant impact on the lifecycle of the species such that it may be placed at risk of extinction.

***Genoplesium insigne***

A terrestrial orchid with a solitary cylindrical leaf that encloses the flowering stem, typically flowering from September to October. Occurs in southern Lake Macquarie LGA and northern Central Coast LGA's. Distribution recorded as far as Cooranbong in the north, Warnervale in the south and Chain Valley Bay in the east.

There are a large number of proximal records for this species occurring nearby, however no specimens were recorded on site. Known specimens were observed flowering in mid-September (2023) at Chain Valley Bay at a control site, with the known flowering period typically within September to early October however in some years can flower as late as November. Survey on site was undertaken beyond the 2023 flowering period so it would unlikely have been observed if present.

The national conservation advice is that the species is only known from the suburbs of Chain Valley Bay, Charmhaven, and Lake Haven, therefore limiting the potential for its occurrence in Wyee.

Important habitat critical for the survival of the species is described as "The Wyong midge orchid occurs in patches of *Themeda australis* (kangaroo grass) amongst shrubs and sedges in heathland and forest. Vegetation associated with this species has been described as dry sclerophyll woodland dominated by *Eucalyptus haemastoma* (scribbly gum), *Corymbia gummifera* (red bloodwood), *Angophora costata* (smooth-barked apple) and *Allocasuarina littoralis* (black she-oak)." Some of these species are present on site but may only include one or two specimens.

The species can tolerate some types of disturbance, noted by a recent individual located in an open and largely cleared road corridor close to the control site at Chain Valley Bay, however this is not an area which is continually mown or trampled on, unlike the remnant vegetation on site at Wyee. If there was some degree of potential habitat on site, the continual mowing and trampling of the area would likely have depleted any seed bank for the species.

The nearest recorded specimen is approximately 3.22 km away from the site (locations of sensitive species are generally denatured in Bionet, so this distance measurement is approximate only) and the habitat present is marginally suitable for this species to occur. As a result of ongoing ground maintenance, it was considered quite unlikely to occur, or not be suitable to maintain a viable population. It is concluded that the proposal is not likely to have a significant impact on the lifecycle of the species such that it may be placed at risk of extinction.

***Tetratheca juncea***

A low shrub that grows in clumps of single multiple stems found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. Found in the LGA's of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes, and Cessnock.

The species can occur in a few different vegetation types, however, is found more typically found on slight-moderate slopes with a southerly aspect. The species usually occurs in moderately intact vegetation with a moderate-dense understorey. These features are generally absent from the site despite the vegetation type being suitable.

The species has a peak flowering period of September-October but may extend from July to January if conditions are suitable. Survey was undertaken on 21 November, which is late in the

flowering period, however it was noted the previous week that the species was flowering very well at a site in Rathmines, approximately 17 km north.

No specimens were recorded onsite during flora survey and the ongoing maintenance regime would not support a decent population. The nearest recorded specimen is recorded approximately 2.17 kms away and given the species lifecycle and seed dispersion, it is unlikely that the proposal will have a significant impact on the species such that it will be placed at risk of extinction.

**Eastern Coastal Free-tailed Bat, Greater Broad-nosed Bat, Eastern False Pipistrelle and Southern Myotis**

These four microbats are considered here together given their similar dependence on hollows, albeit different in microhabitat requirements, and therefore their similar assessment outcome.

The Eastern False Pipistrelle inhabits warm to cool temperate moist and dry open forests (Strahan 1995) with a preference for wet high-altitude forests and being less common on ridge-tops where fertility is low (Law, Herr & Phillips, 2008). It is one of the larger and less common forest bats, with wing morphology indicating it to be a highly mobile species with a large foraging range with recordings up to 12km from roosting sites (Herr, Law & Phillips, 2008) and home ranges up to 136ha (Churchill, 2008). Flight is not very manoeuvrable and as such foraging takes places in open structures or along trails in forest environs. It hunts beetles but also moths and bugs. The Eastern False Pipistrelle roosts mainly in tree hollows, occasionally utilising caves and abandoned buildings (Parnaby 1992; Phillips et al. 1985). Roosts in trees are generally in hollow trunks of eucalypt trees in colonies of 3 to 80 (Churchill 2008). Cave roosting is recorded at Jenolan, NSW, with occasional roosts also recorded in old wooden structures (Churchill, 2008). Colonies are usually entirely male or female for reasons currently unknown.

The Eastern Coastal Free-tailed Bat forages above the canopy of open forests and woodlands and in clearings at forest edges, feeding on small insects (Allison, Hoye & Law 2008). This species is thought to roost predominantly in tree hollows but also under loose bark and occasionally in houses and outbuildings (Allison, Hoye & Law 2008). Until recent findings of a roost within mangroves, all known natural roosts had occurred within hollow spouts of large mature eucalypts. The species is often found close to dams and waterholes. The Eastern Coastal Free-tailed Bat species will utilize paddock trees and isolated remnant vegetation when in proximity to larger forest remnants (Allison, Hoye & Law 2008).

The Greater Broad-nosed Bat inhabits a variety of habitats including moist gullies in mature coastal forest, rainforest, open woodland, Melaleuca swamp woodland, wet and dry sclerophyll forests, cleared paddocks with remnant trees and tree lined creeks in open areas (Churchill 2008). The Greater Broad-nosed Bat predominantly forages within open forest, woodlands, along vegetated creek lines and small river systems (Hoye and Richards 1995). This species roost in tree hollows, cracks and fissures in trunks and dead branches, under exfoliating bark as well as the roof of old buildings (Churchill 2008, Hoye & Richards 1995). The Greater Broad-nosed Bat feeds on large slow flying beetles and moths (Dwyer 1965; Vestjens and Hall 1977). This species is a slow flier and generally hunts for insects over understorey vegetation as well as foraging along the interface of clearings and paddocks with forested areas and along tree-lined creeks (Richards 1988).

The Southern Myotis inhabits rainforests and open forests containing creeks and lakes over which it feeds and roosts in tree hollows, caves, mines, under bridges, in tunnels and occasionally buildings (Richards 1995). The Southern Myotis predominantly forages along

creek lines and over waterbodies where it takes insects and small fish from on and just below the water surface (Richards 1995).

This species has a strong association with streams and permanent waterways, most frequently at low elevations and in flat or undulating country and usually in areas that are vegetated rather than cleared. They will live in most habitat types as long as it is near water (Churchill 2008).

All four of these microbat species were recorded during ultrasonic recording during 2023.

It is considered that the development footprint provides potentially suitable roosting and breeding habitat for the Eastern Coastal Free-tailed Bat, Southern Myotis, Greater Broad-nosed Bat and Eastern False Pipistrelle. This is based on the presence of hollows of various types, most notably bark exfoliations, branch spouts and trunk splits. Given the high mobility of these species, represented individuals in the locality would be part of a population that extends well beyond the immediate locality.

The locating of hollow bat roost sites by survey is often an exhaustive, costly and unreliable process, particularly as these species often change roosting locations. Therefore, in the absence of recordings within proposed development areas the assessment for hollow-dependent threatened microbats is often based on the available habitat present and retained for the species within the locality that would support the local population. In this respect the proposed conservation areas as well as other areas of nearby local habitat will remain extensive.

It is therefore concluded that the proposed development will not likely significantly impact on a local population of Eastern Coastal Free-tailed Bat, Greater Broad-nosed Bat or Eastern False Pipistrelle.

Careful habitat removal measures, relocation of suitable hollows and provision of supplementary roosting habitat measures for these species have been considered and incorporated into the mitigation and amelioration of impacts outlined in Section 5.3. Such measures will ensure that if a colony is found to be roosting within the development footprint at the time of habitat removal, this will be safely recovered and effectively relocated within the relevant hollow section. Suitable hollows within the development landscape will, where possible, also be similarly relocated to reduce the total impact of hollow removal in the immediate area.

Re-used hollows or those with likely occupation are to be relocated to conserved areas or within close proximity to the site. All other hollows removed should be replaced with nest boxes. Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint.

**Little Lorikeet (*Glossopsitta pusilla*)**

Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely flowering eucalypts, but also on a variety of other species including Melaleucas and mistletoes.

There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. Long term investigations indicate that breeding birds are resident from April to December, and even during their non-resident period,

they may return to the nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006).

Approximately 3 cm diameter nest hollows are located mostly in living, smooth-barked eucalypts, and are kept open by the activities of the occupants, which use their beaks to bite away living bark from around the opening. When nest hollows are deserted, e.g. after storm-damage to trees, hollows can close over within 14 months (Courtney & Debus 2006). Nest hollows are occasionally located in dead trees, but birds generally desert hollows within two years of tree death. Nest-hollows are used “traditionally”, with the same hollow (not necessarily by the same individuals) (Courtney & Debus 2006). The breeding season extends from May to September (Higgins 1999) and, if eucalypt nectar and pollen are available throughout this period, two broods of fledglings can be raised in a season.

The major threats to Little Lorikeets are loss of breeding sites and food resources from ongoing land clearing. New nest hollows are not being recruited at a rate that compensates this loss.

It is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and ‘locally nomadic’ movements are suspected of breeding pairs. The Little Lorikeet roosts in treetops, often distant from feeding areas but nests in proximity to feeding areas if possible. The Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.

The study area provides limited and fragmented patches of vegetation suitable for foraging, and suitable sized hollows for breeding.

This species was not recorded during survey however given the habitat suitability this species should be considered using the precautionary principle.

Any hollows found to be used by Little Lorikeet or other hollow-dependent fauna within the development landscape should be relocated within retains areas of suitable habitat and areas where vegetation is retained. Re-used hollows or those with likely occupation are to be relocated to conserved areas or within close proximity to the site. All other hollows removed should be replaced with nest boxes. Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint. Given the highly mobile nature of this species the proposal is not expected to have any significant impact on Little Lorikeet.

**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). 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). 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). Roost sites in tree hollows have not been reported within the literature reviewed.

Potential breeding habitat for Little & Large Bent-winged Bat is defined by *The BAM Bat Guide* as "The PCTs associated with the species (as per the TBDC) within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. No such habitat occurs with the development footprint or surrounds.

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, neither species will be likely significantly impacted by the proposed habitat clearance. There these species require no further assessment.

**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 20 km of camps but individuals are known to commute up to 50 km to a productive food source.

Numerous Grey-headed Flying-fox have been recorded within 10 km of development footprint. The development footprint provides only seasonal limited foraging habitat for the Grey-headed Flying-fox as no suitable roosting or subsequent breeding habitat is present. Foraging habitat is otherwise well represented in the surrounding locality such that removal of 0.16 of potential foraging habitat will not significantly impact on a local population and it is considered that this species requires no further assessment. It is however recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

**Squirrel Glider**

The Squirrel Glider is a species that primarily inhabits mixed aged stands of eucalypt forest and woodlands, including gum barked and high nectar-producing species in south-eastern Australia, away from the denser forests of the coastal ranges. They prefer areas with high nutrient soils below 600m ASL, where there are abundant high nectar-producing eucalypts and flowering shrubs (SFNSW 1997). The diet of Squirrel Gliders consists of nectar, pollen, eucalypt sap, *Acacia* gum, honeydew, and arthropods (Menkhorst & Collier 1988; Quin 1993).

Squirrel Gliders have specific requirements for their habitat, such as trees with hollows for nests and den sites. The home ranges of Squirrel Gliders have been estimated to range from 0.65 to 8.55 hectares, with males having greater movements than females (Quin 1995; NPWS

1995). They have nightly movements estimated to be between 300 and 500 meters (NPWS 1995).

The study area provides limited and fragmented patches of vegetation, which is considered to limit the ability of Squirrel Glider to move through the landscape. However due to the high local records of Squirrel Glider and the presence of Eucalypt species and suitable sized hollows, this species should be considered using the precautionary principle.

No nocturnal or target survey has been undertaken to determine the presence/absence of this species however this survey is recommended.

Any hollows found to be used by Squirrel Gliders or other hollow-dependent fauna within the development landscape should be relocated within retains areas of suitable habitat and areas where vegetation is retained. Re-used hollows or those with likely occupation are to be relocated to conserved areas or within close proximity to the site. All other hollows removed should be replaced with nest boxes. Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint.

**(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**

There are no Endangered Ecological communities or Critically Endangered Ecological communities present within the site footprint or adjacent to the site.

**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,**

There are no Endangered Ecological Communities or Critically Endangered Ecological communities present within the site footprint or adjacent to the site.

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

It is considered that the habitat attributes of the development footprint provide known or potential habitat for *Acacia bynoeana, Angophora inopina, Tetratheca juncea,* Eastern Coastal Southern Myotis, Eastern Coastal Free-tailed Bat, Greater Broad-nosed Bat, Squirrel Glider, Eastern Cave Bat (foraging only) Little & Large Bent-winged Bat (foraging only), Grey-headed Flying-fox (foraging only) and Little Lorikeet.

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

The sites footprint encompasses 0.16 ha of low condition native vegetation and 0.01 ha of planted native vegetation within the study area including three (3) habitat trees.

The planning proposal is seeking to rezone the property from RU4 Primary Production Small Lots to E1 Local Centre to facilitate the future development of a supermarket with supporting retail business use. Whilst the rezoning itself has no impact upon vegetation and habitat pertaining to the site, it will after a Development Application has been lodged. For the purposes of this Test of Significance, it is assumed that the future DA will impact all vegetation. Therefore, the extent of habitat to be likely removed consists of 0.16 ha of low condition native vegetation, 0.01 ha of planted native vegetation and three (3) habitat trees containing small (0-5cm) and medium (10-15cm) sized hollows.

### 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 proposal will not fragment or isolate currently connected areas of habitat as the proposal is a rezoning application. Whilst the rezoning itself has no impact on upon the vegetation, future development on the site will have an impact. The site consists of poor condition native vegetation which has been significantly underscrubbed, mowed and landscaped as large areas of cleared exotic dominated pasture. This vegetation does not connect to large contiguous patches of bushland however, Squirrel Gliders are known to persist in urban remnants with fragmented connectivity.

All threatened species considered with potential habitat within the site are highly mobile in nature with the exclusion of Squirrel Glider. It is recommended that further investigations are undertaken to determine the presence/absence of Squirrel Glider prior to the lodgement of future DA's.

It is considered that known habitat for a threatened species, population or ecological community within the local area and region is unlikely to become isolated or fragmented as a result of the rezoning proposal however future development should consider the implications on the fragmentation of potential local Squirrel Glider populations from other areas of habitat should Squirrel Gliders be identified as utilising the fragmented connective pathways to traverse through the landscape.

### 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.

In respect to threatened fauna species recorded or with high 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.

Although the rezoning application does not have an impact on the vegetation directly, a future development application is likely to impact approximately 0.16 or 11% of the site's existing natural habitats.

Given the occurrence of better quality and contiguous bushland to the north and south and current isolation and fragmentation of the site, the importance of the habitat that will 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. However as mentioned above, all threatened species considered with potential habitat within the site are highly mobile in nature with the exclusion of Squirrel Glider. It is recommended that further investigations are undertaken to determine the presence/absence of Squirrel Glider prior to the lodgement of future DA's.

It is considered that known habitat for a threatened species, population or ecological community within the local area and region is unlikely to become isolated or fragmented as a result of the rezoning proposal however future development should consider the implications on the fragmentation of potential local Squirrel Glider populations from other areas of habitat should Squirrel Gliders be identified as utilising the fragmented connective pathways to traverse through the landscape.

### (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 development footprint 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.

***Key threatening processes***

| Listed key threatening process | Development a threatening process? | | |
|---|---|---|---|
| | Likely | Possible | Unlikely |
| Aggressive exclusion of birds by Noisy Miners (*Manorina melanocephala*) | ✓ | | |
| 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 (*Oryctolagus cuniculus*) | | | ✓ |
| 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 *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations | | | ✓ |
| Infection of frogs by amphibian chytrid causing the disease chytridiomycosis | | | ✓ |

| Listed key threatening process | Development a threatening process? | | |
|---|---|---|---|
| Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae | | ✓ | |
| Infection of native plants by *Phytophthora cinnamomi* | | ✓ | |
| Introduction of the large earth bumblebee (*Bombus terrestris*) | | | ✓ |
| Invasion and establishment of exotic vines and scramblers | | ✓ | |
| Invasion and establishment of Scotch Broom (*Cytisus scoparius*) | | | ✓ |
| Invasion and establishment of the Cane Toad (*Bufo marinus*) | | | ✓ |
| Invasion, establishment and spread of *Lantana camara* | | | ✓ |
| Invasion of native plant communities by bitou bush & boneseed *Chrysanthemoides monilifera* | | | ✓ |
| Invasion of native plant communities by exotic perennial grasses | | ✓ | |
| Invasion of native plant communities by African Olive (*Olea europaea* subsp. *cuspidata*) | | | |
| Invasion of the Yellow Crazy Ant (*Anoplolepis gracilipes*) | | | ✓ |
| 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 (*Canis lupus familiaris*) | | | ✓ |
| Predation by the European Red Fox (*Vulpes vulpes*) | | | ✓ |
| Predation by the Feral Cat (*Felis catus*) | | | ✓ |
| Predation by Gambusia holbrooki Girard, 1859 (plague minnow or mosquito fish) | | | ✓ |
| Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island | | | ✓ |
| Predation, habitat degradation, competition & disease transmission from Feral pigs (*Sus scofa*) | | | ✓ |
| 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 a small degree to a number of these processes as described below. It was not considered that the proposal will have a large or significant impact 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.

*Aggressive exclusion of birds by Noisy Miners (Manorina melanocephala)*

Noisy Miners have been recorded present within the study area. It is likely that Noisy Miners from within the study area may be slightly displaced as a result of habitat removal for the development, resulting in increased impacts from this species on other native birds in the nearby surrounds. Given the high degree of disturbance in the local surrounds it is expected that the Noisy Miner is already at impacting numbers in these areas.

*Anthropogenic 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. Vegetation also acts as a heat sink, and provides important shade, particularly in urban areas. 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*

The proposal is of a class of development recognised as a threatening process. It is generally recommended that all sites should aim to achieve a maintain or improve outcome on the quality and quantity of native vegetation cover through protection and restoration measures. The vegetation management process is to be undertaken in accordance with the conditions of consent and any required vegetation and tree management plans for the development proposal. Offsetting the loss of native vegetation including trees is to be considered as part of the proposed works. The removal of native vegetation on the development footprint is not likely to significantly affect the biodiversity of the local area due to the extent of better-quality natural vegetation within the local area and the small area of vegetation to be removed.

*Invasion and establishment of exotic vines and scramblers*

The site currently contains exotic vine and scrambler species such as *Wisteria floribunda (Wisteria) as* planted specimens. The planning proposal will provide an opportunity to remove, control and possibly eradicate these species within the development footprint. This will result in a beneficial outcome by reducing the likelihood of this Key Threatening Process (KTP) from impacting on the site.

*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 and entry 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 fungicides prior to commencing work. See *Hygiene Guidelines: Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomic, myrtle rust, amphibian chytrid fungus and invasive plants*. DPIE 2020.

*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 is of a class of development recognised as a threatening process due to possible incursions of grasses such as *Cenchrus clandestinus* (Kikuyu), *Ehrharta erecta (*Panic Veldtgrass)*, Andropogon virginicus* (Whisky Grass), and *Briza subaristata.* However, the vegetation within the development footprint is of a degraded nature and the planning proposal is not expected to significantly increase the prevalence of exotic perennial grasses. It is expected that the planning proposal will decrease the number of exotic grass species and will provide an opportunity to manage the area with regard to weed invasion.

*Loss of hollow-bearing trees*

Hollow-bearing tree surveys identified three hollow-bearing trees containing medium (10–30 cm) and small (0–10 cm) sized hollows within the development footprint. The proposal will require the removal of all of these hollow-bearing trees and as such is of a class of development recognised as a threatening process. Threatened species recorded and considered with suitable habitat within the site and dependant on hollows of this nature include, Squirrel Glider, Eastern False Pipistrelle, East-coast Freetail Bat, Greater Broad-nosed Bat, Southern Myotis and Little Lorikeet. None of these species were recorded during surveys undertaken. Replacement of hollows in conservation areas is not likely to be possible. Instead, any salvaged hollow shall be retained by the fauna ecologist / project ecologist to be utilised on other nearby job sites where this hollow augmentation is possible.

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

The proposal could potentially be a class of development recognised as a threatening process if invasive garden plants are utilised as part of the landscaping and allowed to spread into retained vegetation. It is therefore recommended that native plant species commensurate with PCT 3583 Hunter Coast Lowland Scribbly Gum Forest be utilised as part of the future landscaping works and weed control is applied to reduce the potential for spread and establishment of invasive garden plants.

# Appendix 4. EPBC 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?**

- 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

# 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.

# 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.

# Appendix 5. Microbat Survey Results

| Summary of results | | | |
|---|---|---|---|
| **ID Method** | **Result** | **Threatened** | **ID Confidence (probability low to high)** |
| Alternating, steep pulses centred around 31 kHz | *Chalinolobus gouldii* | No | High |
| Non-alternating, flat pulses around 29 kHz | *Ozimops ridei* | No | High |
| Alternating, flat pulses around 33 kHz | *Micronomus norfolkensis* | Yes | High |
| Characteristic frequency around 38 kHz | *Scotorepens orion* or *Falsistrellus tasmaniensis* | Yes (only *Falsistrellus*) | High |
| the non-alternating, large-bandwidth pulses around 34 kHz | *Scoteanax rueppellii* or *Scotorepens orion* | Yes (only *rueppellii)* | High |
| Steep calls with short duration | *Myotis macropus* or *Nyctophilus sp.* | Yes (only *Myotis*) | High |
| Characteristic frequency around 50 kHz and up-sweeping tails | *Vespadelus troughtoni* or *Vespadelus vulturnus* | Yes (only *troughtoni*) | High |

| METHOD DESCRIPTION |
|---|
| One Anabat Swift (full spectrum) with omnidirectional microphones was used to record bat calls. A filter that requires a file to have ≥ 4 bat pulses that meet the criteria of 1) 10-200kHz characterstic frequency, 2) 2-100ms duration, and 3) 5-1500 time between pulses (TBC) was used within the software Anabat Insight to automatically determine files containing bat calls. All non-bat files (i.e., files that did not meet the filter criteria) were deleted. All "Bat" files were run through a per-pulse decision tree in Anabat Insight, which automatically labelled files with either a species or species complex. The results were then manually verified and the call from each species/species complex that was most confidently identified was selected to be used as the image in the "Results" section of this report. All images were taken from within Anabat Insight and shown in either compressed or uncompressed mode, depending on what image best highlighted the diagnostic features. |

| CALL REFERENCE LIBRARY |
|---|
| Calls were identified using 1) "Bat Calls of NSW" by Pennay *et al*. (2004) regional guide, 2) "Bat Calls of Central Eastern NSW" by Chris Corben (2009), and 3) Call metrics obtained from discussions with recognised bat experts including Michael Pennay, Brad Law, Chris Corben, and Greg Ford. The combination of reference calls and call metrics from these sources results in a sufficient local reference-call library for identifying microbat species that occur in the Sydney Basin and beyond. |

## RESULTS

The calls of three species and four species complexes were identified from the four Anabat recorders located at Wyee. One threatened species (*Micronomus norfolkensis)* and four species complexes that contain threatened species (*Scoteanax rueppellii*, *Falsistrellus tasmaniensis, Myotis Macropus* and *Vespadelus troughtoni*) were identified.

**Figure 1**

Gould's Wattle Bat (*Chalinolobus gouldii*) identified with a high level of confidence.

This sequence was identified as a *C. gouldii* call due to the alternating characteristic frequency around 31 kHz and large bandwidth pulses.

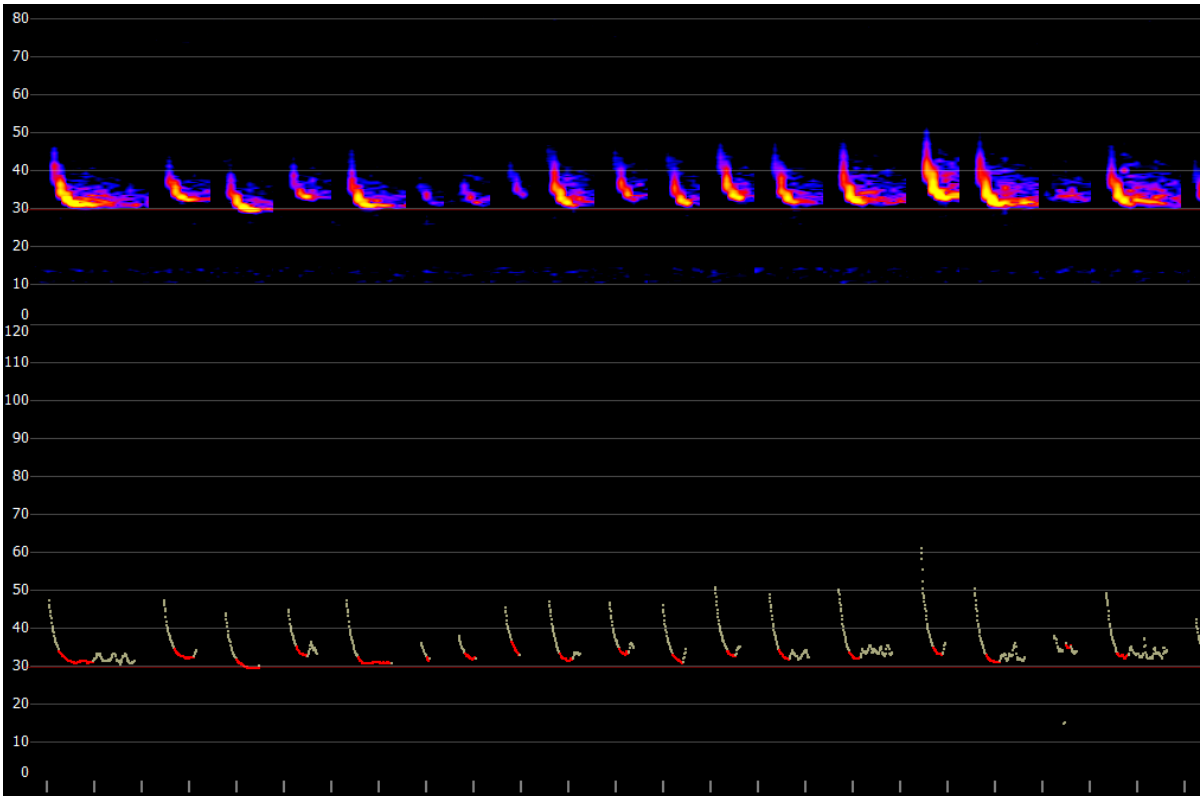


**Figure 2**

Ride's Free-tailed Bat (*Ozimops ridei*) identified with a high level of confidence.

This sequence was identified as an *O. ridei* call due to the non-alternating, relatively flat pulses around 28 wkHz.

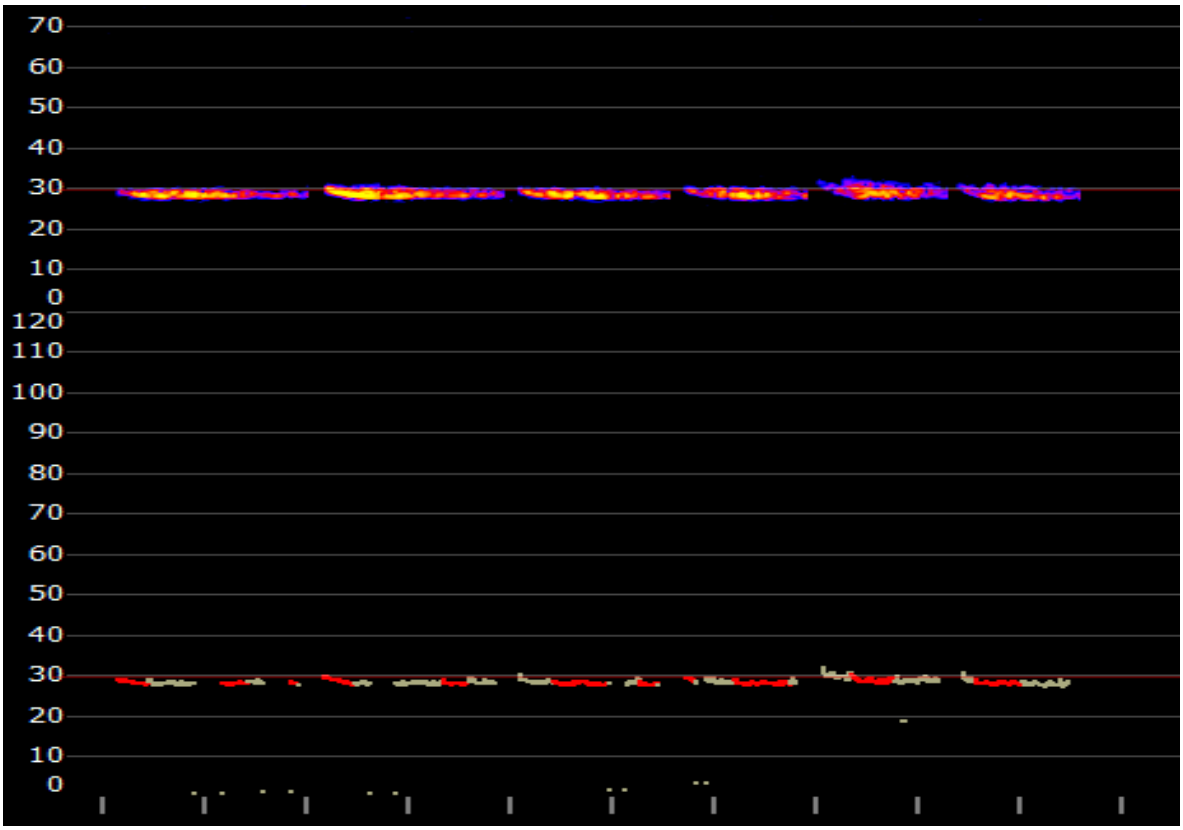

**Figure 3**

Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) identified with a high level of confidence.

This sequence was identified as a *M. norfolkensis* call due to the alternating, relatively flat pulses around 33 kHz.

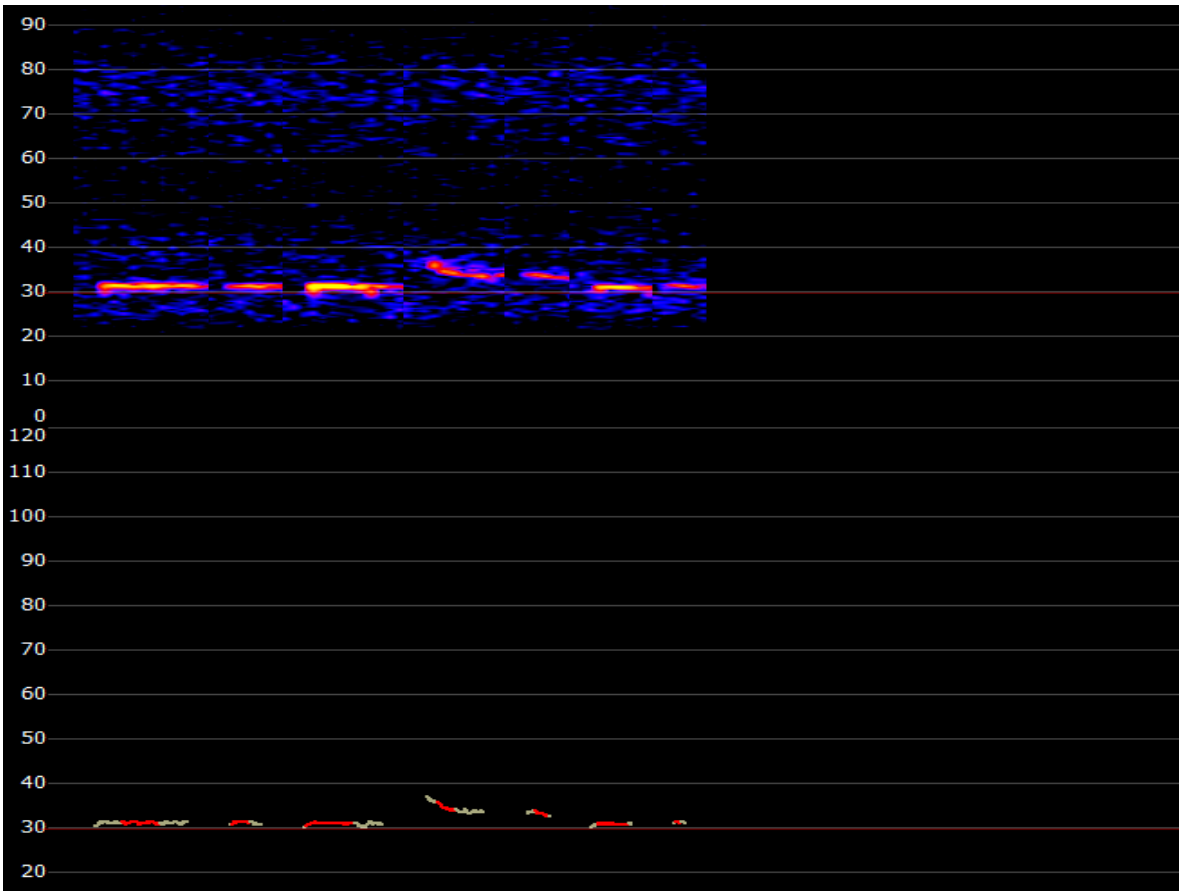


**Figure 4**

Greater Broad-nosed Bat (*Scoteanax rueppellii*) or Eastern Broad-nosed Bat (*Scotorepens orion*) identified with a high level of confidence.

This sequence was identified as a *S. rueppellii* or *S. orion* call due to the non-alternating, large-bandwidth pulses around 34 kHz.

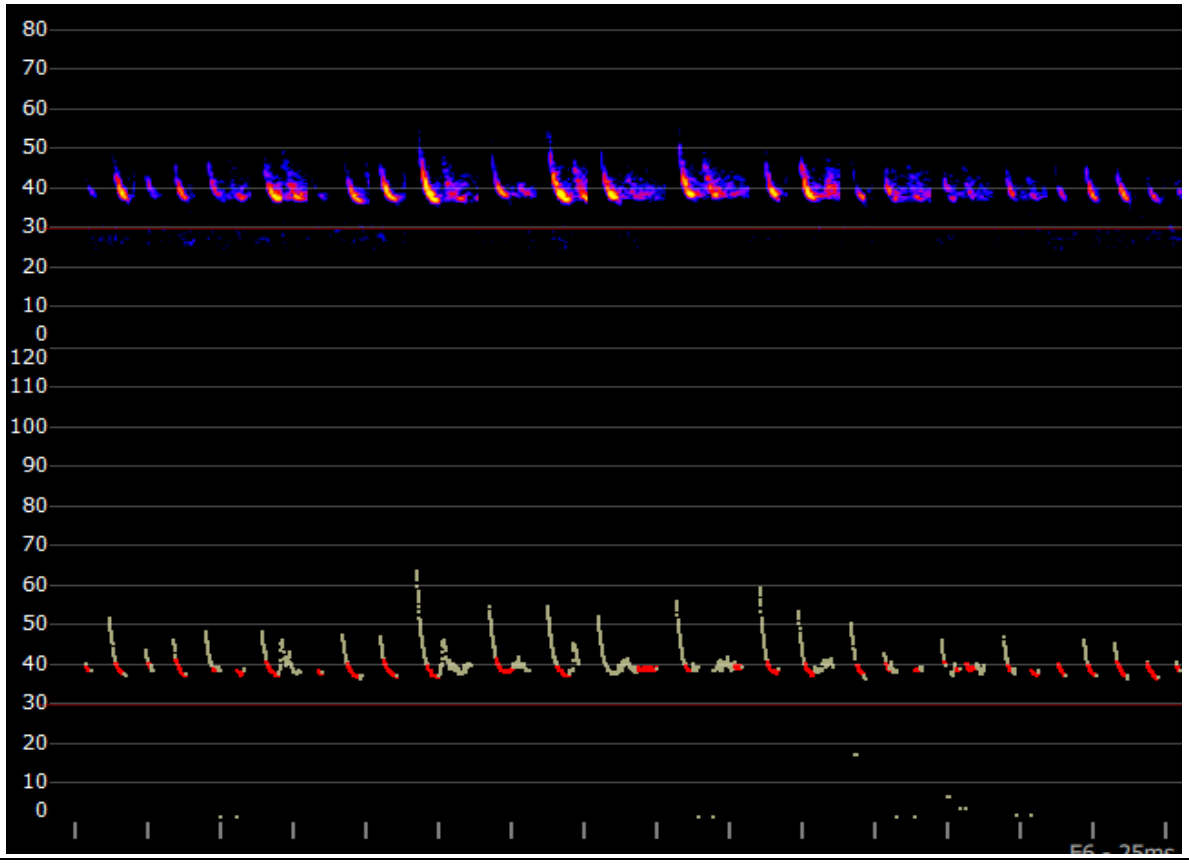

**Figure 5**

Eastern Broad-nosed Bat (*Scotorepens orion*) or Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) identified with a high level of confidence.

This sequence was identified as a *S. orion* or *F. tasmaniensis* call due to the large-bandwidth pulses around 37 kHz.

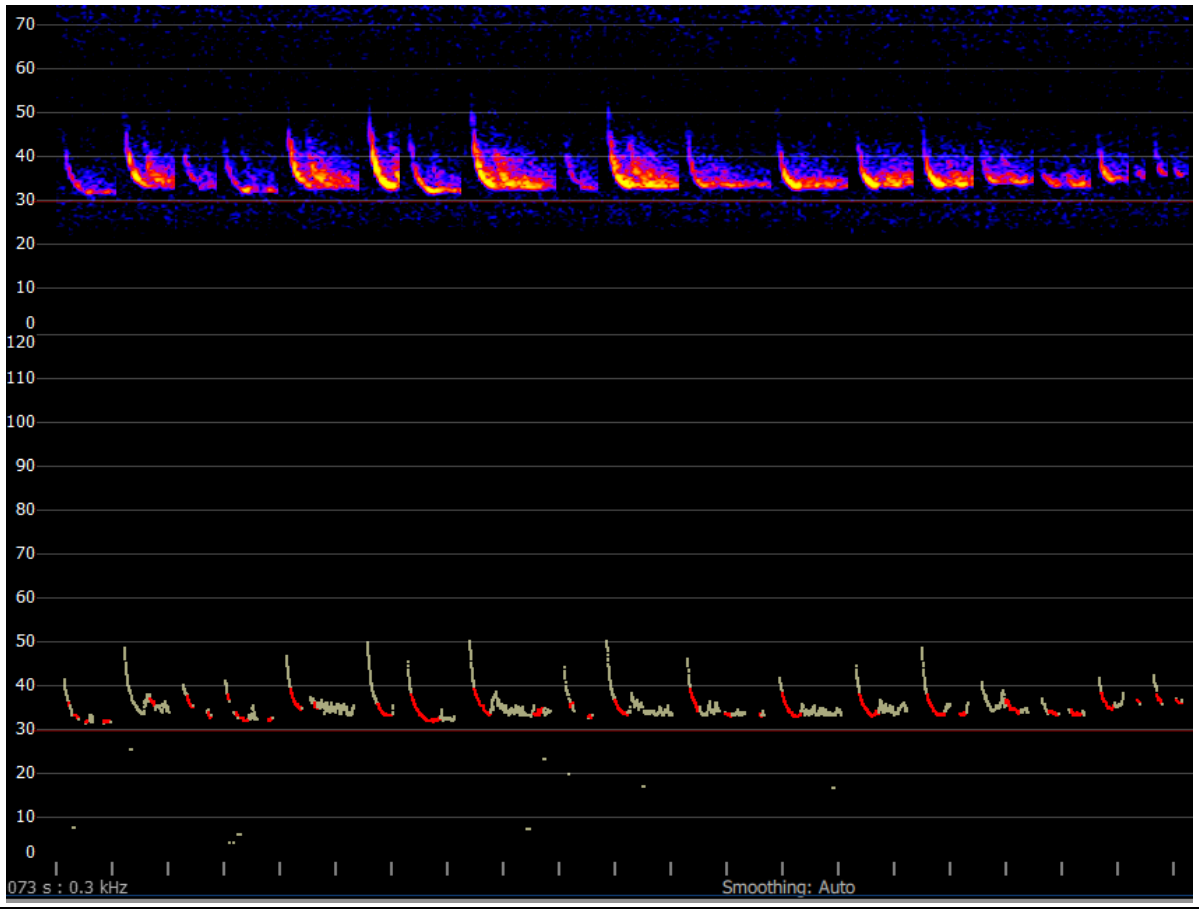

**Figure 6**

Southern Myotis (*Myotis Macropus)* or Long-eared Bat call (*Nyctophilus gouldi or Nyctophilus geoffroyi*) identified with a high level of confidence.

This sequence was identified as a *Myotis* or *Nyctophilus* call due to the high bandwidth, short duration, near vertical pulses around 45 kHz mean frequency.

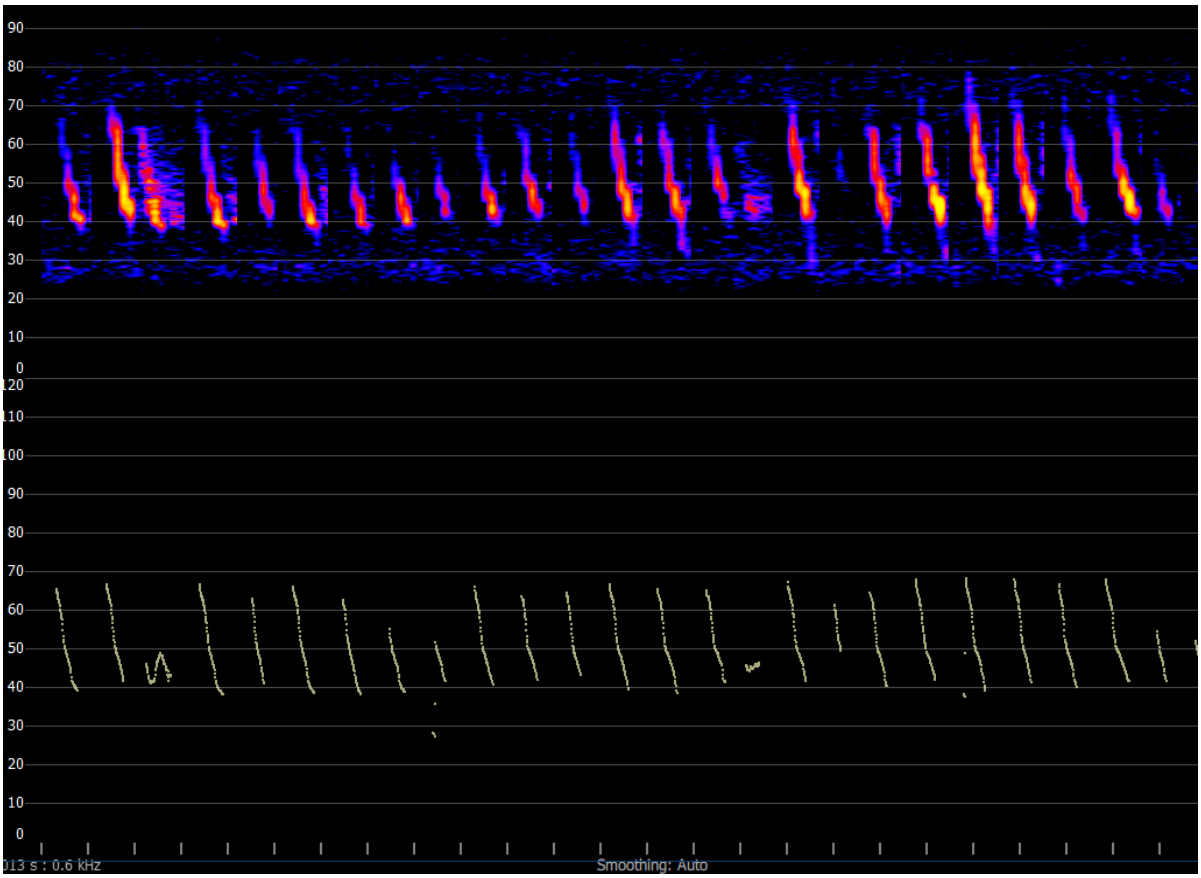


**Figure 7**

Little Forest bat (*Vespadelus vulturnus*) or Eastern Cave Bats (*Vespadelus troughtoni*) identified with a high level of confidence.

This sequence was identified as a *V. vulturnus* or *V. troughtoni* call due to the characteristic frequency around 51 kHz with up-sweeping tails (i.e., backwards 'J' shaped call).