Ecological Assessment

For

Lot 1 DP610629

7 Pomona Road,

Empire Bay NSW

By

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Job Details			
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EXECUTIVE SUMMARY

Everitt Ecology has been engaged by Jamie Barnes to prepare an Ecological Assessment for the planning proposal at Lot 1, DP610629 7 Pomona Road, Empire Bay NSW within the Central Coast LGA.

In regard to the EPBC Act, no threatened entities were recorded within the subject site. Given that the recommendations are implemented, it is considered that the proposed action is unlikely to have a significant impact on this species or any other matters of national environmental significance, therefore no referral is required to be submitted to the Australian Government Environment Minister for approval.

In regard to assessments under the EPA Act, BC Act and FM Act, two (2) threatened micro-bats species and one (1) endangered ecological community were recorded within the subject site. Given that the recommendations are implemented, it is considered that the proposal is unlikely to have a significant impact on any threatened species, populations or endangered ecological communities. Therefore, it is considered that no further assessments are required.

A summary of the results and conclusions of the assessment are provided below:

Vegetation and Condition

- Vegetation mapping provided by Central Coast Council Online Mapping tool contains 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) (CCC, 2020; Bell, 2009b). The site contains minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) and 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b);
- The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of these vegetation communities (Refer to section 4.3.2);
- A schedule of trees is provided in Table 7 (Refer to section 5.3) and displayed in Figures 2, 3 and 4. Of the seventy-three (73) trees recorded, sixty-one (61) are proposed to be retained. Fifty-five (55) trees of species characteristic of the 'Swamp Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany) (Refer to Tables 7 & 8 in section 5.3);

Flora and Ecological Communities

- It is considered that the subject site contains remnant trees characteristic of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' listed as an Endangered Ecological Community (EEC) under the BC Act. The proposal may have indirect impacts on

approximately 1848m^2 of poor condition remnants of this EEC. Fifty-five (55) trees of species characteristic of the 'Swamp Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany) (Refer to Tables 7 & 8 in section 5.3).The extent of likely impacts on these remnants are detailed in section 5.3 and in the 'test of significance' in Appendix 3;

- No threatened flora species listed under either the BC Act or EPBC Act were recorded within the subject site;
- A total of thirty-three (33) introduced flora species were identified, including thirteen (13) high threat weeds (Refer to Table 11 in Appendix 5);

Fauna

- Two (2) threatened fauna species were recorded, including *Miniopterus schreibersii (orianae) oceanensis* (Eastern Bentwing-bat) and *Miniopterus australis* (Little Bentwing-bat). Both of these species are listed as Vulnerable under the NSW BC Act. *Miniopterus australis* (Little Bentwing-bat) was only recorded with a 'possible' level of confidence (Refer to section 4.3.3 & Appendix 3; Refer to the micro-bat identification report in Appendix 6 & Table 12 in Appendix 5);
- Four (4) hollow-bearing trees were located within the southern end of the subject site. These contain a total of thirteen (13) hollows (Refer to Figure 3; Table 5 in section 4.4.1). These hollows provide potential nesting and roosting habitat for small birds and micro-bats respectively. All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed;
- No declared 'Areas of Outstanding Biodiversity Value' occur within or in close proximity to the subject site;

Corridors

- The site is bound by residential and rural residential development to the west, south and east containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east; and
- The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors. It is considered that no area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action (Refer to section 4.4.2).

Recommendations have been made to minimise and mitigate likely or potential impacts of the proposal. These are provided in section 6.2.

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Abbreviations

This report may use the following abbreviations:

- APZ - Asset Protection Zone;
- BAM – Biodiversity Assessment Method;
- BC Act – Biodiversity Conservation Act;
- BOM – Bureau of Meteorology;
- BOS – Biodiversity Offset Scheme;
- BOSET – Biodiversity Offset Scheme Entry Threshold;
- CAMBA - China-Australia Migratory Bird Agreement;
- CCC – Central Coast Council;
- DBH – Diameter at breast height;
- DECC - Department of Environment & Climate Change NSW (name changed to OEH);
- EP&A Act - Environmental Planning and Assessment Act 1979;
- EPBC Act - Environment Protection and Biodiversity Conservation Act 1999;
- EEC - Endangered Ecological Community;
- EIA - Environmental Impact Assessment;
- FM Act - Fisheries Management Act 1994;
- ha - hectares;
- JAMBA - Japan-Australia Migratory Bird Agreement;
- LEP - Local environmental plan;
- LES - Local Environmental Study;
- LGA - Local Government Area;
- LHCCREMS - Lower Hunter Central Coast Regional Environmental Management Strategy;
- NPWS - National Parks and Wildlife Service;
- NPW Act - National Parks and Wildlife Act 1974;
- NSW - New South Wales;

- OEH - Office of Environment & Heritage (NSW);
- PoM - Plan of management;
- PVP - Property Vegetation Plans;
- RFS - Rural Fire Service;
- ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement;
- SEE - Statement of environmental effects;
- SEPP 19 - State Environmental Planning Policy No. 19– Bushland in Urban Areas;
- SEPP 44 - State Environmental Planning Policy No. 44– Koala Habitat Protection;
- SIS - Species impact statement;
- TSC Act - Threatened Species Conservation Act 1995;
- WoNS – Weed of National Significance;
- WWC – Wadalba Wildlife Corridor; and
- WSC - Wyong Shire Council.

1 INTRODUCTION

Everitt Ecology has been engaged by Jamie Barnes to prepare an Ecological Assessment for the planning proposal at Lot 1, DP610629 7 Pomona Road, Empire Bay NSW within the Central Coast LGA.

1.1 Licensing and Qualifications

This work has been undertaken under the following licenses:

- National Parks & Wildlife Act Section 132c Scientific Licence: SL101494;
- Animal Research Authority - Department of Primary Industries; and
- Biodiversity Assessment Method Assessor no. BAAS17049.

The qualifications and experience of personnel involved in this assessment include:

- Nicholas Everitt – Bachelor of Environmental Science – over 12 years experience; and
- Amanda Lo Cascio – refer to Appendix for micro-bat call identification report.

1.1.1 Certification

The results presented in this report are a true and accurate record of the species recorded, or considered likely to occur, on the site in the opinion of the author(s).

The survey work was undertaken in accordance with the Central Coast Flora and Fauna Survey Guidelines 2019. The compliance of this survey to the guidelines is provided in Table 3.

1.2 Site Description

The subject site is located in Empire Bay NSW on the eastern side of the intersection of Empire Bay Drive and Wards Hill Road. The site is bound by residential and rural residential development to the west, south and east as well as vacant land to the north. The site contain minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) and 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b).

The following Table 1 provides a summary of the site details. The location of the subject site is displayed in Figure 1.

Table 1 – Site Details

Site Details	
Street Address	7 Pomona Road, Empire Bay NSW
Lot and Deposited Plans	Lot 1, DP610629
Site Coordinates	E. 349151.931 N. 6291065.083 Lat: -33.509337 Long: 151.375887
Local Government Area	Central Coast
Determining Authority	Central Coast Council
Existing Land Use	Lifestyle Village
Current Zoning	DM – Deferred Matter
Minimum Lot Size	Not specified. Actual lot size is 3.71ha
Elevation	Approximately 10m above sea level
Aspect and slope	North and north-westerly aspect with a slope of approximately 5%.
Hydrology	Two constructed drainage channels are present, which are linked in the centre of the site.
Soils & Geology	Soil Landscapes include: Cockle Bay. The geology of Cockle Bay Soil Landscape is described as 'Alluvial and marine quartz sand, clay and some silt with ferruginous and humic cementation in places and common shell layers' (OEH, 2020b).

Site Details	
Vegetation	The site contain minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) and 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b).

Photograph – Overview of subject site looking south.

1.3 Development Proposal

A planning proposal that will be seeking Schedule 1 of GLEP 2014 or CCLEP 2019 to include a caravan park as an additional permitted use on the land. A concept masterplan for the site which will take into consideration the recommendations of this report, the flooding report and the bushfire assessment will form part of the planning proposal documentation.

A meeting with the Jamie Barnes (the land owner), Paul Bowditch (of Progressive Property Solutions) and Nicholas Everitt (project ecologist from Everitt Ecology) was undertaken on July 29th, 2020. This meeting included a detailed walk throughout the site selecting trees to be retained and removed in consideration of ecological constraints and the future development proposal. The results of tree selection is provided in section 5.3 – Direct Impacts and displayed in Figures 2, 3 and 4.

Figure 1 – Location of Subject Site

1.4 Aims and Objectives

The aims and objectives of this ecological assessment are to:

- Undertake flora surveys to identify and describe vegetation communities and their condition;
- Undertake fauna surveys to determine species presence and habitat utilisation;
- Undertake habitat assessments to determine the likelihood of occurrence of species, populations and ecological communities;
- Undertake target surveys for threatened species, populations and ecological communities;
- Identify areas or features of both low and high biodiversity value to assist with positioning of the proposed building site and access;
- Undertake an impact assessment in accordance with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Environmental Planning and Assessment Act 1979,* the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act) as well as local, state and national guidelines; and
- Make recommendations to avoid, minimise or mitigate the likely impacts of the proposal.

2 STATUTORY REQUIREMENTS

This ecological assessment has been undertaken in accordance with the requirements of both Commonwealth and State legislation as outlined below.

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act has several broad objectives. The primary objective relevant to this assessment is to 'provide for the protection of the environment, especially matters of national environmental significance' (CoA, 2015). Under the EPBC Act an action will require approval from the minister if the action has, will have, or is likely to have, a signifcant impact on a matter of national environmental significance (CoA, 2013a).

For the purpose of this assessment, any matters of national environmental significance which are recorded by surveys or considered likely to be impacted either directly or indirectly by the proposed action will be address by specific 'significant impact criteria' outlined by the Significant Impact Guidelines 1.1 (CoA, 2013a). If it is determined that the proposed action is likely to have a significant impact on a matter of national environmental significance, then a referral will be submitted to the Australian Government Environment Minister for approval.

The nine matters of national environmental significance (MNES) are (CoA, 2015):

- world heritage properties;
- national heritage places;
- wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); &
- a water resource, in relation to coal seam gas development and large coal mining development.

2.2 NSW State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act (EPA Act) is the principal legislation regulating land use in NSW. Part 1 Section 5AA of the EPA Act refers to the provisions of Part 7 of the BC Act and Part 7A of the FM Act that relate to the operation of this Act in connection with the terrestrial and aquatic environment.

2.2.2 Biodiversity Conservation Act 2016 & Biodiversity Conservation Regulation 2017

The *Biodiversity Conservation Act 2016* provides robust tools to avoid, minimise and offset biodiversity impacts through land use planning and during the development assessment process. The new Biodiversity Offsets Scheme includes rules that govern how biodiversity offsets will be used to ensure they deliver clear conservation outcomes (NSW Government, 2017).

Section 7.1 of the Biodiversity Conservation Regulation 2017 sets out threshold levels for when the Biodiversity Offsets Scheme will be triggered (NSW Government, 2017b). This is determined by three main components:

- the area of clearing relative to the minimum lot size (or actual lot size) as outlined in the table below;
- the clearing of native vegetation on land included on the Biodiversity Values Map; and
- section 6.1 which lists additional biodiversity impacts to which the scheme applies.

These additional biodiversity impacts in section 6.1 include; impacts to particular habitats of threatened species and ecological communities; impacts to important movement areas for threatened species to maintain their range and lifecycles; impacts to water quality, water bodies and hydrological processes important to a threatened species or threatened ecological community; impacts of wind turbine strikes; and impacts of vehicle strikes on threatened species of animals or animals that are part of a threatened ecological community.

Table from section 6.2 of the Biodiversity Conservation Regulation 2017.

Minimum lot size of land	Area of clearing
Less than 1 hectare	0.25 hectare or more
Less than 40 hectares but not less than 1 hectare	0.5 hectare or more
Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
1,000 hectares or more	2 hectares or more

If the proposal does not meet the thresholds for the Biodiversity Offsets Scheme, then the 'Test of Significance' detailed in section 7.3 of the *Biodiversity Conservation Act 2016* must be used to determine whether the proposal is likely to significantly affect threatened species.

Ecological survey and assessment requirements

The subject lot is approximately 3.663ha and is zoned DM – Deferred Matter. The minimum lot size is the actual lot size. Therefore the area clearing threshold is 0.5ha. A BOSET report was completed on March 5th, 2020 and is provided in Appendix 8.

The likely impact areas contain approximately 1848m^2 (780 + 418 + 245 + 156 + 119 + 130) of remnant Swamp Sclerophyll Forest canopy (described as Vegetation Community 1) and approximately 385m^2 of remnant Coastal Narrabeen Moist Forest (described as Vegetation Community 2). The total of area of native vegetation within the likely impact areas is therefore approximately 2233m^2 (1848 + 385) or 0.22ha. This canopy vegetation is not proposed to be directly impacted by the proposal.

The areas of vegetation have been calculated from polygons drawn over aerial imagery on Google Earth. These mapped areas contain predominantly tree canopy with no native understorey or groundcover vegetation. The Biodiversity Value Map contains no mapped areas within the subject site (Refer to Appendix 8).

Given that the proposal requires less than 0.5ha of clearing, and does not impact on a Biodiversity Values Map area (refer to Table above), the proposal does not trigger the Biodiversity Offsets Scheme or the use of the Biodiversity Assessment Methodology (BAM).

An ecological assessment and 'Test of Significance' as detailed in section 7.3 of the Biodiversity Conservation Act 2016 must be used to determine whether the proposal is likely to significantly affect threatened entities.

2.2.3 Local Land Services Act 2013

'The Local Land Services Act 2013 provides a framework for clearing of native vegetation that does not require development approval on rural land in NSW' (LLS, undated).

'Landholders who intend to clear native vegetation on rural land and who do not meet the requirements of Allowable Activities or the *Land Management (Native Vegetation) Code 2017* of the *Local Land Services Act 2013* may apply for a native vegetation clearing approval under Division 6 of Part 5A of the *Local Land Services Act 2013*' (LLS, undated).

These approvals are to be determined by the Native Vegetation Panel, an idependent body established under the *Local Land Services Act 2013*.

2.2.4 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

'The SEPP applies to the Sydney and Newcastle metropolitan areas, and to all other land in NSW that is zoned for urban purposes or for environmental conservation/management under the Standard Instrument – Principal Environmental Plan' (NSW Government, 2017b).

The SEPP regulates clearing of:

- native vegetation above the Biodiversity Offset Scheme (BOS) threshold where a proponent will require an approval from the Native Vegetation Panel established under the *Local Land Services Act 2013*; and
- vegetation below the BOS threshold where a proponent will require a permit from Council if that vegetation is identified in the council's Development Control Plan (DCP).

2.2.5 Fisheries Management Act 1994

The overall objective of this Act is to conserve, develop and share the fishery resources of the State for the benefit of present and future generations (NSW Gov, 2015). More specifically it aims to conserve threatened species, populations and ecological communities of fish and marine vegetation (NSW Gov, 2015).

No fish or marine habitat will be impacted by this proposal.

3 METHODOLOGY

3.1 Database Review

A list of migratory and threatened species, populations and ecological communities was obtained from the following database searches:

- A 5km radius search of the Bionet Atlas of NSW Wildlife database accessed on June 30th, 2020 from http://www.bionet.nsw.gov.au
- A 5km radius search with the Protected Matters Search Tool accessed on July 13th, 2020 from http://www.environment.gov.au/webgis-framework/apps/pmst/pmst-coordinate.jsf
- A 5km location search of the PlantNet Database for Empire Bay accessed on on July 13th, 2020 from http://plantnet.rbgsyd.nsw.gov.au/search/spatial.htm

A list of species, populations and endangered ecological communities considered to have at least a moderate likelihood of occurring within the subject site was compiled and presented in Tables 9 and 10 of Appendix 1.

The Areas of Outstanding Biodiversity Value register provided on the OEH website (www.environment.nsw.gov.au) was checked July 17th, 2020 for listings. No listings occur within or in close proximity the subject site.

3.2 Flora and Fauna Survey

The flora and fauna survey methodology has been designed to meet the requirements of the Central Coast Council Flora and Fauna Survey Guidelines 2019, unless otherwise justified (referred to as CCC Guidelines).

The 'subject site' and 'study area' are defined as the same area of Lot 1, DP610629 7 Pomona Road, Empire Bay NSW. The 'subject site' is displayed in Figures 1 and 2.

A summary of survey effort is displayed in Table 2, and the survey locations and results are displayed in Figures 2, 3 and 4. Table 3 provide details of survey compliance.

Figure 2 – Survey locations and results (overview)

Figure 3 – Survey locations and results (Northern section of proposed impact area)

Figure 4 – Survey locations and results (Southern section of proposed impact area)

Table 2 – Summary of survey time & effort

Date	Start time	End time	Temperature	Cloud Cover	Wind Speed	Wind Direction	Moon	Rain	Survey Method	Survey Method Details	GPS Waypoint
31/04/2020	15:30:00	17:30:00	19°C	2/8 cloud	1-5kph	SE	No moon	no rain	Opportunistic Surveys	Hollow-bearing tree survey plus opportunistics	-
03/06/2020	16:30:00	18:00:00	16°C	0/8 cloud	6-10kph	E	3/4 moon	no rain	Stagwatch	H1	9
03/06/2020	16:45:00	18:45:00	16°C	0/8 cloud	6-10kph	E	3/4 moon	no rain	Anabat - stationary	On access from south side	10
03/06/2020	17:00:00	18:45:00	15°C	0/8 cloud	6-10kph	E	3/4 moon	no rain	Anabat - mobile	H1 & spotlighting.	Tracking.
04/06/2020	16:30:00	18:00:00	15°C	0/8 cloud	1-5kph	S	3/4 moon	no rain	Stagwatch	H1	9
04/06/2020	16:45:00	18:45:00	15°C	0/8 cloud	1-5kph	S	3/4 moon	no rain	Anabat - stationary	Along western vehicle track.	11
04/06/2020	17:00:00	18:45:00	15°C	0/8 cloud	1-5kph	S	3/4 moon	no rain	Anabat - mobile	H1 & spotlighting.	Tracking.
05/06/2020	14:00:00	16:00:00	23°C	8/8 cloud	11-15kph	E	No moon	no rain	Target flora survey	BAM plot plus random meander	21

3.2.1 General Flora Survey

Flora and vegetation community surveys were undertaken using Biodiversity Assessment Method (BAM) plot and random meander techniques. The BAM plot technique is described in the BAM (OEH, 2017).

5.3.4.8 of the BAM (OEH, 2017), states 'the assessor must establish survey plots around a central 50m transect as follows:

(a) One 400m^2 plot (standard 20m x 20m) is used to assess all of the composition and structure attributes set out in Table 3 (Table ref. of BAM).

(b) One 1000m^2 (standard 20m x 50m) plot is used to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.

(c) Five 1m^2 sub-plots are used to assess average litter cover (and other optional groundcover components) for the plot'.

Flora survey using the 'random meander' technique (Cropper 1993) were also carried out throughout the rest of subject site. The random meanders specifically searched for additional dominant species not observed within the quadrat as well as specifically targeting any threatened and rare flora species and populations identified in the initial desktop assessment together with any invasive species.

3.2.2 Threatened flora surveys

One (1) threatened flora species, *Persicaria elatior* (Knotweed) was considered at least moderately likely to occur within the subject site. Searches for this species were undertaken along the drains as displayed in Figures 2, 3 and 4.

3.2.3 Fauna surveys

Owl Surveys

Searches for owl pellets and suitable roosting and nesting habitats were undertaken during diurnal surveys. Listening surveys were undertaken during other nocturnal surveys. Refer to stagwatch surveys below.

Spotlighting

A 2200 lumen torch and a 900 lumen LED Lenser headtorch were used to spotlight tree canopies, mid-storey, shrubs and ground covers looking for eyeshine or any movement. Spotlighting was combined with short intermittent periods of listen to detect any calls or activity. Binoculars were used to assist with identification once specimens were located.

Stagwatching

Hollows were observed for approximately 15 mins prior to sunset until 60 mins after sunset. Positions in relation to the targeted hollows were chosen to allow vision of silhouettes of specimens exiting hollows. A 2200 lumen torch and a 900 lumen LED Lenser headtorch were used for spotlighting with the aid of binoculars once a specimen was observed. An Echo Meter Pro was used during stagwatches to identify micro-bats exiting the targeted hollow.

The tree numbers and the results of these surveys are outlined in section 4.4.1.

Micro-bat Surveys

Microbat surveys are carried out using ultrasonic call detection unit, Anabat Express (Titley Electronics, QLD Australia) and Echo Meter Touch Pro (Wildlife Acoustics, Maynard MA USA). The Anabat Express is fixed to a tree on the edge of the central clearing at approximately 1.5 - 4m above the ground. The Echo Meter Touch Pro is held at an angle of 45° during stagwatch surveys. If bats were detected during handheld surveys, then they were followed to maximise the duration and quality of calls recorded.

Recorded calls are sent to microbat call experts for analysis and identification (Refer to Appendix 6).

Reptile and Amphibian Searches

Areas of dense leaf litter, logs, loose rocks, banks and edges of water bodies are searched by lifting of any loose objects, and any specimens were caught and/or identified. Searches for amphibians were focused in areas of suitable habitat, such as the drainage lines and creek if present. Amphibian calls were identified and recorded for reference. No amphibians were handled unless it was considered necessary for identification. Opportunistic recordings were made during other surveys.

Opportunistic surveys were also undertaken during other field surveys.

No call playback surveys were undertaken.

Bird Surveys

Bird surveys were conducted either in the early morning or late afternoon. Any unknown calls were recorded and/or compared to Pizzey & Knight Birds of Australia – Digital Edition, to assist with identification.

Opportunistic surveys were also undertaken during other field surveys.

Inspection of Hollows by Inspection Camera

Hollows safely accessible from the ground and /or a ladder were inspected using a Explorer Premium (Model no. 8802AL) Inspection Camera attached to a 6m extension pole.

Hollow-bearing tree number 2 (H2) was inspected. No fauna or evidence of nesting was observed.

3.2.4 Compliance

Table 3 – Minimum required level of field survey for sites with an impact area of less than 0.5 ha that propose the removal of mature trees (Table 2 on pg. 27 of Central Coast Council Flora and Fauna Survey Guidelines 2019)

Field method	Minimum level of survey effort	Survey effort completed
Parallel transects <5m apart	4 hours per 0.5 ha with a minimum survey of 2 hours[1].	Species requiring parallel transect surveys were considered to have a 'less then moderate likelihood of occurring' in the subject site. Due to the small pockets of habitat present, sufficient searches were undertaken without the use of parallel transects.
Biodiversity Assessment Method plots	One BAM plot per vegetation zone.	One (1) BAM plot was undertaken.
Ultrasonic bat detection	At least two hours recording at dusk for two nights[2].	Two hours recording at dusk for two nights at two stationary Anabat locations plus mobile records using an Echo Meter Pro.
Stag watching	Observation of at least 50% of hollow-bearing tree proposed for removal at dusk for at least two nights.	Four (4) hollow-bearing trees were recorded within the subject site. H2 was inspected by torch during diurnal and nocturnal surveys. H1 and H4 were stagwatched on June 3rd and 4th 2020. No hollow-bearing trees are proposed to be removed.
Target frog survey	Minimum 1 hour of survey per night over two nights[3].	The subject site contains constructed channels which are unlikely to provide habitat any listed amphibian species. Drains were surveyed during spotlighting, searches undertaken and call identified.
Remote cameras	One arboreal mounted (>3m) and one terrestrial camera (0.5-1m) in place for at least 14 consecutive	Camera trapping was not undertaken due the lack of suitable locations to set cameras and the high risk of camera theft. The site is considered to provide limited potential nesting or foraging habitat for

Field method	Minimum level of survey effort	Survey effort completed
	nights. Where possible the arboreal camera should be mounted opposite a hollow[4].	listed arboreal or terrestrial mammal species.
General fauna survey	Opportunistic observations of fauna while on site such as birds and reptiles.	Opportunistic fauna surveys were undertaken while on site.

[1] Surveys must consider the detectability of the species that have the potential to occur, in particular cryptic species such as threatened terrestrial orchids. Appropriate months for survey are included in Appendix A.

[2] Surveys to be completed on nights free of predicted rain between October-April. Detectors must be placed adjacent to hollow- bearing trees if present. Linear projects may require additional survey effort and proposed survey effort should first be discussed with Council.

[3] surveys must occur in the most appropriate season for the species being targeted. Surveys should be completed after rain. Additional surveys may be required in areas of known or high likelihood of occurrence of the Stuttering Frog, Giant Barred Frog, Green and Golden Bell Frog, Green Thighed Frog, Wallum Froglet and Mahony's Toadlet in accordance with NSW OEH and/ or federal amphibian survey guidelines.

[4] Arboreal cameras should include sugar water or tuna oil spray attractant and terrestrial cameras should include a meat bait placed in a bait holder.

3.2.5 Survey Limitations

Call Playback Surveys

Listening surveys were undertaken. No call playback surveys were undertaken. This is considered to be adequate, due to the absence of potential nesting and foraging habitats within or immediately adjacent to the subject site. Call playback surveys are considered to be disruptive to elderly residence within the site.

Other Survey Limitations

Field surveys were undertaken with the following limitations:

- Surveys were carried out in April to June 2020, outside the seasonal activity or growth periods for some fauna and flora species;
- Despite detailed hollow-bearing tree surveys, observations undertaken from the ground level may either miss hollows or mis-identify non-hollows due to viewing limitations such as obstructing branches, dense foliage or hollow orientation;
- Camera trapping was not undertaken due the lack of suitable locations to set cameras and the high risk of camera theft. The site is considered to provide limited potential nesting or foraging habitat for listed arboreal or terrestrial mammal species; and
- Survey locations including tree locations as displayed in figures were collected with a handheld GPS (Garmin etrex 20x) which is generally accurate to within 3m.

3.2.6 Nomenclature

Plant and animal names used in this report are taken from the NSW Office of Environment and Heritage's Atlas of NSW Wildlife, accessed through www.bionet.nsw.gov.au .

Plant names are crosschecked with those contained within The Plant Information Network System of The Royal Botanic Gardens and Domain Trust, Sydney, Australia (version 2.0). This is accessed through http://plantnet.rbgsyd.nsw.gov.au .

All animal and plants names listed as threatened under either the NSW Threatened Species Conservation Act or the Environmental Protection & Biodiversity Conservation Act are also crosschecked with their currently profiles accessed through www.environment.nsw.gov.au and www.environment.gov.au respectively.

4 Results and Discussion

4.1 Database Review

10km (5km radius) searches of BioNet Atlas of NSW Wildlife, the PlantNet and Protected Matters Search Tool databases provided a list of threatened entities for consideration in this assessment. Tables 9 and 10 of Appendix 1 provides information on species and endangered ecological communities and the reasons for inclusion or omission from 'Test of Significance'. The protected matter report obtained from searches of the commonwealth databases under the EPBC Act is provide in Appendix 2.

4.2 Document and Planning Review

4.2.1 State Environmental Planning Policy (SEPP)

SEPP (Coastal Management) 2018

The mapped areas of the Coastal Management SEPP overlap the western end of the subject site contain a small remnant area of Swamp Sclerophyll Forest and the access to the Lifestyle Village off Wards Hill Road. The proposal will have no impact on this area of the site.

State Environmental Planning Policy (Koala Habitat Protection) 2019

The subject site is mapped within the Koala Development Application Map.

Section of the 3.1 of the Koala Habitat Protection Guidelines lists requirements for a Tier 1 - Low or no direct impact development (DPIE, 2020). The Tier 1 process is for development which can be demonstrated to have low or no direct impact on koalas or koala habitat as follows:

1. indirect impacts that will not result in clearing of native vegetation within koala habitat;

Refer to section 5.3 and 5.4 for a summary of impacts. It is considered that the proposal will have a low indirect impact on Koalas or Koala habitats.

2. the development is below the Biodiversity Offsets Scheme threshold under the BC Act;

The development is below the BOS threshold (Refer to section 2.2.2).

3. there is no native vegetation removal;

The subject site contains eight (8) tree species listed as Koala tree species as per schedule 2 of the SEPP. These include:

- *Angophora costata* Sydney Red Gum
- *Angophora floribunda* Rough-barked Apple
- *Corymbia maculata* Spotted Gum
- *Eucalyptus botryoides* Bangalay
- *Eucalyptus microcorys* Tallowwood
- *Eucalyptus pilularis* Blackbutt
- *Eucalyptus robusta* Swamp Mahogany
- *Melaleuca quinquenervia* Broad-leaved Paperbark

In regard to native species, it is proposed to remove four (4) *Grevillea robusta* (Silky Oak) and one (1) *Corymbia maculata* (Spotted-Gum), all of which are considered to be planted. The proposal will not impact on any koala tree species with the exception of the one planted *Corymbia maculata* (Spotted-Gum).

4. the development footprint will not impede movement between koala habitat; and

It is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors (Refer to section 4.4.2 – Corridor Assessment).

5. adequate mitigation measures such as those listed in Table 1 below are implemented as necessary.

It is considered that the indirect impacts as listed in Table 1 in section 3.1 of the Koala Habitat Protection Guidelines (DPIE, 2020) are unlikely to change from the indirect impacts resulting from the current landuse.

'If the development cannot meet all criteria above, then it exceeds a low level of impact on koalas and/or koala habitat and the Tier 2 process is triggered' (DPIE, 2020). It is considered that the proposal will have a low impact on Koalas and / or Koala Habitat and as such a Tier 2 assessment process is not required.

4.2.2 Local Plans

No locals plans are known to be impacted by this proposal.

4.2.3 Previous Studies

No known previous studies are considered to be important for this assessment. A detailed review of previous studies is outside of the scope of this assessment.

4.2.4 Vegetation Mapping

Vegetation mapping provided by Central Coast Council Online Mapping tool contains 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) (CCC, 2020; Bell, 2009b). The site contain minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) and 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b).

4.3 Flora and Fauna Surveys

The results of flora and fauna surveys are presented below.

4.3.1 Flora

A total of sixty-seven (67) flora species were identified (Refer to Table 11 in Appendix 5).

Threatened Flora

No threatened flora species listed under either the BC Act or the EPBC Act were recorded within the subject site.

Endangersed Flora Populations

Two (2) endangered flora populations which occur within the Central Coast LGA include:

- Eucalyptus oblonga population at Bateau Bay, Forresters Beach and Tumbi Umbi in the Wyong LGA; &
- Eucalyptus parramattensis subsp. parramattensis in Wyong and Lake Macquarie LGAs.

No specimens of these populations were observed within the subject site.

Weeds

A total of thirty-three (33) introduced flora species were identified, including thirteen (13) high threat weeds (Refer to Table 11 in Appendix 5).

4.3.2 Vegetation Communities

The subject site contains two (2) vegetation communities containing remnant canopy species. The descriptions of these vegetation communities are based on both BAM plot data and random meander surveys.

Vegetation Community 1 – Swamp Mahogany Paperbark Forest

Summary: Remnant trees surrounded by managed shrub and groundover dominated by introduced species. This vegetation community contains minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) (CCC, 2020; Bell, 2009b).

Structure:

Upper Stratum (Trees) (12 - 20m high): Containing *Eucalyptus robusta* (Swamp Mahogany) and *Livistona australis* (Cabbage Tree Palm).

Mid-stratum (Small trees) (3-6m high): *Schefflera actinophylla** (Umbrella Tree), *Erythrina x sykesii** (Coral Tree) and *Archontophoenix cunninghamiana* (Bangalow Palm) which form part of the landscaping and are considered to be planted.

Lower-stratum (Small shrubs) (1-3m high): Containing *Lantana camara** (Lantana), *Solanum mauritianum** (Wild Tabacco Bush), *Lonicera japonica** (Japanese Honeysuckle) and *Ligustrum sinense** (Small-leaved Privet).

Groundcover (0-1.5m high): A dense cover dominated by managed areas of *Pennisetum clandestinum** (Kikuyu Grass).

Introduced species are marked with '*'.

Condition:

The Swamp Mahogany Paperbark Forest is the equivalent to PCT 1717 – 'Broad-leaved Paperbark – Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast'.

This area is considered to be in poor condition, due to the low numbers of native species in all structural layers, but in particular the lower and groundcover stratum. This is supported by the results of BAM quadrat and calculator, which resulted in a vegetation integrity score of 4.3.

The individual conditions scores were:

- Composition condition score: 12.4
- Structure condition score: 3
- Function condition score: 2.2

Vegetation Community 2 – Coastal Narrabeen Moist Forest

Summary: Remnant trees surrounded by managed shrub and groundover dominated by introduced species. This vegetation community contains minor remnants of vegetation consistent with 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b).

Structure:

Upper Stratum (Trees) (20 - 25m high): Containing *Eucalyptus pilularis* (Blackbutt).

Groundcover (0-1.5m high)**:** A dense cover dominated by managed areas of *Pennisetum clandestinum** (Kikuyu Grass).

Introduced species are marked with '*'.

Condition:

The Coastal Narrabeen Moist Forest is considered to be in poor condition, due to the absence of all structural layers apart from the remnant canopy trees. The areas mapped in the north-eastern corner of the subject site are overhanging canopy vegetation rooted offsite. No BAM quadrat was collected for this vegetation community.

4.3.3 Fauna

The results of fauna surveys are presented in Table 12 of Appendix 5. A total of twenty-nine (29) fauna species were recorded during these surveys, including twenty (20) bird, six (6) mammal, one (1) amphibian and two (2) reptile species.

Two (2) threatened species were recorded, including *Miniopterus schreibersii (orianae) oceanensis* (Eastern Bentwing-bat) and *Miniopterus australis* (Little Bentwing-bat). Both of these species are listed as Vulnerable under the NSW BC

Act. *Miniopterus australis* (Little Bentwing-bat) was only recorded with a 'possible' level of confidence (Refer to the micro-bat identification report in Appendix 6 & Table 12 in Appendix 5).

Threatened species are discussed below in the following fauna classes and are assessed as part 'test of Significance' in Appendix 3.

Birds

A total of twenty (20) bird species were recorded, all of which are considered to be common in the local area. No nests or evidence of hollow nesting was observed.

Mammals

The six (6) mammal species recorded (two of which are anecdotal records) included, three (3) terrestrial mammal species, one (1) arboreal mammal species and two (2) micro-bat species. This included one (1) invasive mammal species, *Canis lupus familiaris* (Dog) listed under the EBPC Act.

Two (2) terrestrial mammal species, *Tachyglossus aculeatus* (Short-beaked Echidna) and Bandicoot sp. were anecdotal records from residents of the Lifestyle Village. *Tachyglossus aculeatus* (Short-beaked Echidna) is listed as regionally significant by the Wyong Shire Council Flora and Fauna Survey Guidelines (WSC, 2016).

Two (2) micro-bat species *Miniopterus schreibersii (orianae) oceanensis* (Eastern Bentwing-bat) and *Miniopterus australis* (Little Bentwing-bat). Both of these species are listed as Vulnerable under the NSW BC Act. *Miniopterus australis* (Little Bentwing-bat) was only recorded with a 'possible' level of confidence (Refer to the micro-bat identification report in Appendix 6 & Table 12 in Appendix 5).

Table 4 provides a summary of the micro-bats recorded or with potential to occur and there known roosting habitats. Threatened species are in bold text.

Table 4 – Micro-bats recorded & their known roosting habitats

Scientific Name	Common Name	Roosting Habitat
Species Recorded to a 'definite' level of confidence		
Miniopterus schreibersii oceanensis	**Eastern Bentwing-bat**	**Caves, structures**
Species Recorded to at least a 'possible' level of confidence		
Miniopterus australis	**Little Bentwing-bat**	**Caves, hollows, structures**
Species with potential to occur but not recorded		
Saccolaimus flaviventris	**Yellow-bellied Sheathtail-bat**	**Large hollows**
Micronomus norfolkensis	**Eastern Coastal Free-tailed Bat**	**Hollows, bark, structures**
Chalinolobus dwyeri	**Large-eared Pied Bat**	**Caves, crevices in cliffs, mines**

Scientific Name	Common Name	Roosting Habitat
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Hollows, bark, structures, caves
Scoteanax rueppellii	Greater Broad-nosed Bat	Hollows, bark, structures
Myotis macropus	Southern Myotis	Caves, hollows, structures, foliage

Sourced from: DECC (2007); Churchill (2008).

In regard to micro-bats, hollow-bearing trees and old buildings (structures) may provide potential roosting habitat. No caves or suitable culverts are located within the subject site. Threatened bat species are assessed as part of the 'test of significance' in Appendix 3.

Amphibians

One (1) common amphibian species, *Crinia signifera* (Common Eastern Froglet) was recorded calling within the small constructed drains as displayed in Figure 3.

No threatened species of amphibians were recorded during surveys or considered to have to potential to occur within the subject site.

Reptiles

Two (2) reptile species, *Pseudonaja textilis* (Eastern Brown Snake) and *Morelia spilota spilota* (Diamond Python) were anecdotal records from residents of the Lifestyle Village (Refer to Table 12 of Appendix 5). Both of these species are listed as regionally significant by the Wyong Shire Council Flora and Fauna Survey Guidelines (WSC, 2016).

Invasive Species

Three (3) invasive species (listed under the EBPC Act), *Anas platyrhynchos* (Common Mallard), *Sturnus tristis* (Common Myna) and *Canis lupus familiaris* (Dog) were recorded within the subject site. The impact of potential invasive species are addressed in the 'significant impact criteria' within Appendix 4. The proposal is unlikely to exacerbate the impact of any invasive fauna species.

4.4 Habitat & Connectivity

4.4.1 General Habitat Assessment

Disturbance History

The subject site is currently used as a Lifestyle Village. The majority of the site contains buildings and vehicle tracks surrounds by landscaped and mown lawns.

Habitat Assessment

The subject site contains remnant trees surrounded by mostly managed shrub and groundover dominated by introduced species. A summary of habitat features located within the current subject site is provided below.

Four (4) hollow-bearing trees located in the southern end of the subject site provide limited potential nesting and roosting habitat for a variety of fauna including some micro-bats, small birds and arboreal mammals.

No nests, burrows, caves or other potential habitats were observed. The constructed drains provide breeding habitat for common amphibian species.

Flowering trees dominated by *Eucalyptus robusta* (Swamp Mahobany) and *Eucalyptus pilularis* (Blackbutt) provide a variety of season foraging habitat for birds and arboreal mammals.

Dense areas of weed species such as *Lantana camara** (Lantana) and *Lonicera japonica** (Japanese Honeysuckle) provide suitable nesting and protective cover for small birds and terrestrial mammals.

Hollow-bearing Trees

Four (4) hollow-bearing trees were located within the southern end of the subject site. These contain a total of thirteen (13) hollows (Refer to Figures 3 and 4; Table 5 below). All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights surveys and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

Table 5 - Hollow-bearing Trees

Tree tag no. (Survey tag no.)	Species	Height (m)	DBH (cm)	% Dead	Hollows	Notes
Hollow-bearing trees proposed to be retained						
H1	*Eucalyptus pilularis* (Blackbutt)	28	1.2	10	3 S Br, 1 M Br,	
H2	*Acer negundo* (Elder Box)	10	0.5	20	5 S Br, 2 S Tr	
H3	*Eucalyptus robusta*	15	0.5	40	1 S Tr	
H4	*Eucalyptus robusta*	20	0.6	20	Arboreal termite nest with 1 S.	
Hollows to be retained sub-total					8 S Br, 3 S Tr & 1 M Br, 1 S (in termite nest)	
Hollow-bearing trees proposed to be removed						
-	-	-	-	-	-	-
Hollows to be removed sub-total					All hollows are proposed to be removed.	

Size of hollows (estimate of diameter) : S= <10cm, M=10-20cm, L= 20-30cm, XL= 30-40cm, XXL= >40cm.

Types of hollows: BT= Broken Trunk, Br= Branch, Tr= Trunk, Sp= Split, LB= Loose Bark, N= Nest.

No declared 'Areas of Outstanding Biodiversity Value' occur within or in close proximity to the subject site.

4.4.2 Corridor Assessment

Landscape corridors are critical to ecological processes, enabling migration, colonisation and interbreeding of plants and animals (DEC, 2004). As vegetation patches are reduced in size and become increasingly isolated, the on-going viability of ecosystems and individual populations of species within them is severely affected, which ultimately leads to a break down in ecological processes (DEC, 2004).

The subject site is located in Empire Bay NSW on the eastern side of the intersection of Empire Bay Drive and Wards Hill Road. The site is bound by residential and rural residential development to the west, south and east containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east.

The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors.

Threatened Species, Populations or Endangered Ecological Communities

4.4.3 Threatened Entities Recorded

The subject site contains remnants of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' listed as an Endangered Ecological Community under the BC Act. No other threatened entities listed under either the BC Act or the EPBC Act were recorded.

4.4.4 Threatened Entities Assessed in 'Test of Significance' or 'significant impact criteria'

A list of species, populations and endangered ecological communities considered to have at least a moderate likelihood of occurring within the subject site has been compiled. Considerations include the results of database searches, previous studies, a detailed habitat assessment and field surveys. Tables 9 and 10 of Appendix 1 provides the reasons for their inclusion or omission.

A total of fourteen (14) species were either recorded or considered at least moderately likely to occur within the subject site. These species include, three (3) bird, ten (10) mammals and one (1) flora species. These threatened entities have been assessed by 'Test of Significance' under section 7.3 of the BC Act or by 'significant impact criteria' (CoA, 2013a), included in Appendix 3 and 4 respectively. Assessed species/entities include:

<u>Birds – potential hollow nesting</u>

- *Glossopsitta pusilla* — Little Lorikeet (V/-)

<u>Birds – potential foraging</u>

- *Lathamus discolor* — Swift Parrot (E1/E)
- *Anthochaera phrygia* — Regent Honeyeater (E4A/CE)

<u>Mammals</u>

- *Phascolarctos cinereus* — Koala (V/V)
- *Pteropus poliocephalus* — Grey-headed Flying-fox (V/V)

Mammals – cave & structure roosting micro-bats

- *Chalinolobus dwyeri* Large-eared Pied Bat (V/V)
- *Miniopterus schreibersii oceanensis* Eastern Bentwing-bat (V/-)
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat (V/-)

Mammals – hollow roosting micro-bats

- *Micronomus norfolkensis* Eastern Freetail-bat (V/-)
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle (V/-)
- *Miniopterus australis* Little Bentwing-bat (V/-)
- *Scoteanax rueppellii* Greater Broad-nosed Bat (V/-)
- *Myotis macropus* Southern Myotis (V/-)

Flora

- *Persicaria elatior* Knotweed (V/V)

Ecological Communities

- 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' (BC Act)

5 ASSESSMENT OF IMPACTS

5.1 Environmental Protection and Biodiversity Conservation Act 1999

No threatened species, populations or ecological communities listed under the EPBC Act were recorded during surveys.

Recommendations have been made in section 6.2. Given that recommendations are implemented, it is considered that the proposed action is unlikely to have a significant impact on any matters of national environmental significance, therefore no referral is required to be submitted to the Australian Government Environment Minister for approval.

5.2 Biodiversity Conservation Act 2016

A total of fourteen (14) species, listed under the BC Act were either recorded or considered at least moderately likely to occur within the subject site. These species include, three (3) bird, ten (10) mammals and one (1) flora species. These listed entities have been assessed by 'Test of Significance' provided in Appendix 3.

Recommendations have been made in section 6.2. Given that recommendations are implemented, it is considered that the proposal is unlikely that a significant impact any threatened species, population or endangered ecological community. Therefore it is considered that no further assessment is required.

5.3 Direct Impacts

A meeting with Jamie Barnes (the land owner), Paul Bowditch (of Progressive Property Solutions) and Nicholas Everitt (project ecologist from Everitt Ecology) was undertaken on July 29th, 2020. This meeting included a detailed walk throughout the site selecting trees to be retained and removed based on the future development proposal and in consideration of ecological constraints. The results of tree selection are provided below and displayed in Figures 2, 3 and 4.

The following Table 6 summarises the vegetation communities patches and the likely impacts on each area. These areas are displayed in Figures 2, 3 and 4 in section 3.2 above.

Table 6 – Summary of impacts on vegetation community patches

Patch Name	Vegetation Community	Area (m^2 – estimated from mapped polygon)	Condition (Refer to section 4.3.2)	Likely impact of the proposal.
SSF1	1	780	Poor	Possible indirect impacts. No clearing of native canopy proposed.
SSF2	1	418	Poor	Possible indirect impacts. No clearing of native canopy proposed.
SSF3	1	245	Poor	Possible indirect impacts. No clearing of native canopy proposed.
SSF4	1	156	Poor	*Livistona australis* along road edge with managed exotic groundcover.
SSF5	1	119	Poor	*Livistona australis* with managed exotic groundcover.
SSF6	1	130	Poor	*Livistona australis* with managed exotic groundcover.
SSF7	1	1070	Moderate	No impact.
SSF8	1	694	Moderate	No impact.
CNMF1	2	395	Poor	To be retained as open space. Areas of polygon overhanging likely proposed impact areas is canopy only. Contains one (1) outlying *Eucalyptus robusta* (Tree no. 58/H4).
CNMF2	2	541	Moderate	No impact.

Note: SSF – Swamp Sclerophyll Forest; CNMF – Coastal Narrabeen Moist Forest.

Based on the estimated areas in Table 6 above, the proposal may indirectly impact upon approximately 1848m^2 poor condition habitats (780 + 418 + 245 + 156 + 119 + 130).

A schedule of trees is provided in Table 7 below and displayed in Figures 2, 3 and 4. Of the seventy-three (73) trees recorded, sixty-one (61) are proposed to be retained. Fifty-five (55) trees of species characteristic of the 'Swamp

Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany). All trees characteristic of the 'Swamp Sclerophyll Forest' EEC are proposed to be retained. Table 8 provides a summary of the information provided in Table 7.

Table 7 – Tree schedule

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
1	Livistona australis	8	0.3	Foraging. Nesting for Brushtail Possum.	12	Yes.	Yes.	
2	Livistona australis	5	0.4	Foraging. Nesting for Brushtail Possum.	13	Yes.	Yes.	
3	Livistona australis	8	0.3	Foraging. Nesting for Brushtail Possum.	14	Yes.	Yes.	
4	Livistona australis	8	0.3	Foraging. Nesting for Brushtail Possum.	15	Yes.	Yes.	
5	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	16	Yes.	Yes.	
6	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	17	Yes.	Yes.	
7	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	18	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
8	Livistona australis	4	0.3	Foraging. Nesting for Brushtail Possum.	19	Yes.	Yes.	
9	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	20	Yes.	Yes.	
10	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	21	Yes.	Yes.	
11	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	22	Yes.	Yes.	
12	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	23	Yes.	Yes.	
13	Livistona australis	4	0.3	Foraging. Nesting for Brushtail Possum.	24	Yes.	Yes.	
14	Livistona australis	4	0.3	Foraging. Nesting for Brushtail Possum.	25	Yes.	Yes.	
15	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	26	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
16	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	27	Yes.	Yes.	
17	Livistona australis	7	0.3	Foraging. Nesting for Brushtail Possum.	28	Yes.	Yes.	
18	Livistona australis	10	0.3	Foraging. Nesting for Brushtail Possum.	29	Yes.	Yes.	
19	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	30	Yes.	Yes.	
20	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	31	Yes.	Yes.	
21	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	32-33	Yes.	Yes.	
22	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	32-33	Yes.	Yes.	
23	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	32-33	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
24	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	34	Yes.	Yes.	
25	Eucalyptus robusta	18	0.5	Winter foraging. No hollows observed.	35	Yes.	Yes.	
26	Eucalyptus robusta	18	0.5	Winter foraging. No hollows observed.	36	Yes.	Yes.	
27	Livistona australis	5	0.4	Foraging. Nesting for Brushtail Possum.	38	Yes.	Yes.	
28	Livistona australis	4	0.3	Foraging. Nesting for Brushtail Possum.	39	Yes.	Yes.	
29	Livistona australis	12	0.3	Foraging. Nesting for Brushtail Possum.	40	Yes.	Yes.	
30	Livistona australis	10	0.45	Foraging. Nesting for Brushtail Possum.	41	Yes.	Yes.	
31	Livistona australis	10	0.3	Foraging. Nesting for Brushtail Possum.	42	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
32	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	43	Yes.	Yes.	
33	Eucalyptus amplifolia	12	0.4	Foraging. No hollows observed.	-	Yes.	Yes.	
34	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
35	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
36	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
37	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
38	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
39	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
40	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
41	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
42	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
43	Livistona australis	6	0.3	Foraging. Nesting for Brushtail Possum.	44	Yes.	Yes.	
44	Livistona australis	5	0.3	Foraging. Nesting for Brushtail Possum.	45	Yes.	Yes.	
45	Eucalyptus amplifolia	18	0.6	Foraging. No hollows observed.	46	No.	Yes.	
46	Eucalyptus robusta	18	0.5	Winter foraging. No hollows observed.	47	Yes.	Yes.	
47	Eucalyptus robusta	10	0.45	Winter foraging. No hollows observed.	48	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
48	Eucalyptus robusta	17	1	Winter foraging. No hollows observed.	49	Yes.	Yes.	
49	Livistona australis	5	0.4	Foraging. Nesting for Brushtail Possum.	50	Yes.	Yes.	
50	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
51	Livistona australis	4	0.4	Foraging. Nesting for Brushtail Possum.	-	Yes.	Yes.	
52	Livistona australis	7	0.4	Foraging. Nesting for Brushtail Possum.	51	Yes.	Yes.	
53 (H3)	Eucalyptus robusta	20	0.6	1 small trunk hollow. Winter foraging (Refer to Table 5 in section 4.4.1).	53	Yes.	Yes.	
54	Eucalyptus robusta	18	0.4	Winter foraging. No hollows observed.	54	Yes.	Yes.	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
55	Eucalyptus robusta	18	0.4	Winter foraging. No hollows observed.	55	Yes.	Yes.	
56	Livistona australis	8	0.4	Foraging. Nesting for Brushtail Possum.	56	Yes.	Yes.	
57	Eucalyptus microcorys	25	0.8	Foraging. No hollows observed.	-	No.	Yes.	
58 (H4)	Eucalyptus robusta	15	0.5	Winter foraging. Arboreal termite nest with small hollow.	57	Yes	Yes	
59 (H1)	Eucalyptus pilularis	28	1.2	Foraging. Small and medium sized hollow observed (Refer to Table 5 in section 4.4.1).	26	No	Yes	
60	Grevillea robusta	0.7	18	Foraging.	58	No	Yes	
61 (H2)	Acer negundo	0.5	10	Hollow nest or roosting potential (Refer to Table 5 in section 4.4.1).	27	No	Yes	

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
62	Grevillea robusta	0.5	15	Foraging. No hollows observed.	3	No	No	
63	Pinus sp.	0.8	12	Nil.	52	No	No	Dead.
64	Pinus sp.	0.8	18		1	No	No	
65	Pinus sp.	0.8	18		2	No	No	
66	Acer negundo	0.7	18	Nil.	4	No	No	
67	Grevillea robusta	18	0.5	Foraging. No hollow observed.	5	No	No	Safety concerns.
68	Grevillea robusta	18	0.5	Foraging. No hollow observed.	6	No	No	Safety concerns.
69	Grevillea robusta	18	0.5	Foraging. No hollow observed.	7	No	No	Safety concerns.
70	Stag of exotic species unknown.	8	0.4	Nil. No hollows observed.	8	No	No	Safety concerns.
71	*Angophora costata*	14	0.4	Foraging. No hollow observed.	9	No	No	Asset protection, to allow the retention of nearby *Eucalyptus robusta*.

Tree no.	Species	Height (m)	Diameter at breast height (DBH) (m)	Habitat or habitat potential	Waypoint	Characteristic of 'Swamp Sclerophyll Forest' EEC	To be retained	Comments / Reason for removal or retention
72	*Angophora costata*	14	0.4	Foraging. No hollow observed.	10	No	No	Asset protection, to allow the retention of nearby *Eucalyptus robusta*.
73	*Corymbia maculata*	25	0.8	No hollow observed.	11	No	No	Safety concerns. Previous Spotted Gum located onsite fell.

Table 8 – Summary of results in Table 7.

Species	Total number	Number to be retained
Livistona australis	46	46
Eucalyptus robusta	9	9
Eucalyptus pilularis	1	1
Angophora costata	2	0
Eucalyptus amplifolia	2	2
Eucalyptus microcorys	1	1
Corymbia maculata	1	0
Grevillea robusta	5	1
Pinus sp.	3	0
Acer negundo	2	1
Stag unknown species	1	0
All recorded trees	73	61
Trees characteristic of 'Swamp Sclerophyll Forest' EEC	55	55

Hollow-bearing Trees

Four (4) hollow-bearing trees were located within the southern end of the subject site. These contain a total of thirteen (13) hollows (Refer to Figures 2, 3 and 4; Table 5). All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

Aquatic habitats provided by the constructed drains as displayed in Figures 2, 3 and 4 may be altered as a result of the proposal.

No other significant habitat features will be directly impacted by the proposal.

5.4 Indirect Impacts

Potential indirect impacts as a result of residential development may include (Burgmann & Lindenmayer, 2005):

- soil erosion during construction phase;
- fragmentation of habitat;
- increase in urban runoff;
- invasion by weeds from gardens;
- introduction of pathogens such as Phytophora fungus;
- impacts of uncontrolled domestic pets preying on native animals and the potential for pets to escape and becoming feral;
- incursion of exotic animals;
- planned and *adhoc* mowing programs;
- removal of dead and dying trees;
- trampling by walkers, bicycles & horses;
- disruption of animal foraging or nesting behaviour due to noise, light and movement;
- dumping of household waste;
- dumping of soils and garden cuttings;
- picking of flowers, fruit and foliage;
- malicious damage to trees and wildlife;
- alteration to groundwater and surface waterflows;
- alteration of fire regimes;
- chemical pollution of the air and water;
- drift of pesticides and herbicides; &
- leaching of fertilisers from lawns and gardens.

Any indirect impacts which are likely to impact upon the retained areas of the subject site, require particular consideration in order to minimise the impact of this proposal. The likely impacts of the initial clearing and construction works can be minimised through the implementation of recommendations, in particular the use of erosion and sediment controls and tree protection measures. Recommendations have been provided to avoid, minimise or mitigate the likely direct and indirect impacts of the proposal (Refer to section 6.2).

The potential indirect impacts of the proposal on adjoining bushland areas, will most likely include, invasion of weeds from gardens, predation by pets on native animals, leaching of fertilisers from lawns and gardens, an increase in artificial light as well as an increase in trampling and recreational activity (Refer to section 6.2 – Recommendations).

6 Conclusion and Recommendations

6.1 Conclusion

An ecological assessment of the proposal has been undertaken and the following conclusions have been made:

Vegetation and Condition

- Vegetation mapping provided by Central Coast Council Online Mapping tool contains 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) (CCC, 2020; Bell, 2009b). The site contains minor remnants of vegetation consistent with 'Swamp Mahogany Paperbark Forest' (Unit E37; CC_SF01i) and 'Coastal Narrabeen Moist Forest' (Unit E6a; CC_WS04i) (CCC, 2020; Bell, 2009b);
- The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of these vegetation communities (Refer to section 4.3.2);
- A schedule of trees is provided in Table 7 (Refer to section 5.3) and displayed in Figures 2, 3 and 4. Of the seventy-three (73) trees recorded, sixty-one (61) are proposed to be retained. Fifty-five (55) trees of species characteristic of the 'Swamp Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany) (Refer to Tables 7 & 8 in section 5.3);

Flora and Ecological Communities

- It is considered that the subject site contains remnant trees characteristic of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' listed as an Endangered Ecological Community (EEC) under the BC Act. The proposal may have indirect impacts on approximately 1848m^2 of poor condition remnants of this EEC;
- Fifty-five (55) trees of species characteristic of the 'Swamp Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany) (Refer to Tables 7 & 8 in section 5.3).The extent of likely impacts on these remnants are detailed in section 5.3 and in the 'test of significance' in Appendix 3;

Fauna

- Two (2) threatened fauna species were recorded, including *Miniopterus schreibersii (orianae) oceanensis* (Eastern Bentwing-bat) and *Miniopterus australis* (Little Bentwing-bat). Both of these species are listed as Vulnerable under the NSW BC Act. *Miniopterus australis* (Little Bentwing-bat) was only recorded with a

'possible' level of confidence (Refer to section 4.3.3 & Appendix 3; Refer to the micro-bat identification report in Appendix 6 & Table 12 in Appendix 5);

- Four (4) hollow-bearing trees were located within the southern end of the subject site. These contain a total of thirteen (13) hollows (Refer to Figure 3; Table 5 in section 4.4.1). These hollows provide potential nesting and roosting habitat for small birds and micro-bats respectively. All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed;
- No declared 'Areas of Outstanding Biodiversity Value' occur within or in close proximity to the subject site;

Corridors

- The site is bound by residential and rural residential development to the west, south and east containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east.;
- The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors. It is considered that no area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action (Refer to section 4.4.2);

Summary

- In regard to the EPBC Act, no threatened entities were recorded within the subject site. Given that the recommendations are implemented, it is considered that the proposed action is unlikely to have a significant impact on this species or any other matters of national environmental significance, therefore no referral is required to be submitted to the Australian Government Environment Minister for approval; and
- In regard to assessments under the EPA Act, BC Act and FM Act, two (2) threatened micro-bats species and one (1) endangered ecological community were recorded within the subject site. Given that the recommendations are implemented, it is considered that the proposal is unlikely to have a significant impact on any threatened species, populations or endangered ecological communities. Therefore, it is considered that no further assessments are required.

6.2 Recommendations

The following recommendations have been made to minimise and mitigate likely or potential impacts of the proposal including any future development proposal. Recommendations include:

- All contractors working within the subject site need to be notified of all ecological issues by onsite induction;
- The extent of areas to be retained are to be clearly marked in the field prior to any clearing works;
- Trees proposed to be removed are to be clearing marked in the field prior to any clearing works;
- Overseeing of clearing works by an ecologist to ensure and that only the nominated trees are removed;
- Implementation of appropriate erosion and sediment control measures prior to any clearing or construction works to minimise indirect impacts to retained areas of native vegetation and habitats within and adjoining the subject site;
- Old buildings or sheds are to be inspected for roosting micro-bats by an ecologist immediately prior to demolition; and
- A total of thirteen (13) high threat weeds listed in Table 11 in Appendix 5 were recorded within the subject site. These species are to be removed from the impact area and disposed of at an approximate waste management facility as part of the vegetation clearing works.

Weed and Pathogen Management

The movement of machinery and personnel can facilitate the spread of weeds and fungal pathogens such as Chytrid, Phytophora and Myrtle Rust. Chytrid fungus has caused the decline of many amphibian species (DECC 2008b) while Phytophora and Myrtle Rust can cause severe damage to native vegetation (Suddaby *et al,* 2008; DEH, 2004; DPI 2011).

Provided that the following hygiene, pathogen and weed control procedures are implemented, the proposal is unlikely to introduce additional weeds to the subject site, spread existing weed species or introduce pathogens. Recommended procedures include:

- NSW Frog Hygiene Protocol (DECC 2008);
- Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Suddaby *et al,* 2008);

- Myrtle Rust: Everyday Management (Department of Primary Industries 2011) (http://www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust).

It is recommended that all personnel, machinery and materials are cleaned prior to entering the work site each day. This includes the cleaning and disinfecting of tyres, boots, floor pans and clothing.

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Appendix 1 – Threatened Species, Populations and Endangered Ecological Communities

Table 9 – Threatened Species & Populations for Consideration

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Birds						
Ptilinopus superbus	Superb Fruit-Dove	V	-	Inhabits rainforest and similar closed forest where it forages high in the canopy, eating fruits of many tree species such as figs and palms (OEH, 2015a). It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees (OEH, 2015a).	BN	Low-moderate. Limited fleshy-fruiting trees were recorded in the subject site.
Hirundapus caudacutus	White-throated Needletail	-	V, M, C, J, K	Almost exclusively aerial from 1m to 1000m above the ground, recorded most often in wooded areas (DE, 2016). This species breeds in Asia (DE, 2016).	BN, PMR	Low-moderate. The subject site may provide non-preferred habitats for this species.
Apus pacificus	Fork-tailed Swift	-	M, C, J, K	Almost exclusively aerial, flying from below 1m to 300m and higher, mostly above inland plains, sometimes above foothills or in coastal areas, preferring more open habitats (DEE, 2016). They also occur over settled areas, cliffs and beaches, above islands as well as way out to sea (DEE, 2016).	BN	Low-moderate. The subject site may provide non-preferred habitats for this species.
Cuculus optatus	Oriental Cuckoo	-	M, C, J, K	Monsoon forest, rainforest edges, leafy trees in paddocks, river flats, roadsides, mangroves and islands (Pizzey & Knight, 2013). A regular non-breeding migrant (September to May) to coastal northern and eastern Australia and	PMR	Low-moderate. The subject site contains limited areas of potential foraging

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				islands (Pizzey & Knight, 2013). Breeds in Mongolia, China and Japan (Pizzey & Knight, 2013).		habitat for this species.
Monarcha melanopsis	Black-faced Monarch	-	M, B	Inhabits mostly rainforest ecosystems, but also found in nearby open eucalypt forests (mainly wet sclerophyll forests) (DEE, 2016). Occurs mainly in marginal habitats during winter or migration (DEE, 2016). Summer breeding migrant to coastal south-eastern Australia (DEE, 2016). May also be found in gullies in mountain areas, coastal foothills, softwood scrub dominated by Brigalow (Acacia harpophylla), coastal scrub dominated by Coastal Banksia (Banksia integrifolia) and Southern Mahogany (Eucalyptus botryoides) and mangroves (DEE, 2016). Builds a deep cup nest of bark strips, rootlets, green moss and spiders web in the fork of a slender sapling, 1 to 12m, sometimes higher (Pizzey & Knight, 2013).	PMR	Low. The subject site contains remnants of swamp forests habitats, unlikely to provide potential habitat for this species. No nests were observed.
Monarcha trivirgatus	Spectacled Monarch	-	M, B	Inhabits understorey of mountain/lowland rainforests, thickly wooded gullies, waterside vegetation including mangroves, mostly well below the canopy (Pizzey & Knight, 2013). Summer breeding migrant to NSW September to May (Pizzey & Knight, 2013). It builds a nest of fine material in fork of open shrub, low tree, hanging vine, 1 to 6m high and often near water (Pizzey & Knight, 2013).	PMR	Low. The subject site contains remnants of swamp forests habitats, unlikely to provide potential habitat for this species. No nests were observed.
Motacilla flava	Yellow Wagtail	-	C, J, K	Habitat requirements are highly variable but typically include open grassy flats near water (CoA, 2015b).	PMR	Low. The subject site is highly disturbed and developed with no open grassy flats

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						preferred by this species.
Myiagra cyanoleuca	Satin Flycatcher	-	M, B	Inhabit heavily vegetated gullies in eucalypt dominated forests and taller woodlands, and on migration occur in coastal forests, woodlands, mangroves, and drier woodlands and open forests (DEE, 2016). In NSW they have been recorded breeding in November to January (DEE, 2016) building a nest consisting of a neat cup of bark strips, moss and spiders web on a horizontal branch 5-25m high, under live foliage (Pizzey & Knight, 2013).	PMR	Low. The subject site contains remnants of swamp forests habitats, unlikely to provide potential habitat for this species. No nests were observed.
Rhipidura rufifrons	Rufous Fantail	-	M, B	'In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (Eucalyptus microcorys), Mountain Grey Gum (E. cypellocarpa), Narrow-leaved Peppermint (E. radiata), Mountain Ash (E. regnans), Alpine Ash (E. delegatensis), Blackbutt (E. pilularis) or Red Mahogany (E. resinifera); usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests; for example near Bega in south-east NSW, where they are recorded in temperate Lilly Pilly (Acmena smithi) rainforest, with Grey Myrtle (Backhousia myrtifolia), Sassafras (Doryphora sassafras) and Sweet Pittosporum (Pittosporum undulatum) subdominants' (DEE, 2016). Nest in a small cup-shaped nest, made from a variety of fine materials, built in a tree, shrub or vine, between 0.34 – 6m high (DEE, 2016).	PMR	Low. The subject site contains remnants of swamp forests habitats, unlikely to provide potential habitat for this species. No nests were observed.
Ephippiorhynchus asiaticus	Black-necked Stork	E1	-	Occur in swamps, billabongs, watercourses and dams of floodplain wetlands along major coastal rivers within NSW (OEH, 2015a). Secondary habitats	BN	Low. A small constructed wetland area, containing a

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				include minor floodplains, coastal sandplain wetlands and estuaries (OEH, 2015a).		fountain with limited bank habitats is unlikely to provide habitat for this species.
Botaurus poiciloptilus	Australasian Bittern	E1	E	'Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (***Typha*** spp.) and spikerushes (***Eleocharis*** spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch' (OEH, 2020).	PMR	Low. A small constructed wetland area, containing a fountain with limited bank habitats is unlikely to provide habitat for this species.
Ixobrychus flavicollis	Black Bittern	V	-	'Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is	BN	Low. A small constructed wetland area, containing a fountain with limited bank habitats is unlikely to provide habitat for this species.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young' (OEH, 2020).		
Hieraaetus morphnoides	Little Eagle	V	-	Occupies open eucalypt forest, woodland or open woodland as well as Sheoak or Acacia woodlands and riparian woodlands of interior NSW (OEH, 2015a). Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter (OEH, 2015a).	BN	Low. The subject site provides limited potential foraging habitat for this species. No stick nests were observed.
Pandion cristatus	Eastern Osprey	V	B	Inhabits coastal areas, especially mouths of large rivers, lagoons and lakes, feeding on fish over clear, open water (OEH, 2015a). Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea (OEH, 2015a).	BN	Low. The subject site provides limited potential foraging habitat for this species. No stick nests were observed.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	M	Inhabits 'coastal habitats, especially those close to the sea shore and around terrestrial wetlands in tropical and temperate regions of mainland Australia' (DoE, 2017). This species is mostly recorded in coastal lowlands, containing large areas of open water including, large rivers, swamps, lakes, the sea, reservoirs, billabongs, saltmarsh, sewage ponds, bays, inlets, beaches, reefs, lagoons, estuaries and mangroves (DoE, 2017). They also occur in terrestrial habitats such as coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and urban areas (DoE, 2017). This species feeds	BN	Low. The subject site provides limited potential foraging habitat for this species. No stick nests were observed.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal (DoE, 2015).		
Falco hypoleucos	Grey Falcon	E	V	'The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid' (OEH, 2020).	PMR	Low. The subject site is outside of the known distribution of this species.
Burhinus grallarius	Bush Stone-curlew	E1	-	Inhabits lowland open forests and woodlands with a sparse grassy groundlayer and fallen timber (OEH, 2015a; DEC 2006). In coastal areas, structurally similar elements of tidal and estuarine communities provide suitable habitat (DEC, 2006). Nests on the ground in a scrape or small bare patch (OEH, 2015a).	BN	Low-moderate. The subject site contains a high density of residences, roads and traffic as well as pets such as dogs. This species is unlikely to utilise the subject site.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	'In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. 'Breeding usually occurs between October and January, and	BN	Low - moderate. The subject site provides limited winter

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				individuals are likely to breed from around four years of age' (Chambers 1995 in NSW Scientific Committee, 2005). In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts' (OEH, 2018a). 'This species requires tree hollows for nesting and sometimes for roosting. Eucalypt trees and acacia shrubs are used for foraging. Plantations of exotic pines are usually avoided' (NSW Scientific Committee, 2008a). 'Nests in hollows in the trunks, limbs or dead spouts of tall living trees, especially eucalypts, often near water' (Scientific Committee, 2008a). 'A clutch of usually two eggs is laid in spring to summer. Each pair has a single successful brood per year, though pairs may have a second attempt if the first attempt fails early in the season. The incubation period is about four weeks, the nestling period seven to eight weeks, and the post-fledging dependence period lasts at least four to six weeks' (Scientific Committee, 2008a). 'The Gang-gang Cockatoo apparently breeds semi-colonially where densities are high. It is thought to show high fidelity to a selected nest hollow' (Scientific Committee, 2008a).		foraging habitat for this species.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Inhabits open forest and woodlands of the coast and the Great Dividing Range, feeding almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with its massive bill (OEH, 2015a). Utilises large hollow-bearing eucalypts for nest sites, laying a single egg between March and May (OEH, 2015a).	BN	Low. No Allocasuarina/Casuarina sp. were recorded within the subject site.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						No potential nesting hollows occur.
Glossopsitta pusilla	Little Lorikeet	V	-	Forages primarily in open eucalypt forest and woodland, utilising riparian habitats due to higher soil fertility and resulting higher productivity (OEH, 2015a). Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe and rarely in orchards (OEH, 2015a). Nests in hollows, selecting limb or trunk hollows of smooth-barked eucalypts with small (3cm) entrances and usually high above the ground (2-15m) (OEH, 2015a).	BN	Moderate. The subject site provides potential habitat for this species.
Lathamus discolor	Swift Parrot	E1	E	Breeds in Tasmania from September to January, migrating to the south-eastern mainland in March and October (OEH, 2015a). Preferred winter-flowering feed trees include Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon and E. albens (OEH, 2015a). 'Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis' (OEH, 2017a).	BN, PMR	Moderate. The subject site provides potential winter foraging habitat.
Ninox connivens	Barking Owl	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland (OEH, 2015a). Roosts in shaded areas of the tree canopy, including tall mid-storey trees with dense foliage such as Acacia and Casuarina species (OEH, 2015a). The male perches in a nearby tree overlooking the hollow entrance during the breeding season (OEH, 2015a). Nests in hollows of large old trees, preferring living eucalypts (OEH, 2015a). Nest-hollow entrances are 2-35 m above the ground with a diameter of 20-46 cm and depth of 20-300 cm (NPWS, 2003a).	BN	Low-moderate. The subject site provides limited potential habitat for this species. No potential nesting hollows were observed.
Ninox strenua	Powerful Owl	V	-	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest (OEH, 2015a). Roosts by day in dense vegetation and nests in large tree hollows, >45cm diameter, >100cm	BN	Low-moderate. The subject site provides limited potential

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				deep and commonly >20m high (or at least >6m) (DEC, 2006). Hollows >0.5m deep according to OEH (2015a). Breeding occurs from late autumn to mid-winter during which time Males roosts nearby (10-200m) (OEH, 2015a).		habitat for this species. No potential nesting hollows were observed.
Tyto novaehollandiae	Masked Owl	V	-	A forest owl that lives in dry eucalypt forests and woodlands from sea level to 1100 m, with a large home range of 500 to 1000ha, often hunting along the edges of forests, including roadsides (OEH, 2015a). Roosts and breeds in moist eucalypt forested gullies, using large tree hollows (>40cm diameter & >100cm deep) or sometimes caves for nesting (OEH, 2015a; DEC, 2006).	BN	Low-moderate. The subject site provides limited potential habitat for this species. No potential nesting hollows were observed.
Tyto tenebricosa	Sooty Owl	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests (OEH, 2015a). Roosts by day in the hollow of a tall forest tree or in heavy vegetation (OEH, 2015a). Nests in large old eucalypts or rainforest species (>40cm diameter & >100cm deep) (DEC, 2006).	BN	Low-moderate. The subject site provides limited potential habitat for this species. No potential nesting hollows were observed.
Chthonicola sagittata	Speckled Warbler	V	-	Inhabits a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies (OEH, 2015a). Typical habitats include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy (OEH, 2015a). Builds rounded, domed nest of dry grass and bark strips in slight hollow in the ground or base of low dense plant, often amongst fallen branches and other litter, with a side entrance allowing the bird to walk directly inside (OEH, 2015a).	BN	Low. The subject site is unlikely to provide habitat for this species. No nests were observed.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Anthochaera phrygia	Regent Honeyeater	E4A	CE	Inhabits dry open forest and woodland, particularly box-ironbark woodland and riparian forests of river she-oak, often with an abundance of mistletoe (OEH, 2015a). Non-breeding flocks have been recorded foraging in flowering Swamp Mahogany & Spotted Gum, particularly on the Central Coast (OEH, 2015a). Key foraging eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany (OEH, 2015a). Also utilises Eucalyptus microcarpa, E.punctata, E.polyanthemos, E.moluccana, Corymbia robusta, E.crebra, E.caleyi, C.maculata, E.mckieana, E.macrorhyncha, E.laevopinea and Angophora floribunda (OEH, 2015a). Also utilise nectar and fruit of Mistletoes Amyema miquelii, A.pendula and A.cambagei as well as lerp and honeydew when nectar is scarce (OEH, 2015a). 'There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak' (OEH, 2018).	BN, PMR	Moderate. Scattered Swamp Mahogany may provide potential foraging habitat for this species.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	'Inhabits open Box-Gum Woodlands on the slopes, Box-Cypress-pine, open Box Woodlands on alluvial plains and woodlands on fertile soils in coastal regions' (OEH, 2017a). 'Flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one, as such birds are generally unable to cross large open areas' (OEH, 2017a). 'Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses' (OEH, 2017a). 'Build and maintain several conspicuous, dome-shaped stick nests about the size of a football, which are used as dormitories for roosting each night' (OEH, 2017a). 'Nests are usually located in shrubs or sapling eucalypts,	BN	Low. No preferred habitats occur within the subject site. No nests were observed.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				although they may be built in the outermost leaves of low branches of large eucalypts' (OEH, 2017a). 'Nests are maintained year round, and old nests are often dismantled to build new ones' (OEH, 2017a). Breed between July and February, usually producing two to three eggs which are incubated by the female (OEH, 2017). 'Territories range from one to fifty hectares (usually around ten hectares) and are defended all year' (OEH, 2017a).		
Epthianura albifrons	White-fronted Chat	V	-	A gregarious species, usually found foraging on bare or grassy ground in wetlands areas, feeding mainly on flies and beetles caught from or close to the ground (OEH, 2015a). Breed from late July to early March, building an open cup nest in low vegetation, usually about 23cm above the ground, but also as high as 2.5m (OEH, 2015a).	BN	Low - moderate. The subject site is unlikely to provide potential habitat for this species due to the managed exotic groundcover.
Grantiella picta	Painted Honeyeater	V	V	The greatest concentration of this species including almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland (OEH, 2015a). Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests, feeding on mostly fruits of mistletoes of the genus *Amyema* (OEH, 2015a). Breeds from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches (OEH, 2015a).	PMR	Low. The subject site contains swamp forest remnant which are unlikely to provide potential habitat for this species.
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially those with rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (OEH, 2015a). Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (OEH, 2015a).	BN	Low - moderate. The subject site is unlikely to provide potential habitat for this species.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Petroica boodang	Scarlet Robin	V	-	Lives in dry eucalypt forests and woodlands, usually containing an open and grassy understorey with few scattered shrubs and an abundance of logs and fallen timber (an important habitat feature) (OEH, 2016a). It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps and conversely is also occasionally found up to 1000 metres in altitude (OEH, 2016a). The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions (OEH, 2016a). Pairs defend a breeding territory and mainly breed between the months of July and January during which they may raise two or three broods (OEH, 2016a). Some adults and young birds disperse to more open habitats after breeding (OEH, 2016a). In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees (OEH, 2016a). Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs (OEH, 2016a). They sometimes forage in the shrub or canopy layer (OEH, 2016a). This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground, often found in a dead branch in a live tree, or in a dead tree or shrub (OEH, 2016a). Birds usually occur singly or in pairs, occasionally in small family parties (OEH, 2016a). Pairs stay together year-round (OEH, 2016a). In autumn and winter, the Scarlet Robin joins mixed flocks of other small insectivorous birds which forage through dry forests and woodlands (OEH, 2016a).	BN	Low - moderate. The subject site is unlikely to provide potential habitat for this species due to the managed exotic groundcover. No nests were observed.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Open forest, woodlands, timbered paddocks, coastal and inland scrubs, golf courses, orchards, roadside and street trees (Pizzey & Knight, 2013). Build a scanty nest with twigs, rootlets, lined with finer rootlets, 1 to 20m high on	BN	Low - moderate. The subject site provides limited potential

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				horizontal branch, against trunk on lifting bark, stump, end of broken branch, fallen limb or cavity in fence post (Pizzey & Knight, 2013).		habitat for this species.
Stagonopleura guttata	Diamond Firetail	V	-	Not commonly found in coastal districts though there are some records (OEH, 2015a). Occurs in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands, often found in riparian areas (OEH, 2015a). Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities (OEH, 2015a). Builds globular nests in shrubby understorey, or higher up, especially under hawk's or raven's nests (OEH, 2015a).	BN	Low. No preferred habitats occur within the subject site.
Mammals						
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Inhabits a range of habitat types such as rainforest, open forest, woodland, coastal heath, inland riparian forest (OEH, 2015a). Occupy home ranges of 750 to 3500 ha (OEH, 2015a). Utilise hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky cliffs for den sites (OEH, 2015a). 'Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals' (OEH, 2017a). Breeds April to July (OEH, 2017a).	BN, PMR	Low. The subject site is unlikely to provide potential habitat for this species due to the absence of groundcover habitats.
Isoodon obesulus obesulus	Southern Brown Bandicoot	E1	E	It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River (OEH, 2015a). Generally only found in heath or open forest with a heathy understorey on sandy or friable soils (OEH, 2015a).	BN	Low. The subject site is outside of the known distribution and lacks a heathy understorey

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						preferred by this species.
Pteropus policephalus	Grey-headed Flying-fox	V	V	Generally found within 200km of the east coast of Australia (OEH, 2015a). Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH, 2015a). Roost camps are generally located within 20km of regular food sources and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH, 2015a).	BN, PMR	Moderate. The subject site provides potential foraging habitat for this species. No camps or potential camp habitats were observed.
Phascolarctos cinereus	Koala	V	V	Inhabit eucalypt woodlands and forest feeding on preferred feed trees, which are listed for each Koala Management Area (OEH, 2015a).	BN, PMR	Moderate. The subject site contains preferred feed tree species.
Petaurus australis	Yellow-bellied Glider	V	-	Occurs in tall mature eucalypt forest, generally in areas with high rainfall and nutrient rich soils (OEH, 2015a). Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein (OEH, 2015a). The Recovery Plan lists one (1) sap tree species, *Eucalyptus punctata* (Grey Gum) for the Central Coast region (NPWS, 2003b). The Recovery Plan lists *Eucalyptus dalrympleana* (Mountain Gum), *E. fastigata* (Brown Barrel), *E. ovata* (Swamp Gum) and *E. viminalis* (Ribbon Gum) for the Southern Tablelands region of NSW (NPWS, 2003b). They feed on favoured food trees, often leaving a distinctive V-shaped scar (OEH, 2015a). They den in hollows of large trees (OEH, 2015a).	BN.	Low - moderate. This species is unlikely to inhabit the subject site due to the density of residences present, and the absence of preferred sap feed trees and potential hollows.
Petaurus norfolcensis	Squirrel Glider	V	-	Inhabits Blackbutt-Bloodwood forests with heath understorey in coastal areas (OEH, 2015a). Nest in hollow-bearing trees. 'Inhabits mature or old growth	BN	Low. The subject site is unlikely to provide

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas' (OEH, 2017a). 'Prefers mixed species stands with a shrub or Acacia midstorey' (OEH, 2017a). 'Live in family groups of a single adult male one or more adult females and offspring' (OEH, 2017a). 'Require abundant tree hollows for refuge and nest sites' (OEH, 2017a). 'Tree hollows utilised can have entrance sizes of 2.5 – 12 cm diameter, although hollows with entrances ≤ 5 cm wide are used most frequently' (Beyer et al. 2008 cited in Fallding, 2015). 'Reproduction peaks in late Autumn and Winter' (Fallding, 2015). 'Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein' (OEH, 2017a).		habitat due to the limited foraging resources present in the both the canopy and the understorey.
Petauroides volans	Greater Glider	-	V	Occurs in eucalypt forest and woodlands, with a diet mostly comprising eucalypt leaves, and occasionally flowers (TSSC, 2016). Typically found in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows, preferring forests with a diversity of eucalypt species (TSSC, 2016). Shelters in tree hollows, with a preference for large hollows in large, old trees (TSSC, 2016). Home range varies from 1 – 4ha in high productive forests and up to 16ha in lower productive, more open woodlands (TSSC, 2016).	BN, PMR	Low. The subject site is unlikely to provide habitat due to the limited foraging resources present in the both the canopy and the understorey.
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V	'The Long-nosed Potoroo (SE Mainland) has scattered populations extending from south-eastern Queensland through to NSW' (DEE, 2017). Habitat preferences in NSW and Qld are broad and unknown due to limited information (DEE, 2017). 'It can be found in wet eucalypt forests (Seebeck 1995b in DEE, 2017) to coastal heaths and scrubs (Mason 1997 in DEE, 2017). 'The main factors would appear to be access to some form of dense vegetation for shelter (Bennett 1987 in DEE, 2017) and the presence of an abundant	PMR	Low. The subject site contains remnants of swamp forest habitats, unlikely to provide potential habitat for this species.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				supply of fungi for food' (Claridge et al. 1992 in DEE, 2017). According OEH, (2017a) they inhabit coastal heaths and dry and wet sclerophyll forests containing dense understorey with occasional open areas and may consist of grass-trees, sedges, ferns or heath, low shrubs including tea-trees or melaleucas (OEH, 2017a). They forage on fruit-bodies of hypogeous (underground-fruiting) fungi as well as roots, insects and larvae and other soft bodied animals, commonly in sandy loam soil (OEH, 2017a). They dig small conical shaped holes in the soil, similar to bandicoots (OEH, 2017a). 'Often digs small holes in the ground in a similar way to bandicoots' (OEH, 2017a). Mainly nocturnal, hiding by day in dense vegetation, however they may forage in daylight hours in winter months (OEH, 2017a). 'Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha' (OEH, 2017a). 'Breeding peaks typically occur in late winter to early summer and a single young is born per litter' (OEH, 2017a). 'Adults are capable of two reproductive bouts per annum' (OEH, 2017a).		
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	'Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Live in family groups of 2 to 5 adults and usually one or two juvenile and sub-adult individuals. Dominant males associate and breed with up to four females. Breeding is likely to be continuous, at least in the southern populations, with no apparent seasonal trends in births' (OEH, 2018).	PMR	Low. No preferred rocky habitats occur within or in close proximity to the subject site.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings, though in treeless areas they are known to utilise mammal burrows (OEH, 2015a). Forages in most habitats across its very wide range (OEH, 2015a).	BN	Moderate. The subject site provides potential roosting and foraging habitat for this species.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-	Occurs in dry sclerophyll forest, woodland, swamp forest and mangrove forest east of the Great Dividing Range (OEH, 2015a). Roosts usually solitary but also communally, mainly in tree hollows but also under bark or in man-made structures (OEH, 2015a). 'Females give birth in late November or early December. Lactation lasts until late January. Juveniles are flying by late January' (Churchill, 2008).	BN	High. The subject site provides potential roosting and foraging habitat for this species.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring' (OEH, 2018).	BN, PMR	Moderate. The subject site provides potential foraging habitat for this species. No potential roosting habitat was observed.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Prefers moist habitats, with trees taller than 20m where it forages on beetles, moths, weevils and flying insects above or just below the tree canopy (OEH, 2015a). Generally roosts in eucalypt hollows, but has also been found under	BN	Moderate - High. The subject site provides potential foraging

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				loose bark or in buildings (OEH, 2015a). Hibernates in winter (OEH, 2015a). They are actively breeding from November to February. 'Ovulation, fertilisation and pregnancy occur in late spring and early summer. The single young is born in December. Lactation continues through January and February' (Churchill, 2008).		habitat for this species.
Phoniscus papuensis	Golden-tipped Bat	V	-	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m (OEH, 2015a). Also found in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests (OEH, 2015a). Roosts mainly in rainforest gullies on small 1st and 2nd order streams, usually in hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside (OEH, 2015a). May also roost under thick moss on the tree trunks, in tree hollows, dense foliage and epiphytes (OEH, 2015a). Specialist feeder on web-building spiders (OEH, 2016a). The breeding period is from November to February. 'A single young is born in November to January, with lactation in December to February' (Churchill, 2008).	BN	Low. The subject site provides potential non-preferred habitat for this species. No hanging bird nests were observed.
Miniopterus australis	Little Bentwing-bat	V	-	Generally found in well-timbered areas including, moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub (OEH, 2015a). Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings (OEH, 2015a). Forage beneath the canopy of densely vegetated habitats (OEH, 2015a). They breed from September to December. 'Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer' (OEH, 2017a).	BN	Recorded. No bats were observed exiting hollows during stagwatch surveys.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Miniopterus schreibersii (orianae) oceanensis	Eastern Bentwing-bat	V	-	Forage in forested areas, catching moths and other flying insects above the tree tops (OEH, 2015a). Roosts primarily in caves, but also uses derelict mines, storm-water tunnels, buildings and other man-made structures (OEH, 2015a). Form discrete populations centred on a maternity cave that is used annually in spring and summer for birthing and rearing of young (OEH, 2015a).	BN	Recorded. No bats were observed exiting hollows during stagwatch surveys.
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest (OEH, 2015a). Roost mainly in tree hollows, but has also been found to roost in buildings (OEH, 2015a). Little is known of this species reproductive cycle, however it is predicted to be from October to February. 'Females congregate in maternity colonies and a single young is born in January, slightly later than other vespertilionid bats that share its range' (Churchill, 2008).	BN	High. The subject site provides potential foraging and limited potential roosting habitat for this species.
Myotis macropus	Southern Myotis	V	-	Generally roosts in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage (OEH, 2015a). Forage over streams and pools catching insects and small fish by raking their feet across the water surface (OEH, 2015a). The breeding cycle in NSW can occur from August to March including the time from ovulation to the completion of lactation. 'In Victoria there is one pregnancy with the single young born in November or December. In northern NSW they produce two litters of single young in October and January' (Churchill, 2008).	BN	Moderate - High. The subject site provides potential foraging habitat for this species. Sheds, old buildings and hollow-bearing trees may provides potential roosting habitat.
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	-	In NSW it is found in heathland, most commonly in dense, wet heath and swamps (OEH, 2015a). It has been determined that optimal habitat may be vigorously regenerating heathland burnt from 18months to 4 years previously, after which the Swamp Rat becomes dominant (OEH, 2015a).	BN	Low. The subject site contains swamp forests with no heathland

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						understorey, unlikely to provide potential habitat for this species.
Pseudomys novaehollandiae	New Holland Mouse	P	V	Inhabits open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes (OEH, 2015a).	BN, PMR	Low. The subject site contains swamp forests with no heathland understorey, unlikely to provide potential habitat for this species.
Reptiles						
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	Largely confined to Triassic and Permian sandstones, including Hawkesbury, Narrabeen and Shoalhaven groups, in the coast and ranges within 250km of Sydney (OEH, 2015a). Shelters in sandstone outcropping features during autumn, winter and spring, moving to hollows in large trees within 500m of escarpments in summer (OEH, 2015a).	PMR	Low. The subject site is situated in remnant swamp forest habitats with no sandstone outcropping or escarpments.
Amphibians						

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Heleioporus australiacus	Giant Burrowing Frog	V	V	Occurs in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based (OEH, 2015a). Breeds in soaks or pools within first and second order streams, calling from open spaces, under vegetation or rocks or from within burrows in the creek bank (OEH, 2015a). Can travel up to 300m from breeding habitats (OEH, 2015a).	PMR	Low. The study area contains swamp forests remnant habitats which are unlikely to provide potential habitat for this species.
Litoria aurea	Green and Golden Bell Frog	E1	V	'Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (***Typha*** spp.) or spikerushes (***Eleocharis*** spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (***Gambusia holbrooki***), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes (OEH, 2020)	BN, PMR	Low. A constructed wetland area, containing a fountain with limited bank habitats is unlikely to provide habitat for this species.
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Breeds in the upper reaches of permanent streams and in perched swamps, after heavy rain usually in from late summer to early spring where it calls from low vegetation close to slow flowing pools (OEH, 2015a). Non-breeding habitat is heath based forest and woodlands where it shelters under leaf litter and low vegetation, hunting for invertebrate prey either in shrubs or on the ground (OEH, 2015a).	PMR	Low. No heath-based forest or woodlands occur within or in close proximity to the subject site.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Mixophyes balbus	Stuttering Frog	E1	V	Found in rainforest and wet, tall open forest in the foothills and escarpments on the eastern side of the Great Dividing Range, breeding in streams during summer after heavy rain (OEH, 2015a).	PMR	Low. The subject site contains remnants of swamp forest habitats with no natural stream habitats suitable for breeding.
Mixophyes iteratus	Giant Barred Frog	E1	E	Found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation (OEH, 2015a). This species prefers rainforest or wet sclerophyll forest, but may also occur in riparian habitats in drier forest or degraded riparian remnant, and occasionally around dams (OEH, 2015a). 'Breeding takes place from late spring to summer' (OEH, 2019).	PMR	Low-moderate. The subject site contains remnants of swamp forest habitats with no natural stream habitats suitable for breeding. There are no BioNet records within 5km.
Pseudophryne australis	Red-crowned Toadlet	V	-	'Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone	BN	Low. No suitable topography occurs within the subject site.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				ridges and forage amongst leaf-litter. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site' (OEH, 2017a).		
Flora						
Acacia bynoeana	Bynoe's Wattle	E1	V	Occurs in heath or dry sclerophyll forest on sandy soils (OEH, 2015a). May prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt places (OEH, 2015a). Associated with overstorey species, Red Bloodwood (*Corymbia gummifera*), Scribbly Gum, Parramatta Red Gum (*Eucalyptus parramattensis*), Saw Banksia (*Banksia serrata*) and Narrow-leaved Apple (*Angophora bakeri*) (OEH, 2015a).	PMR	Low. The subject site contains remnants of swamp forest habitats.
Acacia pubescens	Downy Wattle	V	V	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Longevity is unknown, but clonal species have been known to survive for many decades. Flowers from August to October. Pollination of ***Acacia*** flowers is usually by insects and birds. The pods mature in October to December. Recruitment is more commonly from vegetative reproduction than from seedlings. The percentage of pod production and seed fall for this species appears to be low. ***Acacia*** species	BN, PMR	Low. The subject site contains a swamp forest community which is unlikely to provide habitat for this species.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				generally have high seed dormancy and long-lived persistent soil seedbanks. It is thought that the species needs a minimum fire free period of 5 - 7 years to allow an adequate seedbank to develop' (OEH, 2019).		
Asterolasia elegans		E1	E	Occurs in sheltered, wet forests on mid to lower slopes and valleys on Hawkesbury sandstone (OEH, 2015a; PlantNet, 2015a). Associated canopy species include, Syncarpia glomulifera subsp. glomulifera (Turpentine), Angophora costata (Sydney Red Gum), Eucalyptus piperita (Sydney Peppermint), Allocasuarina torulosa (Forest Oak) and Ceratopetalum gummiferum (Christmas Bush) (OEH, 2015a).	PMR	Low. The subject site contains remnants of swamp forest habitats.
Astrotricha crassifolia	Thick-leaf Star-hair	V	V	'Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Occurs in dry sclerophyll woodland on sandstone. Flowers in spring. Resprouter from root suckers or basal stem buds after fire. Seed storage and dispersal ecology and germination requirements are unknown. Not enough data to rank sensitivity to either frequent or infrequent fires' (OEH, 2019).	BN, PN, PMR	Low. The subject site contains a swamp forest community which is unlikely to provide habitat for this species.
Caladenia tessellata	Thick Lip Spider Orchid	E1	V	'The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border' (OEH, 2020). 'Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and	PMR	Low. The study area contains remnants of swamp forests habitats, unlikely to provide potential habitat for this species.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
				November (but apparently generally late September or early October in extant southern populations)' (OEH, 2020). The precise habitat preferences of this species are unknown (Duncan, 2010).		
Callistemon linearifolius	Nettle Bottle Brush	V	-	Grows in dry sclerophyll forest on the coast and adjacent ranges, flowering in spring to summer (OEH, 2015a). Occurs in damp places in woodland on sandstone, usually in gullies (Robinson, 1997).	BN, PN	Low. The subject site contains swamp forests habitats, unlikely to provide potential habitat for this species.
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	Known to occur in a range of communities including swamp-heath and woodland (OEH, 2015a). Larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E.sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black She-oak (*Allocasuarina littoralis*) (OEH, 2015a). Flowers from December to February (PlantNet, 2016). Should be surveyed preferably from mid-December and through January.	PMR	Low - Moderate. The subject site is highly disturbed containing altered ground levels, exotic ground covers and very limited remnants of a swamp forest community.
Eucalyptus camfieldii	Camfield's Stringybark	V	V	Occurs in coastal heath, mostly on exposed sandy ridges (OEH, 2015a). In shallow sandy soils overlying Hawkesbury sandstone (OEH, 2015a). Associated canopy species include, Eucalyptus oblonga (Narrow-leaved Stringybark), E.capitellata (Brown Stringybark) and E.haemastoma (Scribbly Gum) (OEH, 2015a).	PN, PMR	Low. The subject site is situated is swamp forest habitat.

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
Euphorbia psammogeton	Sand Spurge	E1	-	'Uncommon on sand dunes near the sea' (PlantNet, 2020).	PN	Low. The subject site is not located in sand dune habitats.
Genoplesium baueri	Yellow Gnat-orchid	E1	E	Grows in dry sclerophyll forest and moss gardens over sandstone, flowering from February to March (OEH, 2015a). Current likely locations include, Berowra Valley Regional Park, Royal NP and Lane Cove NP (OEH, 2015a). May also occur in Woronora, O'Hares, Metropolitan and Warragamba catchments (OEH, 2015a).	PMR	Low. The subject site contains limited remnants of a swamp forests habitats, which is unlikely to provide potential habitat for this species.
Grevillea shiressii	-	V	V	'Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils. Flowers mainly late winter to Spring (July-December), with seed released at maturity in October. Flowers are bird pollinated and seeds are dispersed by ants. A fire sensitive obligate seeder that is highly susceptible to local extinction due to frequent fire, however, fire is likely to be relatively infrequent in the habitat of ***G. shiressii***. Seed germination does occur in the absence of fire, however some physical disturbance is likely to promote seed germination' (OEH, 2019)	PMR	Low. The subject site does not contain any natural creeklines or creek line habitats.
Melaleuca biconvexa	Biconvexa Paperbark	V	V	Occurs in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects (OEH, 2015a).	BN, PN, PMR	Low - moderate. This species was not recorded. The subject site contains a highly disturbed and managed groundcover and

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						shrub layer which unlikely to allow for any future recruitment of this species.
Persicaria elatior	Knotweed	V	V	'This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance' (OEH, 2019).	PMR	Moderate. The constructed drains within the site may provide potential habitat for this species.
Persoonia hirsuta	Hairy Geebung	E1	E	'The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other *Persoonia* species are) but will regenerate from seed' (OEH, 2019).	PMR	Low. The subject site contains remnant swamp forest habitats, unlikely to provide potential habitat for this species.
Prostanthera askania	Tranquility Mintbush	E1	E	Occurs adjacent to drainage lines in moist sclerophyll forest and warm temperate rainforest communities often containing canopy species such as *Eucalyptus saligna* (Sydney Blue Gum) and *Syncarpia glomulifera* (Turpentine), though canopy species can be highly variable (OEH, 2015a).	BN, PMR	Low-moderate. No natural drainage lines or creeklines occur within the subject site.
Rhodamnia rubescens	Scrub Turpentine	E4A	-	'Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts' (OEH, 2019).	BN, PN	Low. The subject site contains a highly disturbed exotic ground cover which is unlikely to provide

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						habitat for this species.
Rhodomyrtus psidioides	Native Guava	E4A	-	'Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterised as being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts' (OEH, 2019).	BN	Low. No preferred rainforest habitats or natural creeks or drainage lines occur within the subject site.
Syzygium paniculatum	Magenta Lilly Pilly	E1	V	On the south coast this species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest (OEH, 2015a). On the central coast this species occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities (OEH, 2015a).	BN, PN, PMR	Low. No rainforest vegetation communities occur within or in close proximity to the subject site.
Tetratheca juncea	Black-eyed Susan	V	V	The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape (OEH, 2015a). Generally prefers well-drained site below 200m elevation and annual rainfall between 1000-1200mm. The preferred substrates include sandy skeletal soil on sandstone, sandy-loam soils, low nutrients and clayey soil from conglomerates, pH neutral (OEH, 2015a). Flowers mostly July to November (PlantNet, 2015a).	PMR	Low. The subject site is located on Cockle Bay Soil Landscape with remnant swamp forest habitats, unlikely to provide potential habitat for this species.
Thesium australe	Austral Toadflax	V	V	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast, often growing in association with Themeda triandra (Kangaroo Grass) (OEH, 2015a).	PMR	Low. The subject site contains remnant swamp forests

Scientific Name	Common Name	NSW status	Comm. status	Habitat Description	Records within 5km	Likelihood of occurrence
						habitats with no *Themeda triandra* observed, unlikely to provide potential habitat for this species.

Legend (Note: Aquatic, marine or marine fringe inhabiting species have been omitted from this table):

V - species or ecological community listed as Vulnerable under the NSW Biodiversity Conservation Act (BC Act) 2016 and/or Environment Protection & Biodiversity Conservation (EPBC Act) Act 1999

E1 or E - species or ecological community listed as Endangered under the BC Act and/or EPBC Act

E2 – endangered population listed under BC Act and/or EPBC Act

E4A or CE - species or ecological community listed as Critically Endangered under the BC Act and/or EPBC Act

Ex - species listed as extinct under the BC Act and/or EPBC Act

C – China-Australia Migratory Bird Agreement (CAMBA) listed by EPBC Act

J – Japan-Australia Migratory Bird Agreement (JAMBA) listed by EPBC Act

K – Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) listed by EPBC Act

B – Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) listed by EPBC Act

PN – Unknown number of records from Plantnet database – 10km Search

PMR – Unknown number of records from EPBC Protected Matters Report – 10km Search

M – Marine species under EPBC Act

A – Added by author

Table 10 – Ecological Communities for Consideration

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
'Blue Gum High Forest in the Sydney Basin Bioregion' (BC Act)	E4B	CE	'A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (***Eucalyptus saligna***) and Blackbutt (***E. pilularis***). Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 hectares remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 hectares. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives. Occurs only in areas where rainfall is high (above 1100 millimetres per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest. The rainforest understorey species rely on birds and mammals to disperse their seeds and are vulnerable to fire. Along the drier ridgelines, fire would have been more frequent and an important factor in maintaining understorey diversity. The community also occurs on soils associated with localised volcanic intrusions, 'diatremes''(OEH, 2019).	BN	Low. The subject site is outside of the known distribution for this EEC.
'Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion' (BC Act)	E3	CE	'Characteristic tree species of this ecological community are Mountain Blue Gum (***Eucalyptus deanei***), Monkey Gum (***E. cypellocarpa***) and Turpentine (***Syncarpia glomulifera***). Known from the local government areas of Blue Mountains and Hawkesbury, both within the Sydney Basin Bioregion. It may occur elsewhere in the Bioregion, and communities within Wollondilly LGA certainly show	BN	Low. The subject site is outside of the known distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			similarities to this community. Blue Mountains Shale Cap Forest is found on deep fertile soils formed on Wianamatta Shale, on moist sheltered sites at lower to middle altitudes of the Blue Mountains and Wollemi areas. Extensive occurrences of shale are at Springwood, Berambing to Kurrajong Heights, Mountain Lagoon and Colo Heights. Blue Mountains Shale Cap Forest includes vegetation that is part of Map Unit 9a Shale Cap Forest of the Royal Botanic Gardens' 1:100 000 vegetation maps and vegetation that is part of Smith and Smith's ***Eucalyptus deanei–Syncarpia glomulifera*** Tall Open Forest . Blue Mountains Shale Cap Forest is a rich habitat for fauna, supporting greater numbers and a greater diversity of mammals and birds than the typical lower, drier eucalypt forests and woodlands of the Blue Mountains. The ***Eucalyptus deanei*** trees are a major provider of nest hollows for owls, parrots, gliders and other hollow dependent fauna including the threatened species Powerful Owl and Glossy Black-Cockatoo. Blue Mountains Shale Cap Forest has been extensively cleared for agricultural and urban development and is poorly represented in Blue Mountains and Wollemi National Parks. The structure of the community was originally tall open forest to open forest, depending on site conditions and history, but as a result of partial clearance may now exist as woodland or as groups of remnant trees' (OEH, 2019).		
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	V2	E	'Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is dominated by ***Eucalyptus parramattensis*** subsp. ***parramattensis***, ***Angophora bakeri*** and ***E. sclerophylla***. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is to occur within the local	BN	Low. The subject site is outside of the known distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith (James 1997), but may occur elsewhere within the Sydney Basin Bioregion. Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. The boundary with these units appears to be a function of the localised drainage conditions and the thickness of the tertiary alluvium mantle. The shrub understorey includes a number of listed threatened species including *Acacia bynoeana*, *Allocasuarina glareicola*, *Dillwynia tenuifolia*, *Grevillea juniperina* subsp. *juniperina*, *Micromyrtus minutiflora*, *Persoonia nutans* and *Pultenaea parviflora*, and may also possibly contain *Grevillea parviflora* subsp. *parviflora*. There are periodic fires in Castlereagh Scribbly Gum Woodland and most species are able to regenerate from lignotubers and buds beneath the bark, as well as seed stored in the soil' (OEH, 2019).		
'Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions' (BC Act) or 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' (EPBC Act)	E3	CE	Represents a complex of rainforest and coastal vine thickets on the east coast of Australia (DE, 2015). Typically occurs within 2km of the coast or adjacent to a large salt water body, such as an estuary, thus influence by the sea (DE, 2015).	BN	Low. No rainforest vegetation communities occur within or in close proximity to the study area.
'Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions' (BC	E3	V	Occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea (OEH, 2015).	BN	Low. No intertidal zones occur within or in close proximity to the subject site.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
Act) or 'Subtropical and Temperate Coastal Saltmarsh' (EPBC Act)					
Coastal Upland Swamp in the Sydney Basin Bioregion	E3	E	Includes open graminiod heath, sedgeland and tall scrub associated with periodically waterlogged soils on the Hawkesbury sandstone plateaux (OEH, 2015).	BN	Low. The subject site is not located on Hawkesbury Sandstone.
Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act).	E4B	CE	'The dominant canopy trees of Cumberland Plain Woodland are Grey Box (***Eucalyptus moluccana***) and Forest Red Gum (***E. tereticornis***), with Narrow-leaved Ironbark (***E. crebra***), Spotted Gum (***Corymbia*** maculata) and Thin-leaved Stringybark (***E.*** eugenioides) occurring less frequently. The shrub layer is dominated by Blackthorn (***Bursaria spinosa***), and it is common to find abundant grasses such as Kangaroo Grass (***Themeda*** australis) and Weeping Meadow Grass (***Microlaena stipoides*** var. ***stipoides***). Occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Typically occurs on heavy clay soils derived from Wianamatta Shale. Well adapted to drought and fire, and the understorey plants often rely on underground tubers or profuse annual seed production to survive adverse conditions. Cumberland Plain Woodland is habitat for threatened species such as the Cumberland land snail (***Meridolum corneovirens***)' (OEH, 2020).	BN	Low. The subject site is outside of the known distribution of this EEC.
'Duffy's Forest Ecological Community in the Sydney Basin Bioregion' under BC Act	E3	-	'Open-forest or woodland community dominated by Red Bloodwood ***Corymbia gummifera***, Black Ash ***Eucalyptus sieberi***, Smooth-barked Apple ***Angophora costata***, and frequently a stringybark ***E. capitellata*** or ***E. oblonga***. Other understorey species include Myrtle Wattle ***Acacia myrtifolia***, Hairpin Banksia ***Banksia spinulosa***, Rusty Velet-	BN	Low. The subject site is dominated by *Eucalyptus robusta* which is not characteristic of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			bush ***Lasiopetalum ferrugineum***, Crinkle Bush ***Lomatia silaifolia***, Broad-leaf Geebung ***Persoonia levis***, Apple–berry ***Billardiera scandens***, Wiry Panic ***Entolasia stricta***, Twisted Mat-rush ***Lomandra obliqua***, ***Micrantheum ericoides*** and ***Xanthorrhoea media' (OEH, 2020)***. 'Extensively fragmented distribution, occurring primarily within Warringah, and Ku-ring-gai Local Government Areas (LGA) with minor occurrences in the Pittwater (Ingleside and Bilgola Plateau), Manly (Seaforth Oval) and Hornsby (South Turramura and Epping North) LGAs. Estimated original extent was approximately 1450 ha, of which less than 16%, or approximately 240 ha, remains' (OEH, 2020). 'Occurs in association with shale lenses and lateritic soils in Hawkesbury Sandstone. Rock outcrops are usually absent from this community, except on the fringes, where it adjoins typical sandstone vegetation, generally characterised by extensive sandstone outcrops' (OEH, 2020). 'Situated on ridgetops, plateaus and upper slopes, but may also occur on mid-slopes or benches downslope of Sydney Sandstone Ridgetop Woodland' (OEH, 2020). 'Occurs on Somersby, Blacktown, Lucas Heights and Lambert Soil Landscapes and, to a lesser extent, the Gymea and Hawkesbury Soil Landscapes' (OEH, 2020). 'Floristic composition and structural diversity are influenced by the size and disturbance history of the site. Fire severity and frequency		

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			are important factors influencing community composition' (OEH, 2020).		
'Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion' under the BC Act	E4B	E	'Predominantly a sclerophyllous heath or scrub community although, depending on site topography and hydrology, some remnants contain small patches of woodland, low forest or limited wetter areas. Common species include ***Banksia aemula***, ***B. ericifolia***, ***B. serrata***, ***Eriostemon australasius***, ***Lepidosperma laterale***, ***Leptospermum laevigatum***, ***Monotoca elliptica*** and ***Xanthorrhoea resinifera (OEH, 2020).*** 'Once occupied around 5,300 hectares of land between North Head and Botany Bay in Sydney's eastern suburbs. Surviving stands totalling approximately 146 hectares have been recorded from the local government areas of Botany, Randwick, Waverley, and Manly' (OEH, 2020). 'Occurs on disjunct patches of nutrient poor aeolian (wind blown) dune sand. The community possesses soil seed bank and has been observed to regenerate naturally on cleared sand where the soil profile remains intact' (OEH, 2020). 'Floristic composition and structural diversity is influenced by the size and disturbance history of the remnant. Field observations indicate that after a prolonged period (>15 years) without fire or similar disturbance, the floristic composition and vegetation structure becomes simplified with a few species dominating the standing vegetation' (OEH, 2020).	BN	Low. The subject site contains remnant trees with no Banksia scrub.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	E3	-	'General structural form is open-forest but may now exist as woodland or remnant trees. The tree canopy layer is characterised by Spotted Gum ***Corymbia maculata*** and Grey Ironbark ***Eucalyptus paniculata*** and is associated with Smooth-barked Apple ***Angophora costata***, Red Bloodwood ***Corymbia maculata***, Broad-leaved White Mahogany ***E. umbra***, Grey Gum ***E. punctata***, Turpentine ***Syncarpia glomulifera***, Bangalay ***E. botryoides***, and Rough-barked Apple ***Angophora floribunda' (OEH, 2020)***. 'Occurs entirely within the Pittwater Local Government Area, on the Barrenjoey Peninsula and Western Pittwater Foreshores. Remnants are typically small and on private property, however there are a few remnants in Council reserves and one remnant within Ku-ring-gai Chase NP' (OEH, 2020). 'Occurs in association with shale derived soils with high rainfall on lower hillslopes on the Narrabeen Group - Newport Formations on the Barrenjoey Peninsula and western Pittwater Foreshores' (OEH, 2020). 'Assemblage diversity must take into account species likely to be present in the soil seedbank. Structural form is typically open-forest but may now exist as woodland or remnant trees. Floristic composition and structural diversity influenced by the remnant size, disturbance history and fire severity and frequency' (OEH, 2020).	BN	Low. The subject site is outside of known distribution.
Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Bioregions	E3	-	'Found in the Central Hunter Valley between Singleton and Muswellbrook occurring in area of relatively low rainfall and high temperatures. Associated with Permian lithology and situated on gently undulating hills, slopes and valleys and occasionally on rocky	BN	Low. The subject site is outside of the known distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			knolls. Characterised by the presence of Narrow-leaved Ironbark (*Eucalyptus crebra*), Kurrajong (*Brachychiton populneus subsp. populneus*) and Grey Box (*Eucalyptus moluccana*). Other tree species such as Rough-barked Apple (*Angophora floribunda*) and Black Cypress Pine (*Callitris endlicheri*) may be present and occasionally dominate or co-dominate. The understorey in intact sites is often present and common shrub species include Velvet Mock Olive (*Notelaea microcarpa var. microcarpa*), Coffee Bush (*Breynia oblongifolia*), Blackthorn (*Bursaria spinosa subsp. spinosa*), *Cassinia quinquefar*ia and Sticky Hop-bush (*Dodonaea viscosa*). Subshrubs may also be common and include Narrawa Burr (*Solanum cinereum*), *Phyllanthus virgatus* and Small-leaf Bluebush (*Maireana microphylla*). Ground cover can be moderately dense to dense, and consist of numerous forbs and grass species as well as a small number of ferns, sedges and twiners. The more common species include Barbed Wire Grass (*Cymbopogon refractus*), Purple Wiregrass (*Aristida ramosa*), Kidney Weed (*Dichondra repens*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Bristly Cloak Fern (*Cheilanthes distans*), Tall Chloris (*Chloris ventricosa*), Slender Tick-trefoil (*Desmodium varians*), Yellow Burr-daisy (*Calotis lappulacea*), Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Blue Trumpet (*Brunoniella australis*) and *Glycine tabacina'* (OEH, 2019).		
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Bioregions	E3	-	'Found in the Central Hunter Valley mainly between Maitland and Muswellbrook, occurring in areas of undulating country including low rises and slopes on all aspects. Mostly occurs on clayey soils on	BN	Low. The subject site is outside of the known distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			Permian sediments, may also occur on alluvial and colluvial soils in valleys. Characterised by Narrow-leaved Ironbark (*Eucalyptus crebra*), Spotted Gum (*Corymbia maculata*) and Grey Box (*Eucalyptus moluccana*) forming an open forest. Other tree species such as Red Ironbark (*Eucalyptus fibrosa*) and Forest Red Gum (*Eucalyptus tereticornis*) may be present, and occasionally dominate or co-dominate. A sparse layer of small trees including Bulloak (*Allocasuarina luehmannii*) or Silver-stemmed Wattle (*Acacia parvipinnula*) may be present in some areas. The shrub layer varies from sparse to moderately dense. Common shrub species include Gorse Bitter Pea (*Daviesia ulicifolia subsp. ulicifolia*), Grey Bush-pea (*Pultenaea spinosa*), Coffee Bush (*Breynia oblongifolia*), Needlebush (Hakea sericea) and Blackthorn (Bursaria spinosa subsp. spinosa). Ground cover can be sparse to moderately dense and consists of numerous forbs, a few grass species and occasional ferns and sedges. Common species include Poison Rock Fern (*Cheilanthes sieberi subsp. sieberi*), Barbed Wire Grass (*Cymbopogon refractus*), Whiteroot (*Pratia purpurascens),* Many-flowered Mat-rush (*Lomandra multiflora subsp. multiflora*), Pomax umbellata, Glycine tabacina, Blue Flax-lily (*Dianella revoluta*), Slender Wire Lily (*Laxmannia gracilis*), Vernonia cinerea var. cinerea, Slender Tick-trefoil (*Desmodium varians*) and Kidney Weed (*Dichondra repens*)' (OEH, 2019).		
Freshwater Wetlands on Coastal floodplains of the NSW North Coast,	E3	-	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years (OEH, 2015). Typically occurs on silts, muds or humic loams in	BN	Low. A constructed wetland / water feature is situated along the northern boundary of the

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
Sydney Basin and South East Corner Bioregions			low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes (OEH, 2015). May also occur in backbarrier landforms where floodplains adjoin coastal sandplains (OEH, 2015).		subject site. No naturally occurring wetlands occur.
Hunter Lowland Red Gum Forest in the Sydney Basin and NSW North Coast Bioregions	E3	-	An open forest where the most common canopy species are *Eucalyptus tereticornis* (Forest Red Gum) and *E.punctata* (OEH, 2015). It has been recorded from the Maitland, Cessnock, Port Stephens, Muswellbrook and Singleton LGAs, but may occur elsewhere in these bioregions (OEH, 2015).	BN	Low. This subject site is outside of the known distribution of this vegetation community. Vegetation within the subject site is not characteristic of this EEC.
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	E3	-	Found in the Hunter Valley from Bulga to Bylong/Goulburn River National Park and known to occur in Singleton, Muswellbrook and the Upper Hunter local government areas. Occurring on colluvial soils on exposed footslopes associated with the interface between Triassic Narrabeen sandstones and Permian sediments. Characterised by the typically dominated by *Eucalyptus dawsonii* (Slaty Gum) and/or *Eucalyptus moluccana* (Grey Box). *Acacia salicina* (Cooba) and *Allocasuarina luehmannii* (Bulloak). Other trees which may be present include *Brachychiton populneus* subsp. *populneus* (Kurrajong), *Callitris endlicheri* (Black Cypress Pine), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus punctata* (Grey Gum). The understorey includes species such as *Olearia elliptica* (Sticky Daisy Bush), *Acacia cultriformis* (Knife-leaved Wattle), *Canthium odoratum* (Shiny-leaved Canthium), *Notelaea microcarpa* var. *microcarpa* (Native Olive), *Dodonaea viscosa* subsp. *cuneata* (Wedge-	BN	Low. This subject site is outside of the known distribution of this vegetation community. The dominant canopy species characteristic of this EEC do not occur.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			leaf Hopbush), *Acacia decora* (Western Golden Wattle) and *Solanum brownii* (Violet Nightshade). The groundcover is typically sparse to very sparse and is relatively species poor. The most frequently occurring species include *Dichondra repens* (Kidney Weed), *Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Aristida ramosa* (Wire Grass), *Brunoniella australis* (Blue Trumpet), *Cymbopogon refractus* (Barbed Wire Grass), *Desmodium brachypodum* (Large Tick-trefoil), *Fimbristylis dichotoma* (Common Fringe-rush) and *Sida corrugata* (Corrugated Sida).		
Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion	E3	CE	Found in the Hunter Valley associated with heavy clay soils on depositional landforms in the south-western part of the Hunter River valley floor. Characterised by the dense open tree canopy about 15 m tall and with the most common tree being *Acacia pendula* (Weeping Myall), which may occur with *Eucalyptus crebra* (Narrow-leaved Ironbark), *A. salicina* (Cooba) and/or trees within the *A. homalophylla - A. melvillei* complex. Understorey shrubs may include *Canthium buxifolium* (Stiff Canthium), *Dodonaea viscosa* (Sticky Hopbush), *Geijera parviflora* (Wilga), *Notelaea microphylla* var. *microphylla* (Native Olive) and *Senna zygophylla* (Silver Cassia). However, the shrub stratum is absent from some stands. The groundcover varies from dense to sparse, and is comprised of grasses such as *Austrodanthonia fulva* (a wallaby grass) and *Themeda australis* (Kangaroo Grass), and low shrubs and herbs such as *Chrysocephalum apiculatum* (Common Everlasting), *Einadia nutans* subsp. *nutans* (Climbing Saltbush),	BN	Low. This subject site is outside of the known distribution of this vegetation community. The dominant canopy species characteristic of this EEC do not occur.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			Enchylaena tomentosa (Ruby Saltbush), *Maireana microphylla* (Eastern Cotton Bush) and *Ptilotus semilanatus*.		
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	E4B	-	An open forest with a tree canopy dominated by some combination of *Eucalyptus racemosa* (Scribbly Gum), *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood), *Syncarpia glomulifera* (Turpentine) and *Eucalyptus piperita* (Sydney Peppermint) (OEH, 2015).	BN	Low. No characteristic canopy species occur within the subject site.
Low woodland with heathland on indurated sand at Norah Head	E3	-	A low woodland or heathland with a very open cover of trees up to 3 metres high including, *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca sieberi*, *Corymbia gummifera* (Red Bloodwood) and the Endangered *Eucalyptus camfieldii* (Camfield's Stringybark) (OEH, 2015). The dense shrub layer includes *Banksia oblongifolia* (Fern-leaved Banksia), *Hakea dactyloides* (Finger Hakea), *Melaleuca nodosa* (Prickly-leaved Paperbark) and *Allocasuarina distyla* (OEH, 2015).	BN	Low. The study area contains a limited remnants of a forest vegetation community with no heathland vegetation present.
Lower Hunter Spotted Gum-Ironbark Forest in the Sydney Basin Bioregion	E3	-	Dominated by Spotted Gum (*Corymbia maculata*) and Broad-leaved Ironbark (*Eucalyptus fibrosa*), while Grey Gum (*E. punctata*) and Grey Ironbark *E. crebra* occur occasionally (OEH, 2015). Restricted to a range of approximately 65 km by 35 km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley (OEH, 2015). Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle and Port Stephens but may also occur elsewhere within the bioregion (OEH, 2015).	BN	Low. One Spotted Gum is located in the subject site. This tree is considered to have been planted. The subject site is outside of the central or lower Hunter Valley distribution of this community.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions	V2		Found in the Lower Hunter Valley, mainly occurring on the Barrington footslopes but is known to occur or have occurred in the Muswellbrook, Singleton, Dungog and Upper hunter local government areas. This community occurs on the Carboniferous sediments in gullies and on steep hillslopes with south facing aspects. Characterised by the common canopy trees, *Elaeocarpus obovatus* (Hard Quandong), *Baloghia inophylla* (Brush Bloodwood), *Streblus brunonianus* (Whalebone Tree), *Mallotus philippensis* (Red Kamala), *Capparis arborea* (Brush Caper Berry), *Olea paniculata* (Native Olive) and *Dendrocnide excelsa* (Giant Stinging Tree). Emergent trees 20 to 30m tall such as *Brachychiton populneus* subsp. *populneus* (Kurrajong), *Corymbia maculata* (Spotted Gum), *Brachychiton discolor* (Lacebark) and *Ficus rubiginosa* (Port Jackson Fig) are often present. Other tree and tall shrub species that are often present include *Guioa semiglauca* (Guioa), *Alectryon tomentosus* (Hairy Alectryon), *Alectryon subcinereus* (Wild Quince), *Melia azedarach* (White Cedar), *Melicope micrococca* (Hairy-leaved Doughwood), *Scolopia braunii* (Flintwood), *Claoxylon australe* (Brittlewood), *Elaeodendron australe* var. *australe* (Red Olive Plum), *Diospyros australis* (Black Plum) and *Pararchidendron pruinosum* var. *pruinosum* (Snow Wood). The understorey is dense with common species including *Notelaea longifolia* (Large Mock Olive), *Breynia oblongifolia* (Coffee Bush), *Clerodendrum tomentosum* (Hairy Clerodendrum) and *Pittosporum revolutum* (Hairy Pittosporum). Vines are abundant and include *Pandorea pandorana* subsp.	BN	Low. Characteristic tree species were not observed within or in close proximity to the subject site. The subject site is outside of the distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			pandorana (Wonga Vine), *Geitonoplesium cymosum* (Scrambling Lily), *Cayratia clematidea* (Native Grape), *Jasminum volubile* (Stiff Jasmine) and *Maclura cochinchinensis* (Cockspur Thorn). The ground cover is variable and is comprised of forbs, grasses and ferns. The common species include *Commelina cyanea* (Scurvy Weed), *Dichondra repens* (Kidney Weed), *Oplismenus aemulus* (Basket Grass) and *Adiantum aethiopicum* (Common Maidenhair)		
'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions' (BC Act) or 'Lowland Rainforest of Subtropical Australia' (EPBC Act).	E3	CE	An ecological community of subtropical rainforest and some related, structurally complex forms of dry rainforest (OEH, 2015).	PMR, BN	Low. No rainforest communities were observed within the subject site.
'*Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions*' (BC Act) or *'Alpine Sphagnum Bogs and Associated Fens'* (EPBC Act) (Refer to separate profile).	E3	E	'The community typically has an open to very sparse layer of shrubs, 1-5 m tall, (eg. ***Baeckea gunniana, B. utilis, Callistemon pityoides, Leptospermum juniperinum, L. lanigerum, L. myrtifolium, L. obovatum, L. polygalifolium***). Species of ***Epacris*** (eg. ***E. breviflora, E. microphylla, E. paludosa***) and ***Hakea microcarpa*** are also common shrubs. In some peatlands and swamps, particularly those with a history of disturbance to vegetation, soils or hydrology, the shrub layer comprises dense thickets of ***Leptospermum*** species. In other peatlands and swamps with a history of grazing by domestic livestock, the shrub layer may be very sparse or absent' (OEH, 2018).	BN	Low. One constructed wetland / water feature is situated along the northern boundary. No swamps containing characteristic shrubs occur within or in close proximity to the subject site.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
'Posidonia Australia seagrass meadows of the Manning-Hawkesbury ecoregion' (EPBC Act)	-	E	-	PMR	Low. No seagrass meadows occur within the subject site.
Quorrobolong Scribbly Gum Woodland in the Sydney Basin Bioregion	E3	-	A low shrubby woodland with the overstorey dominated by *Eucalyptus racemosa* (Scribbly Gum) with other tree species including *E. piperita* (Sydney Peppermint), *E. resinifera* (Red Mahogany), *Angophora costata* (Smooth-barked Apple) and *E. punctata* (Grey Gum) (OEH, 2015).	BN	Low. No Scribbly Gum is present within the subject site.
River-flat Eucalypt Forest of Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions	E3	-	Occurs on the river flats of the coastal floodplains with the most widespread and abundant dominant trees including, *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple) (OEH, 2015).	BN	Low - Moderate. *Angophora floribunda* trees occur within the subject site to the north of the proposed impact area. These trees are likely to be remnant trees. No other characteristic canopy species were recorded.
'Shale Sandstone Transition Forest in the Sydney Basin Bioregion' (BC Act)	E4B	CE	'Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum (***Eucalyptus tereticornis***), Grey Gum (***E. punctata***), stringybarks (***E. globoidea***, ***E. eugenioides***) and ironbarks (***E. fibrosa*** and ***E. crebra***). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland. Shale	BN	Low. The subject site is not located on the edge of the Cumberland Plain.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			Sandstone Transition Forest in the Sydney Basin Bioregion contains many more species than described for the canopy (above) and other references should be consulted to identify these' (OEH, 2020). 'Before European settlement, this community was extensive around the edges of the Cumberland lowlands throughout western Sydney, most particularly in the southern half. Today, only 9,950 ha remains intact (22.6% of its original extent) and the bulk of this occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Good examples can be seen at Gulguer Nature Reserve, in the Wilton area and in the Sackville - Maroota area' (OEH, 2020). 'Well adapted to fire, being often close to sandstone areas. Some species in areas with greater shale influence regenerate from profuse annual seeding and underground tubers. High-sandstone-influence sites have poor rocky soils, and many shrubs which rely on nitrogen-fixing root nodules and soil/root fungi to obtain nutrients. High-shale-influence sites often have a diverse and moderately dense groundcover stratum, with grasses a prominent and diverse component. Shrubs are usually less abundant and less diverse in shale sites' (OEH, 2020).		
Southern Sydney sheltered forest on transition sandstone soils in the Sydney Basin Bioregion	E3	-	'Southern Sydney sheltered forest on transitional sandstone soils is an open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs, grasses and graminoids. The dominant trees include *Angophora costata*, ***Eucalyptus piperita*** and occasionally ***Eucalyptus pilularis***, particularly around Helensburgh. ***Corymbia gummifera***		Low. The subject site contains remnants of swamp forest and is not located on transition sandstone soils.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			occurs frequently within the community, although generally at lower abundance than the other eucalypts' (OEH, 2020). 'Southern Sydney sheltered forest on transitional sandstone soils is found within an estimated total extent of less than 45 000 ha, bounded approximately by Hurstville, Carss Park, Bundeena, Otford, Stanwell Tops, Darkes Forest, Punchbowl Creek and Menai. Within this range, the community is currently estimated to occupy an area of approximately 400 - 4 000 ha. The community has been recorded from the local government areas of Campbelltown, Hurstville, Kogarah, Sutherland, Wollondilly and Wollongong within the Sydney Basin Bioregion and may occur elsewhere in the Bioregion' (OEH, 2020). 'The terrain is primarily gentle, with slopes not often exceeding 10°, and where sandstone outcrops occur infrequently' (OEH, 2020). 'The community is typically associated with sheltered heads and upper slopes of gullies on transitional zones where sandstone outcrops may exist, but where soils are influenced by lateral movement of moisture, nutrients and sediment from more fertile substrates'(OEH, 2020).		
'Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East corner Bioregions' (BC Act) or 'Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and south-east Queensland' (EPBC Act).	E3	E	Occurs on the coastal floodplains of NSW, containing a dense to sparse tree layer dominated by *Casuarina glauca* (swamp oak) northwards from Bermagui (OEH, 2015).	BN	Low. No *Casuarina glauca* were recorded within the subject site.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' (BC Act)	E3	-	A swamp community dominanted by *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (bangalay) and *Eucalyptus longifolia* (woollybutt) (OEH, 2015). Other trees which may occur at low abundance include, *Callistemon salignus* (sweet willow bottlebrush), *Casuarina glauca* (swamp oak) and *Eucalyptus resinifera* subsp. *hemilampra* (red mahogany), *Livistona australis* (cabbage palm) and *Lophostemon suaveolens* (swamp turpentine) (OEH, 2015).	BN	Recorded. Several tree canopy species characteristic of this EEC were recorded within the subject site.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E3	-	A complex of vegetation types largely restricted to freshwater swamps in coastal areas, occurs on sand dunes and low-nutrient sandplains (OEH, 2015).	BN	Low. One constructed wetland / water feature is situated along the northern boundary of the subject site. No natural wetlands occur within the subject site.
Sydney Turpentine – Ironbark Forest in the Sydney Basin Bioregion (BC Act)	EB4	CE	'Open forest, with dominant canopy trees including Turpentine ***Syncarpia glomulifera***, Grey Gum ***Eucalyptus punctata***, Grey Ironbark ***E. paniculata*** and Thin-leaved Stringybark ***E. eugenoides***. In areas of high rainfall (over 1050 mm per annum) Sydney Blue Gum ***E. saligna*** is more dominant. The shrub stratum is usually sparse and may contain mesic species such as Sweet Pittosporum ***Pittosporum undulatum*** and Elderberry Panax ***Polyscias sambucifolia' (OEH, 2020).*** 'Occurs close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus. A transitional community, between Cumberland	BN	Low. No canopy species characteristic of this EEC were recorded within the subject site. The subject site is outside of the known distribution of this EEC.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			Plain Woodland in drier areas and Blue Gum High Forest on adjacent higher rainfall ridges' (OEH, 2020).		
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3	-	A grassland community dominated by *Themeda triandra* (Kangaroo Grass) and occurring on seacliffs and coastal headlands (OEH, 2015). *Banksia integrifolia subsp. integrifolia, Westringia fruticosa* and *Acacia sophorae* occurs as an emergent shrub or as a dense cover where they have recruited over grasslands (OEH, 2015). Smaller shrubs occur often as prostrate to dwarf forms, most frequently *Pimelea linifolia, Hibbertia vestita, Pultenaea maritima and Westringia fruticosa* (OEH, 2015).	BN	Low. The subject site remnants of a swamp forest vegetation community.
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	E3	-	A low woodland dominated by trees of Eucalyptus botryoides and Angophora floribunda with a diverse understorey of sclerophyllous shrubs species including Banksia integrifolia, Banksia serrata, Monotoca elliptica, Macrozamia communis, Acacia ulicifolia, Platysace lanceolata, Acacia suaveolens and Allocasuarina littoralis (OEH, 2015). 'Largely restricted to coastal sands on the Umina, Woy Woy and Ettalong Sandplain, a beach ridge system within the Gosford local government area. Including ecotonal areas, less than 10% (being less than 10 hectares) of the community's estimated original cover of about 80 hectares remains. This comprises four main remnants at Umina, while a few smaller remnant patches and scattered trees around Pearl Beach and Patonga and elsewhere on the 'Peninsula' indicate its former distribution. Occurs on sandy soils (iron podzols) of the Woy Woy Soil Landscape which are distinguished from the humus podsols generally associated with	BN	Low. The subject site is located on Cockle Bay Soil Landscape. *Eucalyptus botryoides* occurs offsite to the north and east. *Angophora floribunda* occurs within the north-eastern parts of the site.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			foothill talus slopes further away from the coast on which ***Angophora costata*** predominates' (OEH, 2020).		
Warkworth Sands Woodland in the Sydney Basin Bioregion (BC Act)	E3	CE	'Warkworth Sands Woodland is a low woodland dominated by ***Angophora floribunda*** (Rough-barked Apple) and ***Banksia integrifolia*** subsp. ***integrifolia*** (Coast Banksia). Other tree species may be present such as ***Eucalyptus tereticornis*** (Forest Red Gum)and ***E. glaucina*** (Slaty Red Gum)' (OEH, 2020). 'Shrub and ground layer species commonly present include ***Acacia filicifolia*** (Fern-leaved Wattle), ***Melaleuca thymifolia*** (Thyme Honey-myrtle), ***Brachyloma daphnoides*** (Daphne Heath), ***Pteridium esculentum*** (Bracken), ***Pimelea linifolia*** (Slender Rice Flower), ***Imperata cylindrica*** var. ***major*** (Blady Grass), ***Chrysocephalum apiculatum*** (Common Everlasting) and ***Glycine clandestina***. Small drainage lines within the area occupied by this community may support the presence or higher abundance of certain species (such as ***Melaleuca thymifolia***) and the absence or lower abundance of others (such as ***Banksia integrifolia*** subsp. ***integrifolia***)' (OEH, 2020). 'Warkworth Sand Woodland occurs on aeolian sand deposits south of Singleton in the Hunter Valley' (OEH, 2020).	BN	Low. The subject site is outside of the distribution of this EEC.
Western Sydney Dry Rainforest in the Sydney Basin Bioregion (BC Act)	E3	CE	***'Melaleuca styphelioides***), Hickory Wattle (***Acacia implexa***) and Native Quince (***Alectryon subcinereus***). There are many rainforest species in the shrub layer, such as Mock Olive (***Notolaea longifolia***), Hairy Clerodendrum (***Clerodendrum tomentosum***) and Yellow Pittosporum ***(Pittosporum revolutum***). The shrub layer combines with vines, such as Gum Vine (***Aphanopetalum resinosum***), Wonga	BN	Low. No characteristic species occur within the subject site.

Community Name	NSW status	Comm. status	Habitat Description	Records	Likelihood of occurrence
			Vine (***Pandorea pandorana***) and Slender Grape (***Cayratia clematidea***) to form dense thickets in sheltered locations' (OEH, 2020). 'Very restricted and occurs most commonly in the far southern section of the Cumberland Plain, in the Razorback Range near Picton. Outlying occurrences have been recorded at Grose Vale and Cattai' (OEH, 2020).		

Legend: E1 - Endangered; E2 - Endangered Population; E3 - Endangered ecological community; E4 Critically endangered; P - Protected; K - Known occurrence; PR - Predicted occurrence; V - Vulnerable; E4 critically endangered

Appendix 2 – Protected Matters Report

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

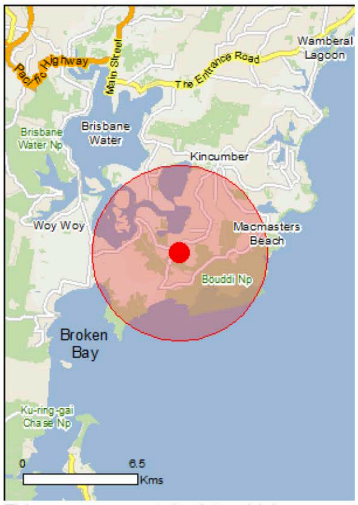
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/07/20 20:28:17

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



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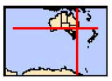

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	78
Listed Migratory Species:	65

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	87
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	1
Invasive Species:	47
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community may occur within area
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll	Endangered	Species or species

Name	Status	Type of Presence
(southeastern mainland population) [75184]		habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat may occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Astrotricha crassifolia Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat likely to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Grevillea shiressii [19186]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Prostanthera askania Tranquillity Mintbush, Tranquility Mintbush [64958]	Endangered	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Tetratheca juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Charadrius bicinctus		
Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may

Name	Threatened	Type of Presence
		occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Director of War Service Homes

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		

Name	Threatened	Type of Presence
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Trachyrhamphus bicoarctatus		
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris		
Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer		
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri		
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus		
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Dugong dugon		
Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bouddi	NSW
Cockle Bay	NSW
Rileys Island	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Brisbane Water Estuary	NSW
Cockrone Lagoon	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.50934 151.37589

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix 3 - 'Test of Significance'

A total of fourteen (14) species were either recorded or considered at least moderately likely to occur within the subject site. These species include, three (3) bird, ten (10) mammals and one (1) flora species. These threatened entities are assessed by 'Test of Significance' under section 7.3 of the BC Act. Tables 9 and 10 of Appendix 1 provide reasons their inclusion or omission. Assessed species/entities include:

Birds – potential hollow nesting

- *Glossopsitta pusilla* — Little Lorikeet (V/-)

Birds – potential foraging

- *Lathamus discolor* — Swift Parrot (E1/E)
- *Anthochaera phrygia* — Regent Honeyeater (E4A/CE)

Mammals

- *Phascolarctos cinereus* — Koala (V/V)
- *Pteropus poliocephalus* — Grey-headed Flying-fox (V/V)

Mammals – cave & structure roosting micro-bats

- *Chalinolobus dwyeri* — Large-eared Pied Bat (V/V)
- *Miniopterus schreibersii oceanensis* — Eastern Bentwing-bat (V/-)
- *Saccolaimus flaviventris* — Yellow-bellied Sheathtail-bat (V/-)

Mammals – hollow roosting micro-bats

- *Micronomus norfolkensis* — Eastern Freetail-bat (V/-)
- *Falsistrellus tasmaniensis* — Eastern False Pipistrelle (V/-)
- *Miniopterus australis* — Little Bentwing-bat (V/-)
- *Scoteanax rueppellii* — Greater Broad-nosed Bat (V/-)
- *Myotis macropus* — Southern Myotis (V/-)

Flora

- *Persicaria elatior* — Knotweed (V/V)

Ecological Communities

- 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' (BC Act)

Test of significance

The Test of Significance is listed below, addressing each of the included threatened species, populations and endangered ecological communities.

(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,

Birds – potential hollow nesting

- *Glossopsitta pusilla* Little Lorikeet (V/-)

Glossopsitta pusilla (Little Lorikeet)

Forages primarily in open eucalypt forest and woodland, utilising riparian habitats due to higher soil fertility and resulting higher productivity (OEH, 2015a). Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe and rarely in orchards (OEH, 2015a). Nests in hollows, selecting limb or trunk hollows of smooth-barked eucalypts with small (3cm) entrances and usually high above the ground (2-15m) (OEH, 2015a).

Flowering trees throughout the subject site provide potential foraging habitat for this species. Remnant trees throughout the site will be retained as part of this proposal. Small hollows within hollow-bearing trees may provide potential nesting habitat for this species. It is proposed to retain all hollow-bearing trees.

The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of this species such that a viable local population may be place at risk of extinction.

Birds – potential foraging

It is considered that the subject site provides potential foraging habitat for the following bird species:

- *Lathamus discolor* Swift Parrot (E1/E)
- *Anthochaera phrygia* Regent Honeyeater (E4A/CE)

Lathamus discolor (Swift Parrot)

Breeds in Tasmania from September to January, migrating to the south-eastern mainland in March and October (OEH, 2015a). Preferred winter-flowering feed trees include Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon and E. albens (OEH, 2015a). 'Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis' (OEH, 2017a).

Anthochaera phrygia (Regent Honeyeater)

Inhabits dry open forest and woodland, particularly box-ironbark woodland and riparian forests of river she-oak, often with an abundance of mistletoe (OEH, 2015a). Non-breeding flocks have been recorded foraging in flowering Swamp Mahogany & Spotted Gum, particularly on the Central Coast (OEH, 2015a). Key foraging eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany (OEH, 2015a). Also utilises Eucalyptus microcarpa, E.punctata, E.polyanthemos, E.moluccana, Corymbia robusta, E.crebra, E.caleyi, C.maculata, E.mckieana, E.macrorhyncha, E.laevopinea and Angophora floribunda (OEH, 2015a). Also utilise nectar and fruit of Mistletoes Amyema miquelii, A.pendula and A.cambagei as well as lerp and honeydew when nectar is scarce (OEH, 2015a). 'There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak' (OEH, 2018).

Flowering trees throughout the subject site provide potential foraging habitat for these species. Remnant trees throughout the site will be retained as part of this proposal.

The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population may be place at risk of extinction.

Mammals

It is considered that the subject site provides potential foraging habitat for the following mammal species:

- *Phascolarctos cinereus* Koala (V/V)
- *Pteropus poliocephalus* Grey-headed Flying-fox (V/V)

Phascolarctos cinereus (Koala)

The impact on Koala has addressed under the State Environmental Planning Policy (Koala Habitat Protection) 2019 in section 4.2.1 above.

The subject site contains eight (8) tree species listed as Koala tree species as per schedule 2 of the SEPP. These include:

- *Angophora costata* Sydney Red Gum
- *Angophora floribunda* Rough-barked Apple
- *Corymbia maculata* Spotted Gum
- *Eucalyptus botryoides* Bangalay
- *Eucalyptus microcorys* Tallowwood
- *Eucalyptus pilularis* Blackbutt
- *Eucalyptus robusta* Swamp Mahogany
- *Melaleuca quinquenervia* Broad-leaved Paperbark

In regard to native species, it is proposed to remove four (4) *Grevillea robusta* (Silky Oak) and one (1) *Corymbia maculata* (Spotted-Gum), all of which are considered to be planted. The proposal will not impact on any koala tree species with the exception of the one planted *Corymbia maculata* (Spotted-Gum).

It is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors (Refer to section 4.4.2 – Corridor Assessment).

It is considered that the indirect impacts as listed in Table 1 in section 3.1 of the Koala Habitat Protection Guidelines (DPIE, 2020) are unlikely to change from the indirect impacts resulting from the current landuse.

Given the likely low level of impacts on potential habitats for this species (Refer to section 5.3 direct impacts), it is considered that the proposal is unlikely to have an adverse effect on the life cycle of this species such that a viable local population may be place at risk of extinction.

Pteropus policephalus (Grey-headed Flying-fox)

Generally found within 200km of the east coast of Australia (OEH, 2015a). Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH, 2015a). Roost camps are generally located within 20km of regular food sources and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH, 2015a).

The subject site provides potential foraging habitat for this species. No camps or potential camp habitats were recorded. Remnant trees throughout the site will be retained as part of this proposal.

The extent of impacts are detailed in sections 5.3 and 5.4.

Given the absence of camps or potential camp habitat, and the likely low level of impact on potential foraging habitats for this species, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of this species such that a viable local population may be place at risk of extinction.

Mammals – cave & structure roosting micro-bats

It is considered that the subject site provides potential habitat for the following cave and structure roosting micro-bat species:

- *Chalinolobus dwyeri* Large-eared Pied Bat (V/V)
- *Miniopterus schreibersii oceanensis* Eastern Bentwing-bat (V/-)
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat (V/-)

Chalinolobus dwyeri (Large-eared Pied Bat)

Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring' (OEH, 2018).

Miniopterus schreibersii oceanensis (Eastern Bentwing-bat)

Forage in forested areas, catching moths and other flying insects above the tree tops (OEH, 2015a). Roosts primarily in caves, but also uses derelict mines, storm-water tunnels, buildings and other man-made structures (OEH, 2015a). Form discrete populations centred on a maternity cave that is used annually in spring and summer for birthing and rearing of young (OEH, 2015a).

Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)

Roosts singly or in groups of up to six, in tree hollows and buildings, though in treeless areas they are known to utilise mammal burrows (OEH, 2015a). Forages in most habitats across its very wide range (OEH, 2015a).

No caves, cliffs, mines, mammal burrows or Fairy Martin nests were observed within the subject site. The subject site provides potential foraging habitat for these species as well as potential roosting habitat for *Saccolaimus flaviventris*. Hollow-bearing trees were either stagwatched or inspected during surveys and no micro-bats were observed roosting or exiting hollows. Small culverts across drains are unlikely to provide potential roosting habitat. Old buildings / sheds may provide potential roosting habitat for micro-bat species. Recommendations within section 6.2 provide ameliorative measures to reduce the impact of any removal roosting habitats such as old building or sheds.

Remnant trees throughout the site will be retained as part of this proposal, retaining the extent of endemic foraging habitat. The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts on both roosting and foraging habitat, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population may be place at risk of extinction.

Mammals – hollow roosting micro-bats

It is considered that the subject site provides potential habitat for the following hollow-roosting micro-bat species:

- *Micronomus norfolkensis* Eastern Freetail-bat (V/-)
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle (V/-)
- *Miniopterus australis* Little Bentwing-bat (V/-)
- *Scoteanax rueppellii* Greater Broad-nosed Bat (V/-)
- *Myotis macropus* Southern Myotis (V/-)

Micronomus norfolkensis (Eastern Freetail-bat)

Occurs in dry sclerophyll forest, woodland, swamp forest and mangrove forest east of the Great Dividing Range (OEH, 2015a). Roosts usually solitary but also communally, mainly in tree hollows but also under bark or in man-made structures (OEH, 2015a). 'Females give birth in late November or early December. Lactation lasts until late January. Juveniles are flying by late January' (Churchill, 2008).

Falsistrellus tasmaniensis (Eastern False Pipistrelle)

Prefers moist habitats, with trees taller than 20m where it forages on beetles, moths, weevils and flying insects above or just below the tree canopy (OEH, 2015a). Generally roosts in eucalypt hollows, but has also been found under loose bark or in buildings (OEH, 2015a). Hibernates in winter (OEH, 2015a). They are actively

breeding from November to February. 'Ovulation, fertilisation and pregnancy occur in late spring and early summer. The single young is born in December. Lactation continues through January and February' (Churchill, 2008).

Miniopterus australis (Little Bentwing-bat)

Generally found in well-timbered areas including, moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub (OEH, 2015a). Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings (OEH, 2015a). Forage beneath the canopy of densely vegetated habitats (OEH, 2015a). They breed from September to December. 'Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer' (OEH, 2017a).

Scoteanax rueppellii (Greater Broad-nosed Bat)

Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest (OEH, 2015a). Roost mainly in tree hollows, but has also been found to roost in buildings (OEH, 2015a). Little is known of this species reproductive cycle, however it is predicted to be from October to February. 'Females congregate in maternity colonies and a single young is born in January, slightly later than other vespertilionid bats that share its range' (Churchill, 2008).

Myotis macropus (Southern Myotis)

Generally roosts in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage (OEH, 2015a). Forage over streams and pools catching insects and small fish by raking their feet across the water surface (OEH, 2015a). The breeding cycle in NSW can occur from August to March including the time from ovulation to the completion of lactation. 'In Victoria there is one pregnancy with the single young born in November or December. In northern NSW they produce two litters of single young in October and January' (Churchill, 2008).

Hollow-bearing trees provide potential roosting habitat for these species. Hollow-bearing trees were either stagwatched or inspected during surveys and no micro-bats were observed roosting or exiting hollows. Remnant trees throughout the site will be retained as part of this proposal, retaining the extent of endemic foraging habitat. The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts on both roosting and foraging habitat, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population may be place at risk of extinction.

Flora

It is considered that the subject site provides potential habitat for the following flora species:

- *Persicaria elatior* Knotweed (V/V)

Persicaria elatior (Knotweed)

'This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance' (OEH, 2019).

The small constructed drains may provide potential habitat for this species. This species was not recorded during surveys. The proposal may alter parts of this drain. The habitat potential is unlikely to decrease as a result of the proposal.

Given the likely low level of impacts on potential habitats, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population may be place at risk of extinction.

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

It is considered that the subject site contains remnant trees characteristic of 'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions' (BC Act). These areas are displayed in Figures 2, 3 and 4. The extent of likely impacts on these remnants are detailed in section 5.3.

The Swamp Mahogany Paperbark Forest is the equivalent to PCT 1717 – 'Broad-leaved Paperbark – Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast'.

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

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

No remnant trees characteristic of this EEC are proposed to be removed. The proposal may have indirect impacts on patches SSF1 – SSF6 forming a total area of 1848m^2 as shown by Table 6 in section 5.3 (excerpt provided below). These areas are considered to be in poor condition, due to the low numbers of native species in all structural layers, but in particular the lower and groundcover stratum. This is supported by the results of BAM quadrat and calculator, which resulted in a vegetation integrity score of 4.3.

The individual conditions scores were:

- Composition condition score: 12.4
- Structure condition score: 3
- Function condition score: 2.2

Fifty-five (55) trees of species characteristic of the 'Swamp Sclerophyll Forest' EEC were recorded, including forty-six (46) *Livistona australis* (Cabbage Palm) and nine (9) *Eucalyptus robusta* (Swamp Mahogany). All trees characteristic of the 'Swamp Sclerophyll Forest' EEC are proposed to be retained (Refer to section 5.3 and Figures 2, 3 and 4).

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of this EEC. Given the likely low level of impacts on this EEC, it is considered that the proposal is unlikely to have an adverse effect on the extent of the ecological community or substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Excerpt from section 5.3 - Table 6 – Summary of impacts on vegetation community patches

Patch Name	Vegetation Community	Area (m^2 – estimated from mapped polygon)	Condition (Refer to section 4.3.2)	Likely impact of the proposal.
SSF1	1	780	Poor	Possible indirect impacts. No clearing of native canopy proposed.
SSF2	1	418	Poor	Possible indirect impacts. No clearing of native canopy proposed.
SSF3	1	245	Poor	Possible indirect impacts. No clearing of native canopy proposed.

Patch Name	Vegetation Community	Area (m^2 – estimated from mapped polygon)	Condition (Refer to section 4.3.2)	Likely impact of the proposal.
SSF4	1	156	Poor	*Livistona australis* along road edge with managed exotic groundcover.
SSF5	1	119	Poor	*Livistona australis* with managed exotic groundcover.
SSF6	1	130	Poor	*Livistona australis* with managed exotic groundcover.
SSF7	1	1070	Moderate	No impact.
SSF8	1	694	Moderate	No impact.
CNMF1	2	395	Poor	To be retained as open space. Areas of polygon overhanging likely proposed impact areas is canopy only. Contains one (1) outlying *Eucalyptus robusta* (Tree no. 58/H4).
CNMF2	2	541	Moderate	No impact.

Note: SSF – Swamp Sclerophyll Forest; CNMF – Coastal Narrabeen Moist Forest.

Based on the estimated areas in Table 6 above, the proposal may indirectly impact upon approximately 1848m^2 poor condition habitats (780 + 418 + 245 + 156 + 119 + 130).

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

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

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide potential foraging habitat for the assessed micro-bat and bird species.

Four (4) hollow-bearing trees were located within the southern end of the subject site (Refer to section 4.4.1; Refer to Figures 3 and 4). These contain a total of thirteen (13) hollows, which provide potential roosting and

/or nesting habitat for small bird and micro-bat species. All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights surveys and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

The small constructed drains as displayed Figures 2 and 3, which provide habitat for common amphibian species may be altered as a result of the proposal.

No other significant habitat features will be directly impacted by the proposal.

(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

Landscape corridors are critical to ecological processes, enabling migration, colonisation and interbreeding of plants and animals (DEC, 2004). As vegetation patches are reduced in size and become increasingly isolated, the on-going viability of ecosystems and individual populations of species within them is severely affected, which ultimately leads to a break down in ecological processes (DEC, 2004).

The subject site is located in Empire Bay NSW on the eastern side of the intersection of Empire Bay Drive and Wards Hill Road. The site is bound by residential and rural residential development to the west, south and east containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east.

The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors. It is considered that no area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action.

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

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide a small area of potential foraging habitat for the assessed micro-bat and bird species.

Four (4) hollow-bearing trees were located within the southern end of the subject site (Refer to section 4.4.1; Refer to Figure 3). These contain a total of thirteen (13) hollows, which provide potential roosting and /or nesting habitat for small bird and micro-bat species. All hollow-bearing trees are proposed to be retained. H1

and H4 were stag watched for two nights and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

The small contructed drains as displayed Figure 3, which provide habitat for common amphibian species may be altered as a result of the proposal.

No other significant habitat features will be directly impacted by the proposal.

Given the small area of habitat to be impacted, and the absence of known roosting, nesting or significant habitat for threatened species to be impacted, it considered that habitat to be removed is of low importance to the long-term survival of the species, populations or ecological communities in the locality.

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

No declared 'Areas of Outstanding Biodiversity Value' occur within or in close proximity to the subject site.

(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 assessment of potential key threatening processes is provided in the following table.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
KTPs associated with pest and/or introduced fauna species					
Aggressive inclusion of birds from woodland and forest habitat by abundant Noisy Miners (*Manorina melanocephala*)	KTP	KTP	Recorded.	Low.	None. Refer to section 6.2 – Recommendations.
'Competition and land degradation by rabbits' (EPBC Act) or 'Competition and grazing by the feral European Rabbit (*Oryctolagus cuniculus*)' (BC Act)	KTP	KTP	Likely to occur.	Land clearing and management is likely to increase the area of habitat for this species.	None. Refer to section 6.2 – Recommendations.
'Competition and land degradation by unmanaged goats' (EPBC Act) or 'Competition and habitat degradation by Feral Goats (*Capra hircus*)' (BC Act)	KTP	KTP	None.	Low.	N/A
'Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)' (BC Act)	KTP	-	None.	Low.	N/A
'Loss of biodiversity and ecosystem integrity following invasion by the Yellow Crazy Ant (*Anoplolepis gracilipes*) on Christmas Island, Indian Ocean' (EPBC Act) or 'Invasion of the Yellow	KTP	KTP	N/A	N/A	N/A

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW' (BC Act)					
'Predation by the European Red Fox (*Vulpes Vulpes*)' (EPBC Act & BC Act)	KTP	KTP	Likely to occur.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to exacerbate this KTP.	None. Refer to section 6.2 – Recommendations.
'Predation by exotic rats on Australian offshore islands of less than 1000km^2 (100,000 ha)' (EPBC Act) or 'Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island' (BC Act)	KTP	KTP	N/A	N/A	N/A
Predation by Feral Cat (*Felis catus*) (EPBC Act & BC Act)	KTP	KTP	Likely to occur.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.
Predation, habitat degradation, competition and disease transmission by Feral Pigs (EPBC Act & BC Act)	KTP	KTP	None.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
'The biological effects, including lethal toxic ingestion, caused by Cane Toad (*Bufo marinus*)' (EPBC Act) or 'Invasion and establishment of the Cane Toad (*Bufo marinus*)' (BC Act)	KTP	KTP	None.	Cane Toad is not known to occur within the area of the subject site.	N/A.
'The reduction in the biodiversity of Australian native fauna and flora due to the Red Imported Fire Ants (*Solenopsis invicta*)' (EPBC Act) or Importation of Red Imported Fire Ants (*Solenopsis invicta*)' (BC Act)	KTP	KTP	None.	The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.
'Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners' (BC Act)	KTP	-	None.	The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.
'Herbivory and environmental degradation caused by feral deer' (BC Act)	KTP	-	None. Unlikely to occur.	The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.
'Competition from feral honey bees (*Apis mellifera*)' (BC Act)	KTP	-	None.	The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.
'Introduction of the Large Earth Bumblebee *Bombus terrestris*' (BC Act)	KTP	-	None.	The proposal is unlikely to exacerbate this KTP.	None. Refer to Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
'Predation and hybridisation by Feral Dogs, (*Canis lupus familiaris*)' (BC Act)	KTP	-	None.	Human occupation is likely to increase the potential for this KTP to occur. The proposal is unlikely to exacerbate this KTP.	None. Refer to section 6.2 – Recommendations.
KTPs associated with pest and/or introduced flora species					
Invasion of northern Australia by Gamba Grass and other introduced grasses	-	KTP	N/A	N/A	N/A
'Invasion of native plant communities by exotic perennial grasses' (BC Act)	KTP	-	A total of thirty-three (33) introduced flora species were identified, including thirteen (13) high threat weeds (Refer to Table 11 in Appendix 5). (Refer to section 4.3.1).	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	None. Refer to section 6.2 – Recommendations.
'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants' (EPBC Act & BC Act)	KTP	KTP	A total of thirty-three (33) introduced flora species were	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are	Refer to section 6.2 – Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
			identified, including thirteen (13) high threat weeds (Refer to Table 11 in Appendix 5). (Refer to section 4.3.1).	implemented, the proposal is unlikely to exacerbate this KTP.	
'Invasion and establishment of exotic vines and scramblers' (BC Act)	KTP	-	A total of thirty-three (33) introduced flora species were identified, including thirteen (13) high threat weeds (Refer to Table 11 in Appendix 5). (Refer to section 4.3.1).	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Refer to section 6.2 – Recommendations.
'Invasion and establishment of Scotch Broom (*Cytisus scoparius*)' (BC Act)	KTP	-	None.	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are	None. Refer to section 6.2 – Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
				implemented, the proposal is unlikely to exacerbate this KTP.	
'Invasion of native plant communities by African Olive Olea europaea L. subsp. cuspidata' (BC Act)	KTP	-	None.	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	None. Refer to section 6.2 – Recommendations.
'Invasion of native plant communities by *Chrysanthemoides monilifera*' (BC Act)	KTP	-	Recorded.	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Refer to section 6.2 – Recommendations.
'Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. Lat)' (BC Act)	KTP	-	Recorded.	Land clearing and management is likely to increase the area of habitat for this species. Provided the recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Refer to section 6.2 – Recommendations.
KTPs associated with the direct impacts of habitats					

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
'Land clearance' (EPBC Act) or 'Clearing of native vegetation' (BC Act)	KTP	KTP	Yes.	The proposal will indirectly impact approximately 1848m^2 of poor condition habitats.	Refer to section 6.2 – Recommendations.
Alteration of habitat following subsidence due to longwall mining	KTP	-	N/A	N/A	N/A
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	KTP	-	N/A	The proposal will not impact directly on rivers or streams.	Refer to section 6.2 – Recommendations.
'Bushrock removal' (BC Act)	KTP	-	No bushrock was observed in the proposed impact areas.	Land clearing, management and human occupation are likely to increase the potential for this KTP to occur. Provided recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Refer to section 6.2 – Recommendations.
'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' (BC Act)	KTP	-	None.	Land clearing, management and human occupation are likely to increase the potential for this KTP to occur. Provided recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Refer to the Bushfire Assessment for this proposal.
'Loss of Hollow-bearing Trees' (BC Act)	KTP	-	Yes.	Four (4) hollow-bearing trees were recorded. Hollow-bearing trees are proposed to be retained.	Refer to section 6.2 – Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
'Loss or degradation (or both) of sites used for hill-topping by butterflies' (BC Act)	KTP	-	None.	The proposed impact areas are on flat lowland, and are unlikely to be utilised for hill-topping by butterflies.	N/A
'Removal of dead wood and dead trees' (BC Act)	KTP	-	Yes.	The proposal will indirectly impact approximately 1848m^2 of poor condition habitats. In addition three (3) native trees are proposed to be removed which contain a sparse cover of dead wood.	Refer to section 6.2 – Recommendations.
KTPs associated with fungus and disease					
'Dieback caused by root-rot fungus (*Phytophthora cinnamomi*)' (EPBC Act) or 'Infection of native plants by *Phytophthora cinnamomi*' (BC Act)	KTP	KTP	None.	Land clearing, management and human occupation are likely to increase the potential for this KTP to occur. Provided recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Yes. Refer to section 6.2 – Recommendations.
'Infection of amphibians with chytrid fungus resulting in chytridiomycosis' (EPBC Act) or 'Infection of frogs by amphibian chytrid causing the disease chytridiomycosis' (BC Act)	KTP	KTP	None.	Land clearing, management and human occupation are likely to increase the potential for this KTP to occur. Provided recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Yes. Refer to section 6.2 – Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
'Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species' (EPBC Act) or 'Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations' (BC Act)	KTP	KTP	None.	The proposal is unlikely to exacerbate this KTP.	Refer to section 6.2 – Recommendations.
'Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae' (BC Act)	KTP	-	None.	Land clearing, management and human occupation are likely to increase the potential for this KTP to occur. Provided recommendations are implemented, the proposal is unlikely to exacerbate this KTP.	Yes. Refer to section 6.2 – Recommendations.
Other					
'Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases' (EPBC Act) or 'Anthropogenic Climate Change' (BC Act)	KTP	KTP	None.	The proposal is unlikely to exacerbate this KTP.	None.
Novel biota and their impact on biodiversity	-	KTP	No evidence in addition to accompanying KTP addressed here.	Land disturbance may allow invasive species to inhabit the area.	No specific ameliorative measures are known. Refer to section 6.2 – Recommendations.

Key Threatening Process	NSW status	Comm. status	Evidence of Occurrence	Impact of proposal on the operation of this KTP	Ameliorative measure within the scope of this project
KTPs of marine or estuarine ecosystems					
Incidental catch (bycatch) of Sea Turtle during coastal otter-trawling operations within Australian waters north of 28 degrees South	-	KTP	N/A	N/A	N/A
Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations	-	KTP	N/A	N/A	N/A
Injury or fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris	-	KTP	N/A	N/A	N/A
'Death or injury to marine species following capture in shark control programs on ocean beaches' (BC Act)	KTP	-	N/A	N/A	N/A
'Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments' (BC Act)	KTP	-	N/A	N/A	N/A

Appendix 4 - Assessment of 'significance impact criteria' for entities listed under the EPBC ACT

The following species listed as either 'Vulnerable', 'Endangered', 'Critically Endangered' or 'migratory' under the EPBC Act were either recorded or are considered at least moderately likely to occur within the study area:

Birds – potential foraging

- *Lathamus discolor* Swift Parrot (E1/E)
- *Anthochaera phrygia* Regent Honeyeater (E4A/CE)

Mammals

- *Phascolarctos cinereus* Koala (V/V)
- *Pteropus poliocephalus* Grey-headed Flying-fox (V/V)

Mammals – cave & structure roosting micro-bats

- *Chalinolobus dwyeri* Large-eared Pied Bat (V/V)

Flora

- *Persicaria elatior* Knotweed (V/V)

Vulnerable Species

The following species listed as 'Vulnerable' under the EPBC Act were either recorded or are considered at least moderately likely to occur within the subject site:

Mammals

- *Phascolarctos cinereus* Koala (V/V)
- *Pteropus poliocephalus* Grey-headed Flying-fox (V/V)

Mammals – cave & structure roosting micro-bats

- *Chalinolobus dwyeri* Large-eared Pied Bat (V/V)

Flora

- *Persicaria elatior* Knotweed (V/V)

These species are address below in accordance with the 'significant impact criteria assessment' for 'vulnerable' species.

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;***

It is considered that the study area provides potential habitat for the following two (2) threatened mammal species:

- *Pteropus policephalus* Grey-headed Flying-fox (V/V)
- *Phascolarctos cinereus* Koala (V/V)

Phascolarctos cinereus (Koala)

The impact on Koala has addressed under the State Environmental Planning Policy (Koala Habitat Protection) 2019 in section 4.2.1 above.

The subject site contains eight (8) tree species listed as Koala tree species as per schedule 2 of the SEPP. These include:

- *Angophora costata* Sydney Red Gum

- *Angophora floribunda* Rough-barked Apple
- *Corymbia maculata* Spotted Gum
- *Eucalyptus botryoides* Bangalay
- *Eucalyptus microcorys* Tallowwood
- *Eucalyptus pilularis* Blackbutt
- *Eucalyptus robusta* Swamp Mahogany
- *Melaleuca quinquenervia* Broad-leaved Paperbark

In regard to native species, it is proposed to remove four (4) *Grevillea robusta* (Silky Oak) and one (1) *Corymbia maculata* (Spotted-Gum), all of which are considered to be planted. The proposal will not impact on any koala tree species with the exception of the one planted *Corymbia maculata* (Spotted-Gum).

It is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors (Refer to section 4.4.2 – Corridor Assessment).

It is considered that the indirect impacts as listed in Table 1 in section 3.1 of the Koala Habitat Protection Guidelines (DPIE, 2020) are unlikely to change from the indirect impacts resulting from the current landuse.

Given the likely low level of impacts on potential habitats for this species (Refer to section 5.3 direct impacts), it is considered that the proposal is unlikely lead to a long-term decrease in the size of an important population of these species.

Pteropus policephalus (Grey-headed Flying-fox)

Generally found within 200km of the east coast of Australia (OEH, 2015a). Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH, 2015a). Roost camps are generally located within 20km of regular food sources and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH, 2015a).

The subject site provides potential foraging habitat for this species. No camps or potential camp habitats were recorded. Remnant trees throughout the site will be retained as part of this proposal.

The extent of impacts are detailed in sections 5.3 and 5.4.

Given the absence of camps or potential camp habitat, and the likely low level of impact on potential foraging habitats for this species, it is considered that the proposal is unlikely lead to a long-term decrease in the size of an important population of these species.

Mammals – cave & structure roosting micro-bats

It is considered that the study area provides potential habitat for one (1) threatened cave and structure roosting micro-bat species:

- *Chalinolobus dwyeri* Large-eared Pied Bat (V/V)

Chalinolobus dwyeri (Large-eared Pied Bat)

Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring' (OEH, 2018).

The study area provides potential foraging habitat for this species.

No caves, cliffs, mines, mammal burrows or Fairy Martin nests were observed within the subject site. The subject site provides potential foraging habitat for this species. Small culverts across drains are unlikely to provide potential roosting habitat. Old buildings / sheds may provide potential roosting habitat for micro-bat species. Recommendations within section 6.2 provide ameliorative measures to reduce the impact of any removal roosting habitats such as old building or sheds.

Remnant trees throughout the site will be retained as part of this proposal, retaining the extent of endemic foraging habitat. The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts on both roosting and foraging habitat, it is considered that the proposal is unlikely to lead to a long-term decrease in the size of an important population of a species.

Flora

It is considered that the study area provides potential habitat for one (1) threatened flora species or endangered populations:

- *Persicaria elatior* Knotweed (V/V)

'This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance' (OEH, 2019).

The small constructed drains may provide potential habitat for this species. This species was not recorded during surveys. The proposal may alter parts of this drain. The habitat potential is unlikely to decrease as a result of the proposal.

Given the likely low level of impacts on potential habitats, it is considered that the proposal is unlikely to 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;*

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide potential foraging habitat for the assessed micro-bat and bird species.

Four (4) hollow-bearing trees were located within the southern end of the subject site (Refer to section 4.4.1; Refer to Figures 3 and 4). These contain a total of thirteen (13) hollows, which provide potential roosting and /or nesting habitat for small bird and micro-bat species. All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights surveys and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

The small constructed drains as displayed Figures 2 and 3, which provide habitat for common amphibian species may be altered as a result of the proposal.

No other significant habitat features will be directly impacted by the proposal.

Given the small extent of impact on potential habitats for the assessed species, it is considered that the proposal is unlikely to reduce the area of occupancy of an important population.

- *fragment an existing important population into two or more populations;*

Landscape corridors are critical to ecological processes, enabling migration, colonisation and interbreeding of plants and animals (DEC, 2004). As vegetation patches are reduced in size and become increasingly isolated, the on-going viability of ecosystems and individual populations of species within them is severely affected, which ultimately leads to a break down in ecological processes (DEC, 2004).

The subject site is located in Empire Bay NSW on the eastern side of the intersection of Empire Bay Drive and Wards Hill Road. The site is bound by residential and rural residential development to the west, south and east containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east.

The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors.

It is considered that the proposal is unlikely to fragment an existing important population into two or more populations.

- ***adversely affect habitat critical to the survival of a species;***

Given the absence of known roosting or nesting habitats for the assessed species, it is considered that the subject site is unlikely to provide habitat critical to the survival of these species.

- ***disrupt the breeding cycle of an important population;***

Given the absence of known nesting or roosting habitats for the assessed, it is considered that the proposal is unlikely to disrupt the breeding cycle of an important population of this species.

- ***modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;***

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide potential foraging habitat for the assessed micro-bat and bird species.

The proposal is unlikely to change the availability or quality of habitat present within the site to the extent that the assessed 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***

The above criteria of the 'significant impact criteria assessment' can be addressed together through an invasive species assessment and consideration of 'Key Threatening Processes' (KTP) listed under both the EPBC Act and/or BC Act.

The table in part (e) of Appendix 3 provides a list of KTPs and an assessment of their occurrence, potential impact and ameliorative measures. The KTPs are divided into separate sections within the table with introduced flora and fauna being relevant to the first of the two points above, and the section on fungus and disease addressing the second of the two points above.

The following table provides an assessment of invasive species with habitats likely to occur within the area of the subject site, as a result of a 'Protected Matters Report' search.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
Birds						
Acridotheres tristis	Common Myna, Indian Myna	-	Invasive Species	Recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Alauda arvensis	Skylark	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Anas platyrhynchos	Mallard	-	Invasive Species	Recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Carduelis carduelis	European Goldfinch	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Columba livia	Rock Dove	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Lonchura punctulata	Nutmeg Mannikin	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are	None. Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
					harmful to a vulnerable species becoming established in the vulnerable species' habitat.	
Passer domesticus	House Sparrow	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Passer montanus	Eurasian Tree Sparrow	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Pycnonotus jocosus	Red-whiskered Bulbul	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Streptopelia chinensis	Spotted Turtle-dove	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Sturnus vulgaris	Common starling	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
Turdus merula	Common blackbird	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Amphibians						
Rhinella marina	Cane Toad	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Mammals						
Bos Taurus	Domestic cattle	-	Invasive Species	Not recorded.	No cattle properties occur adjacent to the study area. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Canis lupus familiaris	Domestic Dog	-	Invasive Species	Recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Felis catus	Cat	-	Invasive Species	Predicted.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Feral Deer	deer	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are	None. Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
					harmful to a vulnerable species becoming established in the vulnerable species' habitat.	
Lepus capensis	Brown Hare	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Mus musculus	House Mouse	-	Invasive Species	Predicted.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Oryctolagus cuniculus	Rabbit	-	Invasive Species	Predicted.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Rattus norvegicus	Brown Rat	-	Invasive Species	Not recorded.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Rattus Rattus	Black rat	-	Invasive Species	Predicted.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
Vulpes vulpes	Fox	-	Invasive Species	Predicted.	Land clearing and management is likely to increase the area of habitat for this species. The proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	None. Refer to section 6.2 – Recommendations.
Flora						
Alternanthera phioxeroides	Alligator Weed	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Anredera cordifolia	Potato Vine, Madeira Vine	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Asparagus aethiopicus	Asparagus Fern	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Asparagus asparagoides	Bridal Creeper	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is	Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
					unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	
Asparagus sp. previously known as *Protasparagus densiflorus*	Plume Asparagus	-	Invasive Species	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Asparagus plumosus, previously known as *Protasparagus plumosus*	Climbing Asparagus-fern	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Cabomba caroliniana	Cabomba	Noxious Weed	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Chyrsanthemoides monilfera subsp. monilfera	Boneseed	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
Chyrsanthemoides monilfera subsp. rotundata	Bitou Bush	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Cytisus scoparius	English Broom	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Dolichandra unguis-cati	Cats Claw Vine	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Eichhornia crassipes	Water Hyacinth	-	Invasive Species, WoNS	Recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Genista monspessulana	Montpellier Broom	-	Invasive Species, WoNS	Not recorded	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is	Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
					unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	
Genista sp. X Genista monspessulana	Broom	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Lantana camara	Lantana	-	Invasive Species, WoNS	Recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Lycium ferocissimum	African Boxthorn	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Nassella neesiana	Chilean Needle Grass		Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
Nassella trichotoma	Serrated Tussock	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Opuntia spp.	Prickly Pear	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Pinus radiata	Radiata Pine	-	Invasive Species	Pine species recorded. Proposed to be removed.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Rubus fruticosus aggregate	Blackberry	-	Invasive Species, WoNS	Recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Sagittaria platyphylla	Delta Arrowhead	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is	Refer to section 6.2 – Recommendations.

Scientific Name	Common Name	NSW status	Comm. status	Evidence of Occurrence	Assessment	Ameliorative measure within the scope of this project
					unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	
Salix spp. (except *S.babylonica, S.x calodendron & S.x reichardtii*)	Willow	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Salvinia molesta	Salvinia	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Senecio madagascariensis	Fireweed	-	Invasive Species, WoNS	Recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.
Ulex europaeus	Gorse	-	Invasive Species, WoNS	Not recorded.	Land clearing, management and increased access to the public are likely to increase the area of habitat for this species. Provided the recommendations are implemented (refer to section 6.2), the proposal is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Refer to section 6.2 – Recommendations.

- ***interfere substantially with the recovery of the species.***

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide a small area of potential foraging habitat for the assessed micro-bat and bird species.

Given the small extent of habitats to be indirectly impact and the absence of known nesting or roosting habitats for the assessed species, it is considered that the proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Therefore it is considered that the proposal is consistent with objectives of current and / or future recovery plans for the assessed species. The proposal is unlikely to interfere substantially with the recovery of the assessed species.

Endangered or Critically Endangered Species

The following species listed as 'Endangered' or 'Critically Endangered' under the EPBC Act were either recorded or are considered at least moderately likely to occur within the study area:

Birds – foraging migrant (forest)

- *Lathamus discolor* Swift Parrot (E1/E)
- *Anthochaera phrygia* Regent Honeyeater (E4A/CE)

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**

Lathamus discolor (Swift Parrot)

Breeds in Tasmania from September to January, migrating to the south-eastern mainland in March and October (OEH, 2015a). Preferred winter-flowering feed trees include Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon and E. albens (OEH, 2015a). 'Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis' (OEH, 2017a).

Anthochaera phrygia (Regent Honeyeater)

Inhabits dry open forest and woodland, particularly box-ironbark woodland and riparian forests of river she-oak, often with an abundance of mistletoe (OEH, 2015a). Non-breeding flocks have been recorded foraging in flowering Swamp Mahogany & Spotted Gum, particularly on the Central Coast (OEH, 2015a). Key foraging eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany (OEH, 2015a). Also utilises Eucalyptus microcarpa, E.punctata, E.polyanthemos, E.moluccana, Corymbia robusta, E.crebra, E.caleyi, C.maculata, E.mckieana, E.macrorhyncha, E.laevopinea and Angophora floribunda (OEH, 2015a). Also utilise nectar and fruit of Mistletoes Amyema miquelii, A.pendula and A.cambagei as well as lerp and honeydew when nectar is scarce (OEH, 2015a). 'There are three known key breeding areas, two of

them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak' (OEH, 2018).

Flowering trees throughout the subject site provide potential foraging habitat for these species. Remnant trees throughout the site will be retained as part of this proposal.

The extent of impacts are detailed in sections 5.3 and 5.4.

Given the likely low level of impacts (Refer to section 5.3 direct impacts), it is considered that the proposal is unlikely to lead to a long-term decrease in the size of a population of these species.

- **reduce the area of occupancy of the species**

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide potential foraging habitat for the assessed micro-bat and bird species.

Four (4) hollow-bearing trees were located within the southern end of the subject site (Refer to section 4.4.1; Refer to Figures 3 and 4). These contain a total of thirteen (13) hollows, which provide potential roosting and /or nesting habitat for small bird and micro-bat species. All hollow-bearing trees are proposed to be retained. H1 and H4 were stag watched for two nights surveys and no fauna was observed exiting hollows. H2 was inspected on several occasions, and no fauna was observed.

The small constructed drains as displayed Figures 2 and 3, which provide habitat for common amphibian species may be altered as a result of the proposal.

No other significant habitat features will be directly impacted by the proposal.

Given the small extent of impact on potential habitats for the assessed species, it is considered that the proposal is unlikely to reduce the area of occupancy of the species.

- **fragment an existing population into two or more populations**

Landscape corridors are critical to ecological processes, enabling migration, colonisation and interbreeding of plants and animals (DEC, 2004). As vegetation patches are reduced in size and become increasingly isolated, the on-going viability of ecosystems and individual populations of species within them is severely affected, which ultimately leads to a break down in ecological processes (DEC, 2004).

The subject site is located in Empire Bay NSW on the eastern side of the intersection of Empire Bay Drive and Wards Hill Road. The site is bound by residential and rural residential development to the west, south and east

containing mostly arboreal connectivity along Pomona Road. Denser intact native vegetation adjoins the subject site to the north, which connects to Boudii National Park, approximately 650m to the east.

The site contains scattered trees which may provide limited arboreal connectivity between adjoining areas of vegetation. However given limited impact of the proposal on remnant canopy vegetation, it is considered that the proposal is unlikely to have a significant impact on vegetation connectivity or movement corridors. It is considered that the proposal is unlikely to fragment an existing important population into two or more populations.

- **adversely affect habitat critical to the survival of a species**

Given the absence of known roosting or nesting habitats for the assessed species, it is considered that the study area is unlikely to provide habitat critical to the survival of these species.

- **disrupt the breeding cycle of a population**

Given the absence of known nesting habitats for the assessed species, it is considered that the proposal is unlikely to disrupt the breeding cycle of an important population of this species.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide potential foraging habitat for the assessed micro-bat and bird species.

The proposal is unlikely to change the availability or quality of habitat present within the site to the extent that the assessed 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**

The above criteria of the 'significant impact criteria assessment' can be addressed together through an invasive species assessment and consideration of 'Key Threatening Processes' (KTP) listed under both the EPBC Act and/or BC Act (Refer to table included in Vulnerable species assessment above).

The table in part (e) of Appendix 3 provides a list of KTPs and an assessment of their occurrence, potential impact and ameliorative measures. The KTPs are divided into separate sections within the table with introduced flora and fauna being relevant to the first of the two points above, and the section on fungus and disease addressing the second of the two points above.

- **interfere with the recovery of the species.**

The proposal may indirectly impact upon approximately 1848m^2 of poor condition remnants of Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East corner Bioregions'. These areas provide a small area of potential foraging habitat for the assessed micro-bat and bird species.

Given the small extent of habitats to be indirectly impact and the absence of known nesting or roosting habitats for the assessed species, it is considered that the proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Therefore it is considered that the proposal is consistent with objectives of current and / or future recovery plans for the assessed species. The proposal is unlikely to interfere substantially with the recovery of the assessed species.

Appendix 5 – Flora and Fauna Species Lists

Table 11 – Flora Species List

Life Form	Species	Common Name	Introduced Species	High Threat Weeds (BAM)	Weed of National Significance	BAM Plot	Height (m)	Abundance	Cover %
Tree	*Schinus molle var. areira*	Pepper tree	x	-	-				
Tree	*Schefflera actinophylla*	Umbrella Tree	x	x	-		6		
Tree	*Archontophoenix cunninghamiana*	Bangalow Palm	-	-	-	x	10	2	5
Tree	*Phoenix canariensis*	Canary Island Date Palm	x	x	-				
Tree	*Syagrus romanzoffiana*	Cocos Palm	x	-	-	x	12	1	1
Tree	*Erythrina x sykesii*	Coral Tree	x	x	-				
Tree	*Cinnamomum camphora*	Camphor Laurel	x	x	-				
Tree	*Brachychiton acerifolius*	Flame Tree	-	-	-				
Tree	*Ficus benjamina*	Weeping Fig	x	-			8		
Tree	*Angophora costata*	Sydney Red Gum	-	-	-				
Tree	*Angophora floribunda*	Rough-barked Apple	-	-	-				
Tree	*Callistemon salignus*	Willow Bottlebrush	-	-	-				
Tree	*Casuarina glauca*	Swamp Oak	-	-	-		3		
Tree	*Corymbia maculata*	Spotted Gum	-	-	-		25		
Tree	*Eucalyptus amplifolia*	Cabbage Tree Gum	-	-	-		18		
Tree	*Eucalyptus botryoides*	Bangalay	-	-	-				
Tree	*Eucalyptus microcorys*	Tallowwood	-	-	-		25		
Tree	*Eucalyptus pilularis*	Blackbutt	-	-	-				
Tree	*Eucalyptus robusta*	Swamp Mahogany	-	-	-				
Tree	*Lophostemon confertus*	Brush Box	-	-	-				
Tree	*Melaleuca quinquenervia*	Broad-leaved Paperbark	-	-	-				

Life Form	Species	Common Name	Introduced Species	High Threat Weeds (BAM)	Weed of National Significance	BAM Plot	Height (m)	Abundance	Cover %
Tree	*Grevillea robusta*	Silky Oak	-	-	-		17		
Palm Tree	*Livistona australis*	Cabbage Tree Palm	-	-	-	x	12	16	60
Small Tree	*Callistemon salignus*	Willow Bottlebrush	-	-	-				
Small Tree	*Melaleuca linariifolia*	Flax-leaved Paperbark	-	-	-		4		
Small Tree	*Glochidion ferdinandi*	Cheese Tree	-	-	-				
Small Tree	*Acer negundo*	Elder Box	x	-	-				
Small Tree	*Solanum mauritianum*	Wild Tabacco Bush	x	-	-		4		
Small Tree	*Synoum glandulosum*	Scentless Rosewood	-	-	-		7		
Shrub	*Yucca aloifolia*	Dagger Plant	x	-	-				
Shrub	*Plumeria sp.*	Frangipani	x	-	-				
Shrub	*Lonicera japonica*	Japanese Honeysuckle	x	x	-				
Shrub	*Ligustrum sinense*	Small-leaved Privet	x	x	-				
Shrub	*Rubus fruticosus aggregate species*	Blackberry	x	x	x				
Shrub	*Lantana camara*	Lantana	x	x	x	x	3	5	0.5
Sedge	*Isolepis prolifera*	-	x	-	-				
Herb	*Agapanthus praecox*	African Lily	x	-	-				
Herb	*Centella asiatica*	Indian Pennywort	-	-	-				
Herb	*Colocasia esculenta*	Taro	x	x	-		1.2		
Herb	*Monstera deliciosa*	Fruit Salad Plant	x	-	-	x	1.5	10	2
Herb	*Ageratina adenophora*	Crofton Weed	x	x	-	x	0.5	30	1
Herb	*Bidens pilosa*	Cobbler's Pegs	x	x	-				
Herb	*Cirsium sp.*	Thistle species	x	-	-				

Life Form	Species	Common Name	Introduced Species	High Threat Weeds (BAM)	Weed of National Significance	BAM Plot	Height (m)	Abundance	Cover %
Herb	*Senecio madagascariensis*	Fireweed	x	x	x				
Herb	*Soliva sessilis*	Bindyi	x	-	-				
Herb	*Taraxacum officinale*	Dandelion	x	-	-				
Herb	*Commelina cyanea*	Native Wandering Jew	-	-	-	x	0.2	20	0.1
Herb	*Dichondra repens*	Kidney Weed	-	-	-				
Herb	*Geranium homeanum*	-	-	-	-				
Herb	*Oxalis corniculata*	Clover Sorrel	x	-	-				
Herb	*Plantago lanceolata*	Lamb's Tongues	x	-	-				
Herb	*Persicaria decipiens*	Slender Knotweed	-	-	-				
Herb	*Rumex pulcher*	Fiddler Dock	x	-	-				
Herb	*Verbena sp.*	Purpletop	x	-	-				
Grass	*Oplismenus aemulus*	Australian Basket Grass	-	-	-				
Grass	*Paspalum distichum*	Water Couch	-	-	-				
Grass	*Paspalum urvillei*	Vasey Grass	x	-	-				
Grass	*Pennisetum clandestinum*	Kikuyu Grass	x	-	-	x	0.3	>1000	80
Fern	*Blechnum cartilagineum*	Gristle Fern	-	-	-	x	4	10	0.5
Fern	*Calochlaena dubia*	False Bracken	-	-	-				
Fern	*Nephrolepis cordifolia*	Fishbone Fern	x	-	-	x	0.3	30	1
Fern	*Platycerium bifurcatum ssp. bifurcatum*	Elk Horn	-	-	-				
Fern	*Christella dentata*	Binung	-	-	-	x	0.4	10	0.5
Climber	*Ipomoea indica*	Morning Glory	x	x	-				

Life Form	Species	Common Name	Introduced Species	High Threat Weeds (BAM)	Weed of National Significance	BAM Plot	Height (m)	Abundance	Cover %
Climber	*Stephania japonica var. discolor*	Snake Vine	-	-	-				
Aquatic	*Callitriche stagnalis*	Water Starworts	x	-	-				
Aquatic	*Ranunculus inundatus*	River Buttercup	-	-	-				

Table 12 – Fauna Species List

Fauna Class	Family	Species	Common Name	BC Act listed	EPBC Act listed	Regionally Significant sp (LHCCREMS) - Gos, Wy, Cess, Mait, Lmac, New, Pstep.	Introduced species	Invasive Species (EPBC Act)	Observation type	Confidence
Bird	Anatidae	Anas platyrhynchos	Common Mallard	-	-	-	x	x	O	
Bird	Anatidae	Anas superciliosa	Pacific Black Duck	-	-	-	-	-	O	
Bird	Anatidae	Chenonetta jubata	Australian Wood Duck	-	-	-	-	-	O	
Bird	Artamidae	Cracticus tibicen	Australian Magpie	-	-	-	-	-	OW	
Bird	Artamidae	Cracticus torquatus	Grey Butcherbird	-	-	-	-	-	W	
Bird	Artamidae	Strepera graculina	Pied Currawong	-	-	-	-	-	W	
Bird	Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo	-	-	-	-	-	OW	
Bird	Cacatuidae	Eolophus roseicapillus	Galah	-	-	-	-	-	W	
Bird	Charadriidae	Vanellus miles	Masked Lapwing	-	-	-	-	-	OW	
Bird	Cinclosomatidae	Psophodes olivaceus	Eastern Whipbird	-	-	-	-	-	W	
Bird	Columbidae	Ocyphaps lophotes	Crested Pigeon	-	-	-	-	-	OW	
Bird	Halcyonidae	Dacelo novaeguineae	Laughing Kookaburra	-	-	-	-	-	W	
Bird	Megapodiidae	Alectura lathami lathami	Australian Brush-Turkey	-	-	-	-	-	OW	
Bird	Meliphagidae	Manorina melanocephala	Noisy Miner	-	-	-	-	-	OW	
Bird	Monarchidae	Grallina cyanoleuca	Australian Magpie-lark	-	-	-	-	-	OW	
Bird	Psittacidae	Alisterus scapularis	Australian King Parrot	-	-	-	-	-	OW	
Bird	Psittacidae	Trichoglossus haematodus	Rainbow Lorikeet	-	-	-	-	-	OW	
Bird	Psittaculidae	Platycercus eximius	Eastern Rosella	-	-	-	-	-	O	
Bird	Rhipiduridae	Rhipidura leucophrys	Willy Wagtail	-	-	-	-	-	OW	
Bird	Sturnidae	Sturnus tristis	Common Myna	-	-	-	x	x	O	

Mammal	Canidae	Canis lupus familiaris	Dog	-	-	-	x	x	O	
Mammal	Peramelidae		Bandicoot species	-	-	-	-	-	An	
Mammal	Phalangeridae	Trichosurus vulpecula	Common Brushtail Possum	-	-	-	-	-	O	
Mammal	Tachyglossidae	Tachyglossus aculeatus	Short-beaked Echidna	-	-	x	-	-	An	
Mammal	Miniopteridae	Miniopterus australis	Little Bentwing-bat	V	-	-	-	-	U	Po
Mammal	Miniopteridae	Miniopterus schreibersii (orianae) oceanensis	Eastern Bentwing-bat	V	-	-	-	-	U	D
Frog	Myobatrachidae	Crinia signifera	Common Eastern Froglet	-	-	-	-	-	W	
Reptile	Elapidae	Pseudonaja textilis	Eastern Brown Snake	-	-	x	-	-	An	
Reptile	Pythonidae	Morelia spilota spilota	Diamond Python	-	-	x	-	-	An	

Observation Type Codes (Atlas of NSW Wildlife Database): AR – Acoustic recording; C – Cat kill; D – Dog kill; E – Nest/ Roost; F – Tracks scratchings; FB – Burrow; G – Crushed cones; H – Hair, feathers or skin; K – Dead; O – Seen; OW – Seen & heard; P – Scat; Q – Camera; R – Road Kill; T – Trapped or netted; V – Fox kill; W – Heard call; X – In scat; Y – Bone, teeth, shell; & Z – In raptor/owl pellet.

Identification confidence: D – Definite; Pr – Probable; & Po – Possible. BC Act & EPBC Act status: M – Marine; B – Bonn (Migratory).

Appendix 6 – Micro-bat Call Identification Report

Identification of echolocation call sequences recorded at Empire Bay, Central Coast, New South Wales

Data

Data was received by email on the 16/06/2020 and was analysed using Anabat Insight v1.9.3. Recording was completed over two nights 3rd and the 4th June 2020 from 17:00 – 18:45 and 17:10 – 18:25 respectively. The Anabat Express log files indicate that temperatures ranged from 15:25 - 17:75°C on the first night 12:75 – 17:50°C and on the second night. One hundred and two sequence files were recorded, four one of which were marked as containing recognizable microbat calls.

Temperature has been shown to have a significant effect on microbat foraging activity (see for example Irvin, Prevett, & Westbrooke 2003, Threlfall et. al. 2012, and DEWHA 2010).

The original call files display Australian Eastern Standard Time recorded with a division ratio of 8.

Reference Library

Call identification for this data set was based on call keys and descriptions for New South Wales (Pennay et al 2004) with reference to descriptions published for southern Queensland (Reinhold et al 2001) and the authors own call library.

Analysis

The reliability of identification is as follows;

Definite; one or more calls were there is no doubt about the identification of the species

Probable; most likely to be the species named, low probability of confusion with species that use similar calls

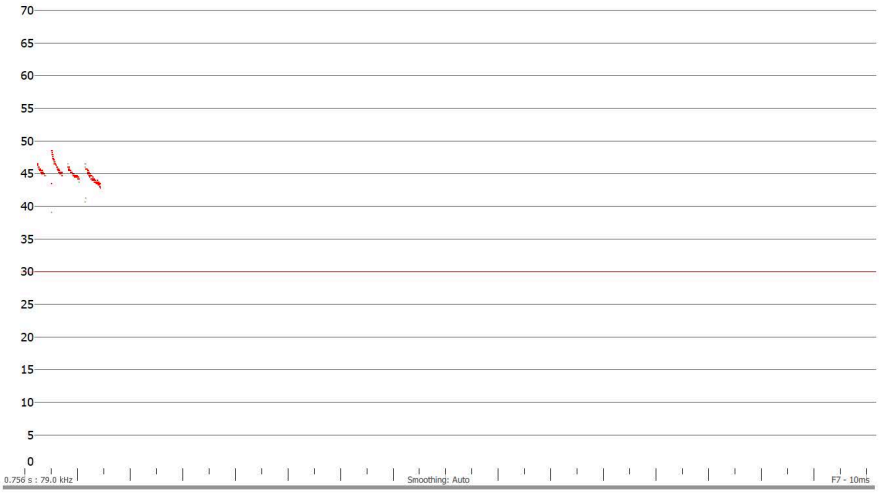
Possible; call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

A total of two species were identified. *Miniopterus orianae oceanensis* was identified as definite and *Miniopterus australis* as possible.

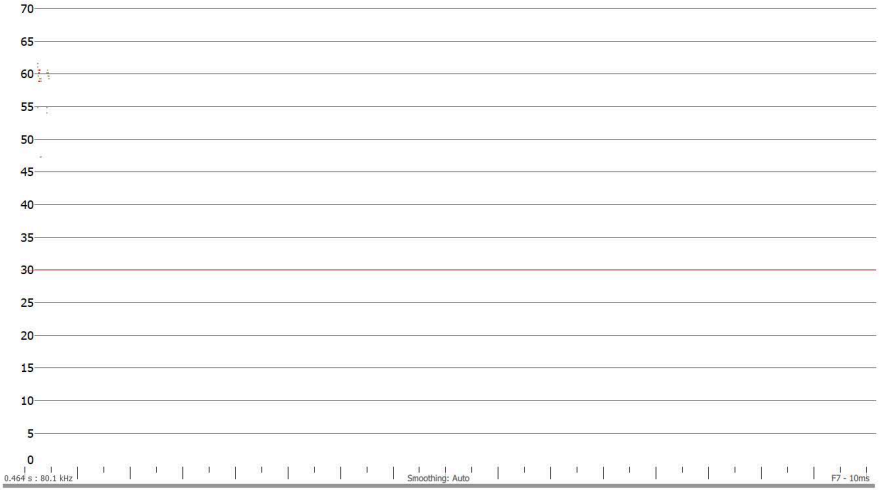
While some call sequences were recognised as bat calls the quality was not sufficient to assign species identification. These species have been recorded or are considered likely to occur in the surrounding area (NPWS Atlas and Wildlife of Living Australia Data June 2020).

EverittEcology - ABN: 78 642 128 782 - Mob: 0438197840 - Email: nick@everittecology.com.au B

Call Examples (calls have been edited and filtered for reporting purposes)



Definitely *Miniopterus orianae oceanensis*. The pulses above clearly display a down sweeping tail and has a characteristic frequency between 44 – 47 kHz.



Probably *Vespadelus pumilus/Miniopterus australis*. *M. australis* overlaps with *V. pumilus* from 54.5 to 58kHz. There is insufficient detail in this call sequence to assign a positive identification.

References

Churchill, S. 2008, Australian Bats, Allen and Unwin, Sydney.

Department of Environment, Water, Heritage and the Arts (DEWHA) (2010). Survey Guidelines for Australia's Threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act.

Irvin, M., Prevett, P., & Westbrooke, M. (2003). Effects of repeated low-intensity fire on insectivorous bat populations of a mixed eucalypt foothill forest in south-eastern Australia.

Pennay, M., B. Law & L. Reinhold (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats. Hurstville: NSW Department of Environment and Conservation.

Reinhold, L., Law, B., Ford, G. and Pennay, M. 2001, Key to the bat calls of southeast Queensland and north-east New South Wales. Forest Ecosystem Research and Assessment Technical paper 2001-07, Department of Natural Resources and Mines, Queensland.

Threlfall CG, Law B, Banks PB. 2012. Influence of landscape structure and human modifications on insect biomass and bat foraging activity in an urban landscape. PLoS ONE 7, e38800

Disclaimer

Appendix 7 – Photographs

Photograph 1 – Hollow-bearing tree 1 (H1)

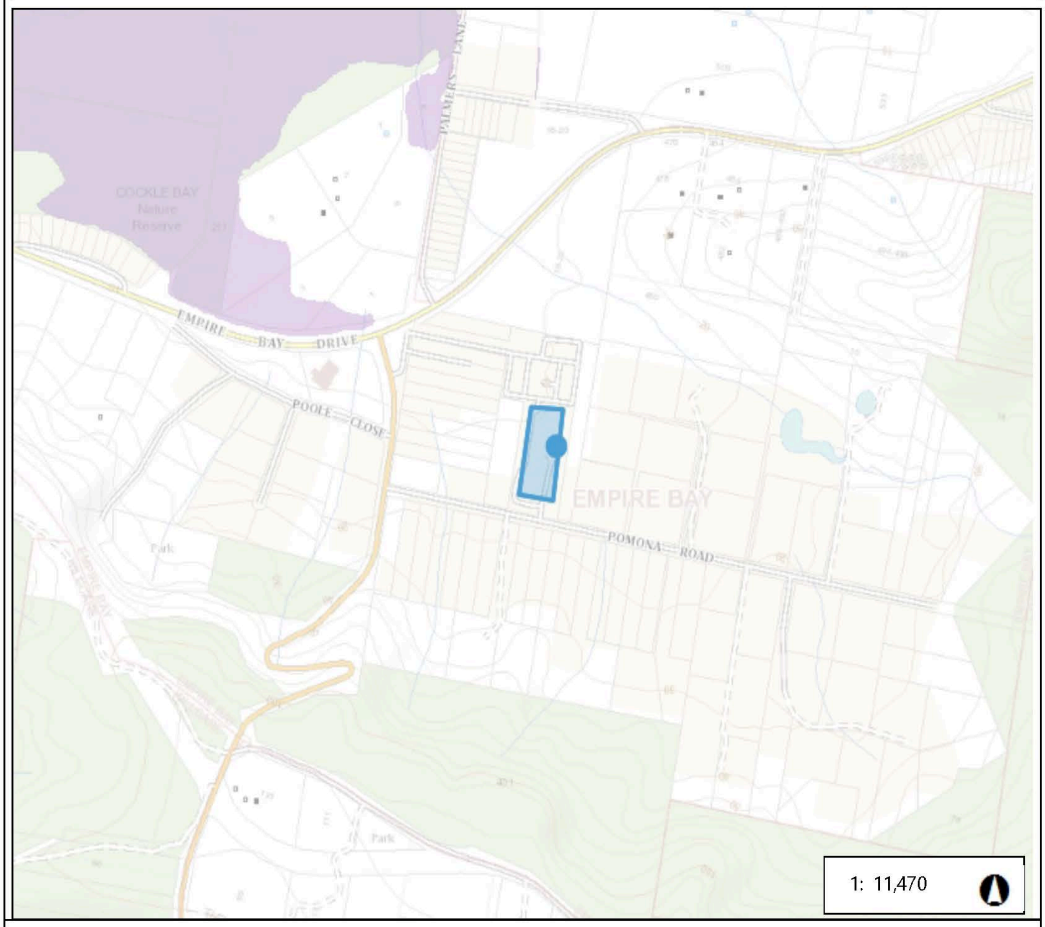
Photograph 2 – Hollow-bearing tree 2 (H2)

Photograph 3 – Stationary Anabat

Appendix 8 – BOSET Report

NSW GOVERNMENT

Biodiversity Offset Scheme (BOS) Entry Threshold Map



582.7 0 291.34 582.7 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

NSW GOVERNMENT

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	05/03/2020 2:32 PM	**BDAR Required***
Total Digitised Area	0.91 ha	
Minimum Lot Size Method	Lot size	
Minimum Lot Size	3.71 ha	
Area Clearing Threshold	0.5 ha	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is '"likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies will all aspects of the *Biodiversity Conservation Act 2016.*

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature_____ Date: 05/03/2020 02:32 PM