LODGE
ENVIRONMENTAL

Date: 11 Nov. 2021
Project Code: LE1396

FLORA AND FAUNA ASSESSMENT

60 MACKLEAY ST
NARRAWALLEE

PREPARED FOR
DONNA HARTWIG

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Project Name:

60 Macleay St, Narrawallee – Flora and Fauna Assessment

Project Code:

LE1396

Document Tracking:

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Record of Distribution

Copies	Report No. & File Name	Status	Date	Prepared for:
1 x PDF	LE1396 60 MACKLEAY ST NARRAWALLEE FFA V1	Rev.1	11 November 2021	Donna Hartwig

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1.0 INTRODUCTION

Lodge Environmental were commissioned by Donna Hartwig, to prepare this Flora and Fauna Assessment (FFA) to inform Development Application (DA) No. DA20/2061 which seeks consent for the construction of a two storey dwelling containing nine (9) bedrooms each with their own ensuite, a carport, sauna, swimming pool, and 5 plunge pool located at 60 Macleay Street, Narrawallee (herein referred to as the Study Area).

This report describes the native vegetation, threatened species, populations and communities and associated habitat features which were recorded within the Study Area in the context of an impact assessment. This report is based on information obtained through data searches and field survey. The legislative context, methods used, and recommendations are included within this report.

1.1 PROJECT DESCRIPTION

This report will assist in informing the DA (**Figure 1**). Minor potential native vegetation clearance is required for the proposed development to achieve required bushfire protection measures. The privately owned land is zoned a combination of R2 – Low Density Residential and E2 – Environmental Conservation, with the proposal being permissible with consent. The DA dwelling is sited within the R2 zoning.

The dwelling is proposed to be constructed upon a cleared area of the site and as such the development application does not propose the removal of vegetation in order to facilitate the proposed development. The introduction of the associated Asset Protection Zone (APZ) would theoretically allow the removal of vegetation within 17m of the dwelling. Although not planned for removal, this report provides an assessment of the impact should the 17m buffer area be cleared in the future.

The overall area maximum area to be directly impacted is herein defined as the ***Subject Land***. The assessment contained within this report is conducted for all areas within the Subject Land (**Figure 1**).

1.2 OBJECTIVES

This report presents an assessment of possible impacts associated with the proposal at the Study Area and is based on a field investigation, a literature review of previous studies undertaken in the region, the consultation of relevant databases and a consideration of the objectives of Section 4 of the EP&A Act, the State BC Act, the Commonwealth EPBC Act and any relevant State Environmental Planning Policies (SEPP).

Where considered necessary, the environmental impacts of the development have been assessed via the Test of Significance pursuant to Section 7.3 BC Act 2016, the Matters of National Environmental Significance (MNES) under the EPBC Act, and the relevant clauses within the Shoalhaven Local Environment Plan (LEP 2014) and Shoalhaven Development Control Plan (DCP 2014). The direct and indirect ongoing impacts of the development are addressed in this FFA.

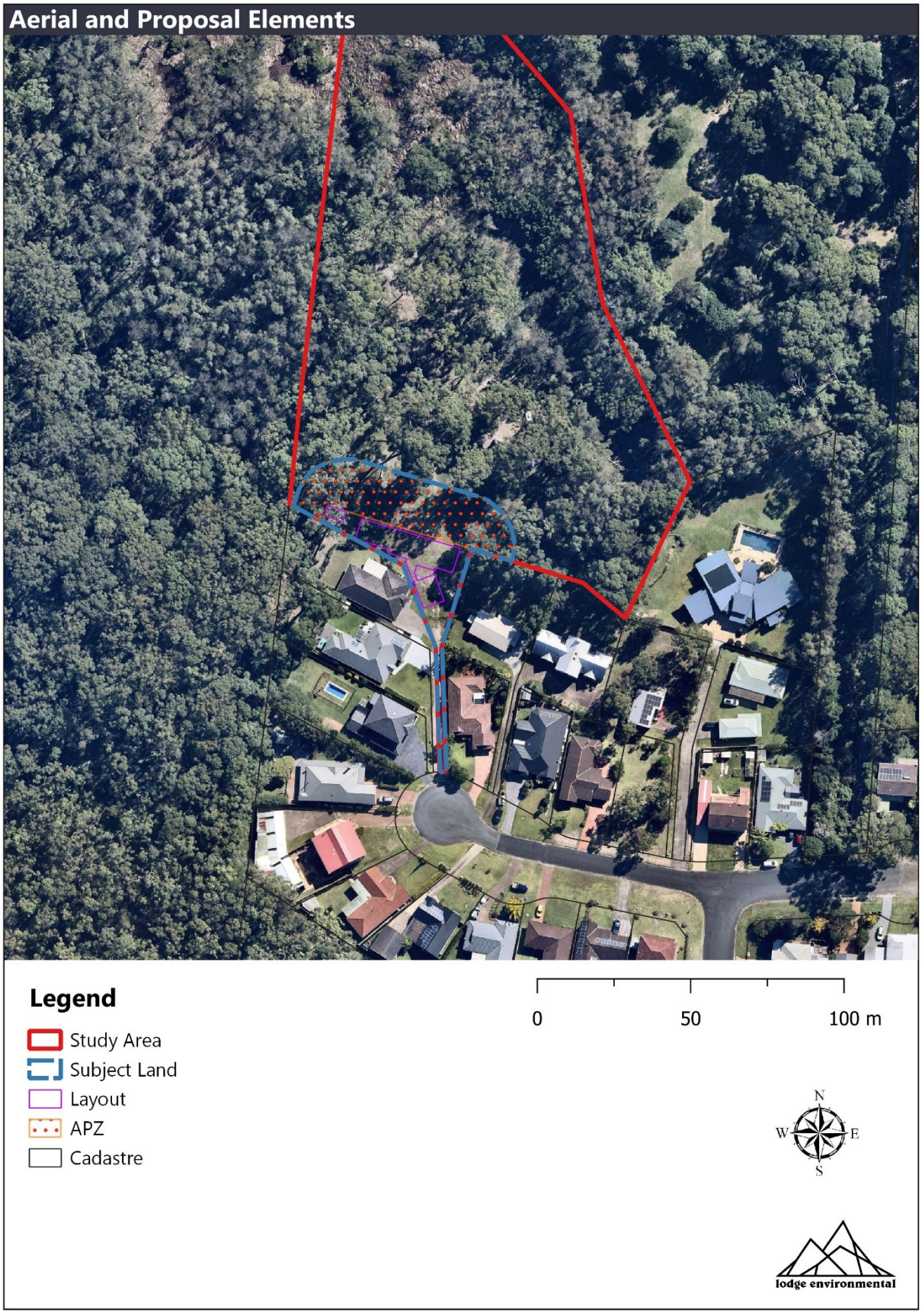

Figure 1: Study Area and Subject Land

2.0 LEGISLATIVE CONTEXT

2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The NSW EP&A Act is the principal planning legislation for the state, providing a framework for the overall environmental planning, and development assessment process. Various legislative instruments, such as the BC Act, NSW *Water Management Act 2000* (WM Act) and NSW *Rural Fires Act 2007* (RF Act) are integrated with the EP&A Act and have been reviewed below where relevant.

2.2 BIODIVERSITY CONSERVATION ACT 2016

The NSW BC Act aims to slow the decline of threatened species, populations and communities listed under the Act. The BC Act is integrated with the EP&A Act and requires consideration of whether a development (Part 4 of the EP&A Act) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

The schedules of the BC Act lists species, populations and communities as endangered or vulnerable. All developments, land use changes or activities need to be assessed to determine if they will have an unacceptable impact on species, populations or communities listed on these schedules.

The potential impact of the development on any threatened species, populations or communities is assessed through application of an Assessment of Significance (AoS) under Section 7.3 of the BC Act at the development application stage. If the impacts on the area are found to be 'significant', a Biodiversity Development Assessment Report (BDAR) would be required as would concurrence from the Chief Executive of the NSW Environment, Energy and Sciences Group (EES) including application of the Biodiversity Assessment Methodology (BAM) and entering into the Biodiversity Offset Scheme (BOS). A BDAR would also be deemed necessary if the proposed subdivision were to involve clearance of vegetation mapped on the State Biodiversity Values Map (BVM), or involve native vegetation clearance above the thresholds tables within the BC Act (**Table 1**).

Table 1: Offset scheme thresholds - area criteria

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme applies
Less than 1 ha	0.25 ha or more
1 ha, and less than 40 ha	0.5 ha or more
40 ha, and less than 1,000 ha	1 ha or more
1,000 ha or greater	2 ha or more

2.3 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Commonwealth EPBC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. Under this Act an action will require approval from the Minister for the Environment if the action has, will have, or is likely to have, a significant impact on a MNES. MNES include listed threatened species and ecological communities, migratory species and wetlands of international importance protected under international agreements. Where applicable, the assessment criteria relevant to this Act must be drawn upon to determine whether there would be a significant impact on these species and hence whether referral to the Federal Environmental Minister is required.

2.4 LOCAL PLANNING INSTRUMENTS

2.4.1 Shoalhaven Local Environment Plan 2014

The Shoalhaven Local Environment Plan 2014 (LEP) is the principal planning instrument for the SCC LGA. The LEP sets out the planning framework and establishes the requirements for the use and development of land in the LGA. The LEP provides broad direction with regard to what types of development are permitted within specific land use zones.

2.4.2 Shoalhaven Development Control Plan 2014

The Shoalhaven Development Control Plan 2014 aims to make detailed local provisions for all land within the LGA. Specifically, the DCP provides detailed construction, building and environmental controls for the types permitted land use described in the LEP. Environmental controls address issues such as biodiversity, bushfire prone land, trees and vegetation.

3.0 METHODS

3.1 DATA AND LITERATURE REVIEW

Data records and relevant literature pertaining to the ecology of the Study Area and surrounding areas were reviewed. The material reviewed included:

- DPIE threatened species profile database (DPIE 2021).
- Review of the State Biodiversity Values Map (Accessed 10/11/21).
- Protected Matters Search Tool (DEE 2021)
- Plant Community Type Vegetation Mapping (DPIE 2016).
- SCC LEP and DCP.
- relevant legislative documents.
- aerial photography.
- online property report.

A review of the databases allowed for the production of a list of threatened species and communities that may occur within the Study Area (**Appendix A**). Likelihood of occurrences for threatened species, endangered populations and communities in the Study Area were then made based on location of database records, the likely presence or absence of suitable habitat on the site, and knowledge of the species' ecology. The likelihood of occurrence was stratified using a rating of "high", "moderate" or "low" likelihood, with those species considered to have a considerable likelihood of occurrence (following site validation) then identified as either potentially "affected" by the proposal and therefore requiring a significance assessment or not.

3.2 FIELD SURVEY

To address the FFA the following survey methods were undertaken on the 22nd September 2020 by ecologists James Lidsey and Jack Talbert, and the 1st November 2021 by Jack Talbert:

- Identification of plant species and vegetation communities present within the site.
- Search for signs of threatened species, observe and record significant flora and fauna – threatened and migratory species, other incidental fauna observations.
- Observe and record current disturbance and threats (e.g. weeds, trampling, litter).
- Identifying potential habitat for threatened flora and fauna species/populations (e.g. habitat bearing trees (HBTs), creeks, boulders etc).
- Recording presence of environmental weeds.
- Taking reference photographs of the entire site.

3.3 SURVEY LIMITATIONS

Survey was conducted in Spring and may be outside of the optimal survey period for some flora and fauna species. It is therefore possible that some species may not have been detected due to their seasonal geographic variation. Cryptic species may not have been obvious. However, habitat assessments were conducted to further predict the likelihood of species occurrence at the site. A conservative approach was applied in the assumption of the presence of species that could potentially occur within the site area. In this regard, the survey is considered adequate for the purposes of this report.

4.0 DESKTOP REVIEW

4.1 EXISTING VEGETATION AND BIODIVERSITY VALUES MAPPING

The Subject Land is mapped nearby land mapped on the State Biodiversity Values Map (BVM) (**Figure 2**). The dwelling and APZ has been sited to avoid impacts within the BVM and therefore this entrance trigger into the Biodiversity Offset Scheme is **not applicable.**

A review of vegetation mapping that covers the Study Area (VIS_ID_3900 and VIS_ID 3901) identified several Plant Community Types (PCTs) within the Study Area (**Figure 3**) – being;

Plant Community Types within the Study Area:

- **PCT 659:** Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion
- **PCT 920:** Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion
- **PCT 1232:** Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion

Additional Plant Community Types nearby, within the locality:

- **PCT 1231:** Swamp Mahogany swamp sclerophyll forest on coastal lowlands of the Sydney Basin Bioregion and South East Corner Bioregion
- **PCT 1126:** Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion

Associated Endangered Ecological Communities:

- **PCT 659:** Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions
- **PCT 1126:** Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions
- **PCT 1231:** Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions
- **PCT 1232:** Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions

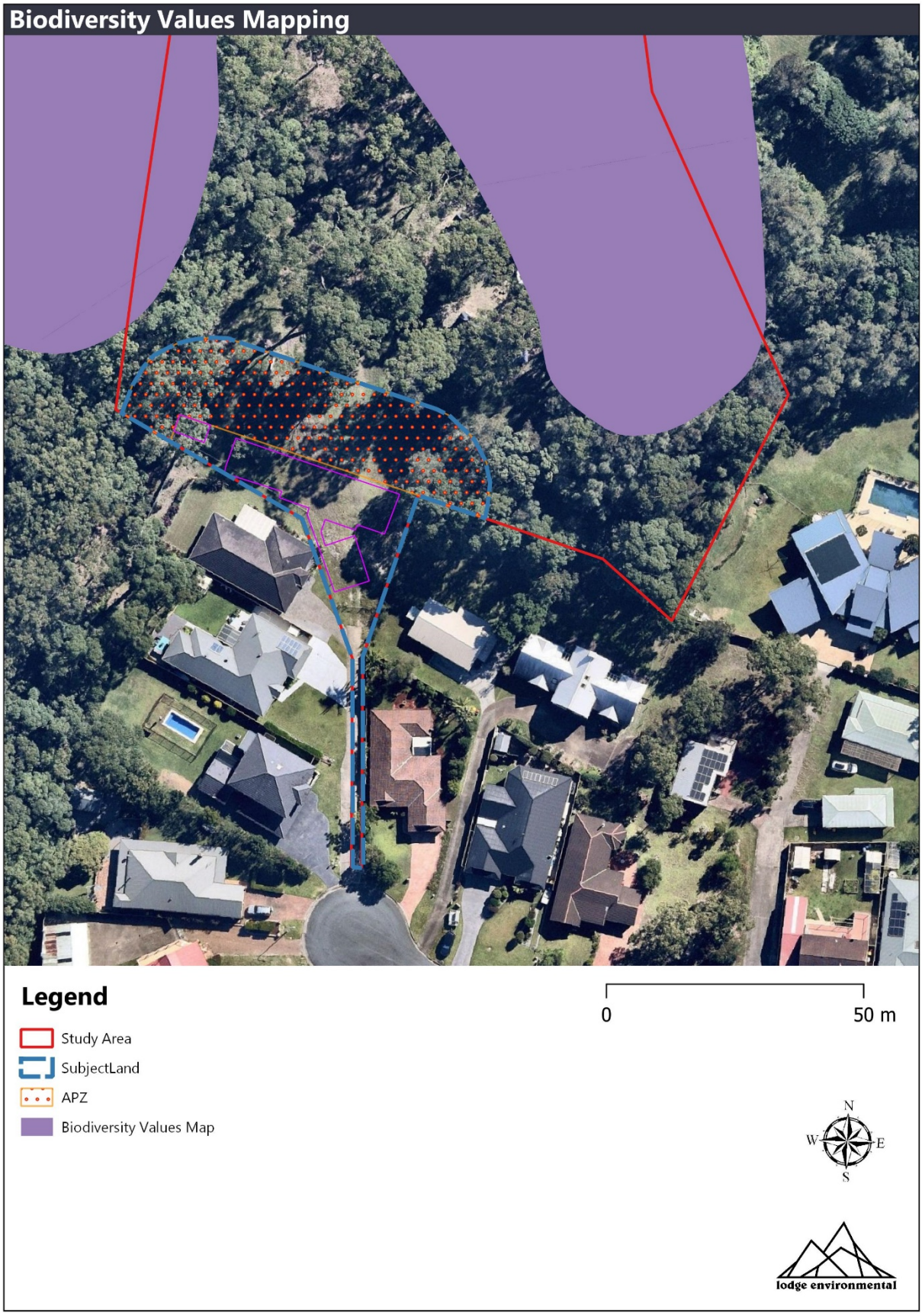

Figure 2: Biodiversity Values Map

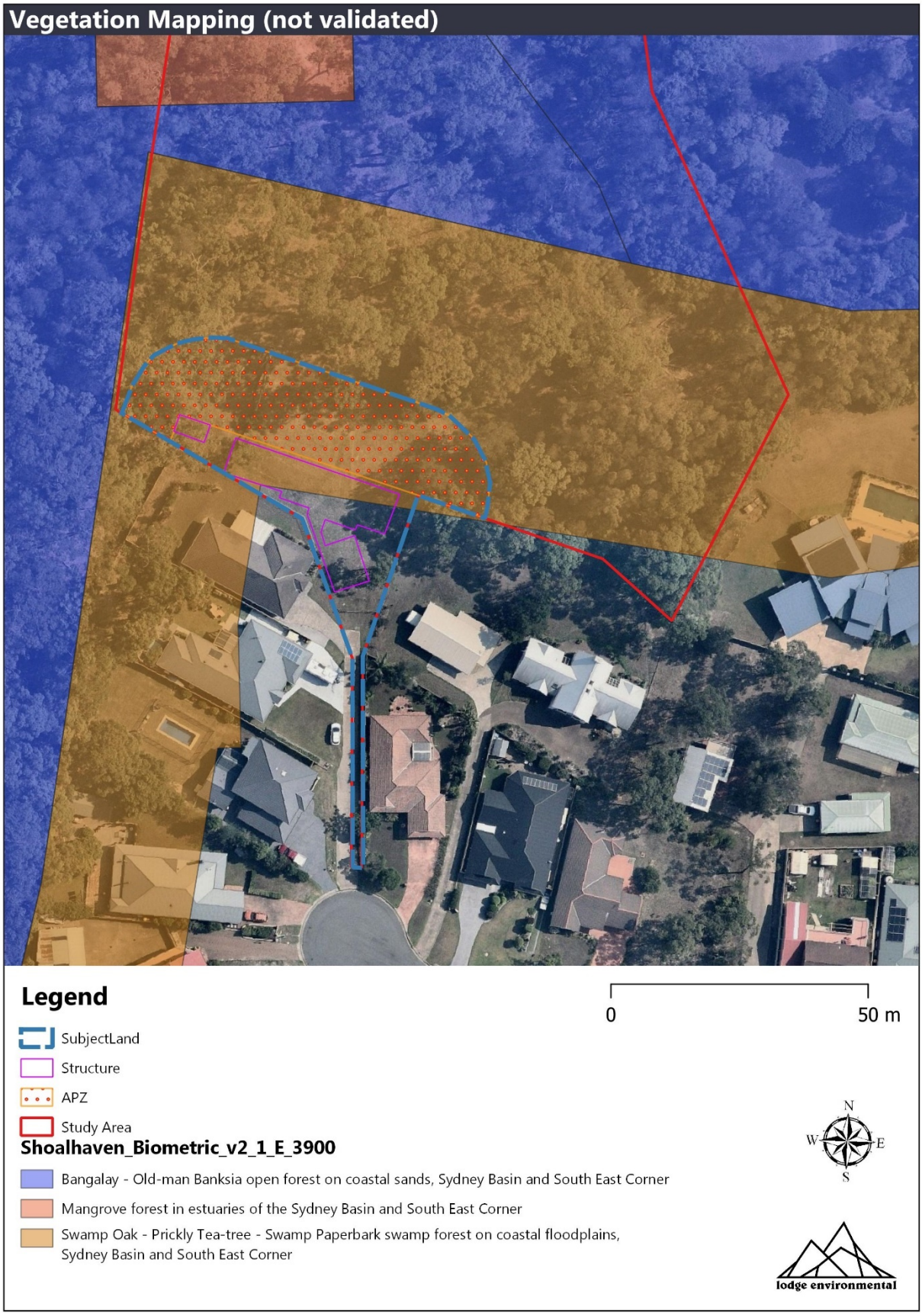

Figure 3: Vegetation communities modelled VIS_ID_3900 without field validation

4.2 ZONING

The land is covered by two zoning classifications:

R2 – Low Density Residential

Minimum lot size: 0.055 ha

The objectives of this zone are:

- Protect the locality' s single dwelling character and landscape setting
- Allow for a variety of housing types, facilities and services to meet the needs of the community and residents

Activities permitted with consent are listed below:

> Bed and breakfast accommodation; boarding houses; child care centres; community facilities; dual occupancies; dwelling houses; environmental protection works; flood mitigation works; group homes; health consulting rooms; home businesses; home industries; multi dwelling housing; places of public worship; recreation areas; respite day care centres; roads; seniors housing.

E2 – Environmental Conservation

This zone applies to areas that contain high ecological, scientific, cultural or aesthetic values. The objectives of the zone are to protect those resources and to prevent development that could destroy, damage or otherwise have an adverse effect on those values.

Activities permitted with consent are listed below:

> Environmental facilities; Environmental protection works; Flood mitigation works; Information and education facilities; Roads.

4.3 LOCAL CLAUSES

The Study Area is covered by the below local clauses:

- Terrestrial Biodiversity (habitat corridor, disturbed habitat and vegetation, and significant vegetation)
- Riparian Lands and Watercourses

Terrestrial Biodiversity

Terrestrial Biodiversity has been mapped by the SLEP to promote protection of native fauna and flora in addition to the ecological processes necessary for their continued existence.

As a portion of the Subject Land is covered by this clause (Biodiversity – Significant Vegetation; **Figure 4**), the development consent must not be granted until the consent authority is satisfied that

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

Riparian Land and Watercourses

The Riparian Lands clause aims to protect and maintain watercourses within the LGA.

The objective of this clause is to protect and maintain the following:

(a) water quality within watercourses,

(b) the stability of the bed and banks of watercourses,

(c) aquatic and riparian habitats,

(d) ecological processes within watercourses and riparian areas.

The Subject Land has been sited to avoid the Riparian Land and Watercourses mapping. No further consideration of this clause is required.

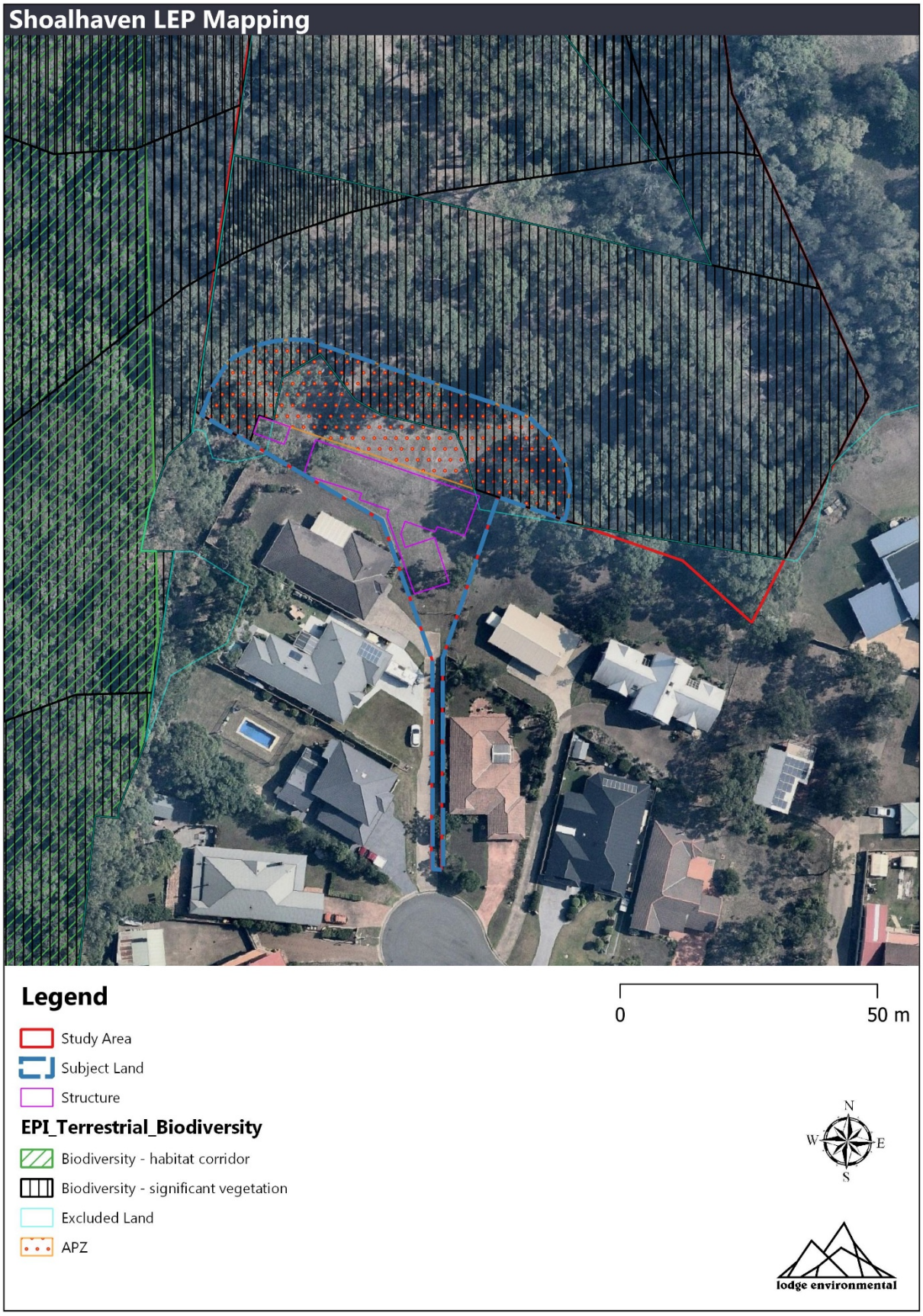

Figure 4: Natural Resource Sensitivity - Terrestrial Biodiversity

4.4 THREATENED SPECIES

A review of the DPIE and Department of the Environment and Energy (DEE) databases identified the threatened flora and fauna listed under the BC Act and/or the EPBC Act that have been previously recorded, or are considered to have habitat, within 5 km of the site (**Figure 5**). This initial compilation of potentially occurring species informed the site survey, providing an indication of which species required consideration within the site.

The following threatened flora species in were identified as having a potential to occur within the Study Area prior to field survey:

- *Rhodamnia rubescens* (Scrub Turpentine)

The following threatened fauna species in **Table 2** were identified as having a potential to occur within the Study Area prior to field survey.

Table 2: Potentially occurring threatened fauna prior to field survey

Scientific name	Common name	BC	EPBC
Amphibian			
Litoria aurea	Green and Golden Bell Frog	E	V
Birds			
Actitis hypoleucos	Common Sandpiper	-	M
Callocephalon fimbriatum	*Gang-gang Cockatoo*	V	-
Calyptorhynchus lathami	*Glossy Black-Cockatoo*	V	-
Calidris melanotos	Pectoral Sandpiper	-	M
Haematopus longirostris	Pied Oystercatcher	E	-
Glossopsitta pusilla	Little Lorikeet	V	-
Haematopus fulinginosus	Sooty Oystercatcher	V	-
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-
Limosa lapponica baueri	Bar-tailed Godwit	-	V
Ninox strenua	Powerful Owl	V	-
Numenius madagascariensis	Eastern Curlew	-	CE
Pandion cristatus	Eastern Osprey	V	-
Sternula albifrons	Little Tern	E	-
Thinornis rubricollis	Hooded Plover	E	V
Tyto novaehollandiae	Masked Owl	V	-
Tyto tenebricosa	Sooty Owl	V	-
Mammal			
Dasyurus maculatus	Spotted-tailed Quoll	V	E
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E
Petauroides volans	Greater Glider	-	V
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-

Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-
Myotis macropus	Southern Myotis	V	-
Phoniscus papuensis	Golden-tipped Bat	V	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Reptilia			
Caretta caretta	Loggerhead Turtle	E	E
Chelonia mydas	Green Turtle	V	V

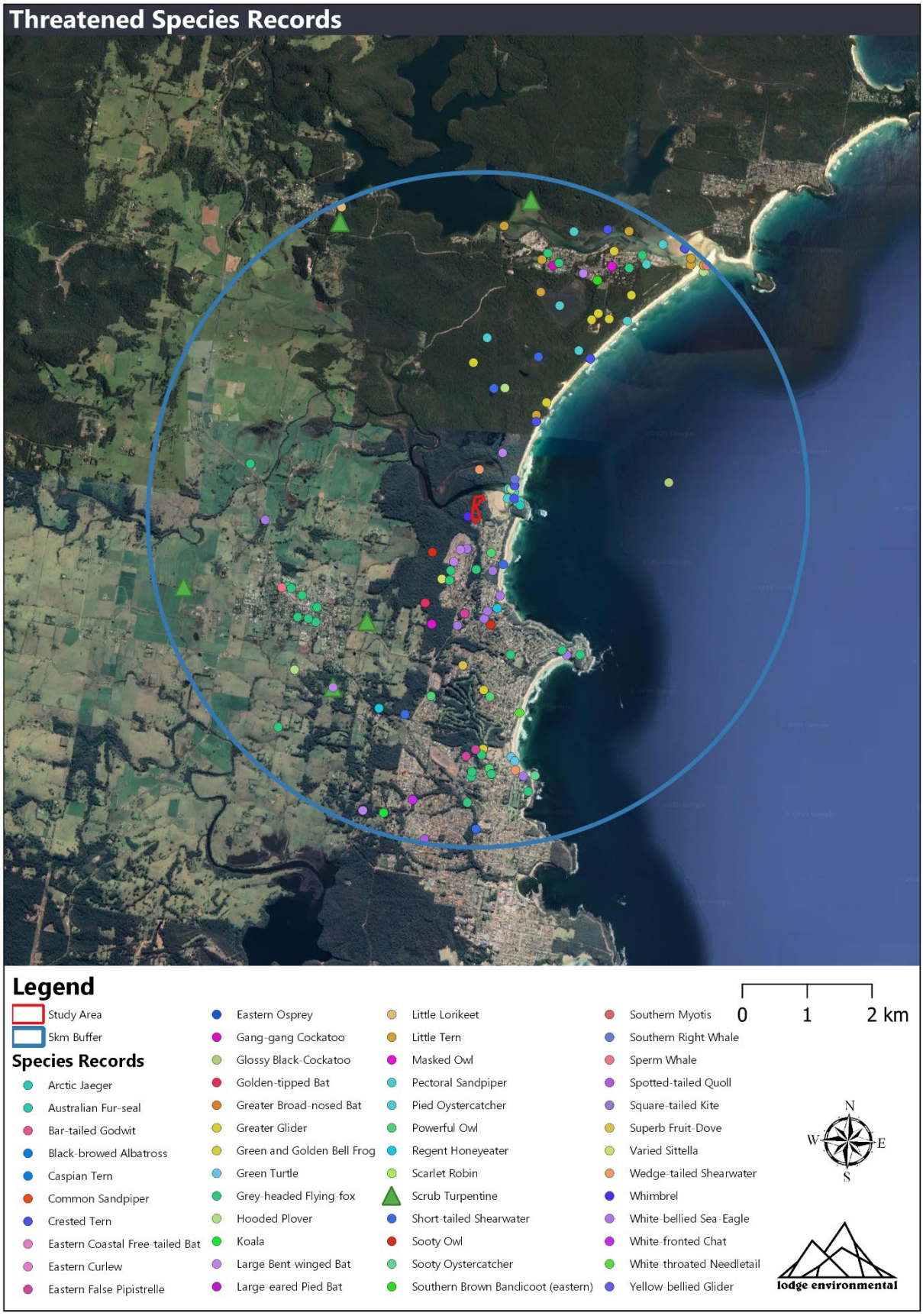

Figure 5: Threatened Species Records (Bionet 2021)

5.0 FIELD SURVEY RESULTS

5.1 EXISTING ENVIRONMENT

The environment of the Study Area is generally characterised by:

- Areas of historically cleared land adjacent to the existing residential township of Narrawallee.
- Areas of open woodland.
- Mangroves and saltmarsh in good condition.

Currently there are no structures on the Study Area. The native vegetation contained mature trees and areas of good condition woodland with all layers of stratum present with some trees estimated over 50 years old. The good condition woodland continued to extend beyond the boundaries of the Study Area into the wider locality.

The mangroves and saltmarsh were in good condition and were contiguous with mangrove and saltmarsh further out from the Study Area. The mangrove and saltmarsh areas provide feeding and breeding habitat for fish, birds and crustaceans, act as filters for nutrients and sediments, reduce erosion and maintain water quality while also providing protection from storm events.

The tree cover across the site is expected to facilitate to the movement and foraging of more mobile native fauna species (i.e. birds and mammals) between the Study Area and wider locality. More specialist habitat features were also recorded, including habitat bearing trees, large trees, stratum complex areas and species-specific feed trees.

The area of cleared land exists as exotic dominant lawn which provides little habitat for fauna.

5.2 VEGETATION COMMUNITIES

The field inspection recorded two vegetation types as mapped in **Figure 6**, which included:

- Cleared Land
- **PCT 659** - Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion (Good Condition)
- **PCT 920** - Estuarine mangrove forest (Good Condition)
- **PCT 1126 -** Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Good Condition)
- **PCT 1232 -** Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion (Good Condition)

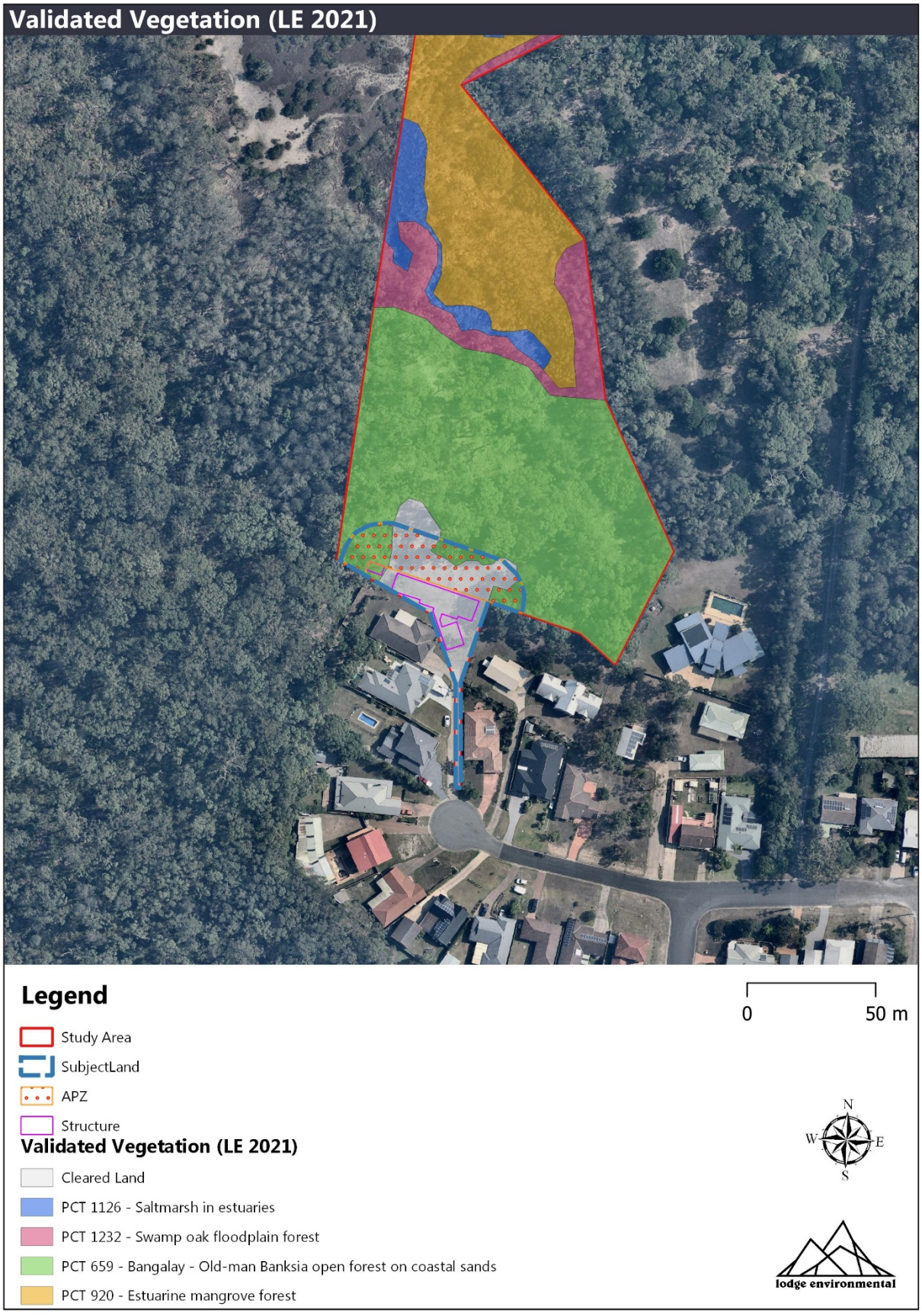

Figure 6: Validated Vegetation (LE 2021)

Cleared Land

The Cleared Land is depicted below in **Figure 7** and was comprised predominantly of *Pennisetum clandestinum* (Kikuyu).

Figure 7: Cleared land

PCT 659

The Plant Community Type (PCT) PCT 659 - Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion which exists across the Study Area is detailed in **Table 3**.

Table 3: PCT 659 Justification Table

Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	
PCT ID	659
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	South Coast Sands Dry Sclerophyll Forests
Condition on site	Good Condition
Survey effort	Random meander, no plots

PCT Justification: Expected Species by Stratum (Bold denotes diagnostic species present within Study Area patch)	Upper Stratum: ***Eucalyptus botryoides***; *Banksia serrata;* ***Banksia integrifolia* subsp. *integrifolia***; *Eucalyptus pilularis;* *Angophora floribunda;* *Corymbia gummifera;* *Eucalyptus robusta*	Mid Stratum: *Allocasuarina littoralis;* *Breynia oblongifolia;* *Glochidion ferdinandi;* ***Macrozamia communis;*** *Platysace lanceolata*	Ground Stratum: ***Dianella caerulea***; *Hardenbergia violacea;* ***Lomandra longifolia***; *Pomax umbellata;* ***Pteridium esculentum***; *Imperata cylindrica* var. *major*
TEC Status	There is one TEC associated with this PCT, being: Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions (BC Act)		
Photo of PCT 659			

5.3 FLORA

A total of 53 species were recorded during the site inspection (44 natives and 9 exotic). A species list is provided in **Appendix A**.

5.3.1 Threatened Flora Species

There were no threatened species identified within the site.

5.4 FAUNA

A total of 15 fauna species were identified within the site. A species list is included in **Appendix B**. Targeted surveys were not conducted as part of this assessment.

5.4.1 Threatened Fauna Species

There were no threatened fauna species identified within the site.

Across the Study Area there is potential for a number of mobile threatened fauna species to utilise the site for roosting and foraging purposes within the native vegetation communities. Impacts within the Subject Land are considered to be minor and occur to a maximum of five trees that did not contain tree hollows.

The relatively few mature native trees are considered to provide minimal foraging habitat with no signs of roosting potential for any known local threatened species.

However, as this assessment is taking a conservative approach, the most likely threatened species to occur on occasion are outlined below.

- **Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) -** Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide marginal potential foraging habitat for the species. Although the clearance of this vegetation is not expected to adversely impact the life cycle of this species, a conservative approach is being taken with further assessments undertaken in **Appendix D**.
- **Eastern Freetail-bat (*Mormopterus norfolkensis*)** – Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide marginal potential foraging for the species. Although the clearance of this vegetation is not expected to adversely impact the life cycle of this species, a conservative approach is being taken with further assessments undertaken in **Appendix D**.
- **Large Bentwing-bat (*Miniopterus schreibersii oceanensis*) -** Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide marginal potential foraging for the species. Although the clearance of this vegetation is not expected to adversely impact the life cycle of this species, a conservative approach is being taken with further assessments undertaken in **Appendix D**.
- **Greater Broad-nosed Bat (*Scoteanax rueppellii*) -** Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide marginal potential foraging for the species. Although the clearance of this vegetation is not expected to adversely impact the life cycle of this species, a conservative approach is being taken with further assessments undertaken in **Appendix D**.
- **Gang-gang Cockatoo (*Callocephalon fimbriatum*)** - Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide potential foraging habitat for the species. The lack of many mature trees (reduced flowering) reduces the likelihood for the species to occupy the Study Area. As this assessment is taking a conservative approach an Assessment of Significance (AoS) in accordance with the BC Act has been prepared in **Appendix D.**
- **Grey-headed Flying-fox (*Pteropus poliocephalus*)** – Potential to occur on site as the species passes through the landscape. The small stand of native vegetation is considered

to provide for the species as *Eucalyptus pilularis* is considered a significant feed tree for the Grey-headed Flying-fox (Eby & Law 2008). The Significant Impact Criteria (SIC) and an Assessment of Significance (AoS) in accordance with the EPBC and BC Act have been prepared in **Appendix D and E**.

- **Regent Honeyeater (*Anthochaera Phrygia*)** – Potential to occur on site as the species passes/forages through the landscape. The small stand of native vegetation is not considered to provide any critical habitat for the species. The lack of mature trees (reduced flowering) further reduces the likelihood for the species to occupy the Study Area. The Significant Impact Criteria (SIC) and an Assessment of Significance (AoS) in accordance with the EPBC and BC Act have been prepared in **Appendix D and E.**
- **Southern Myotis (*Myotis macropus*) -** Potential to occur within the site on occasion as the species passes/forages through the landscape. The small stand of native vegetation is considered to provide marginal potential foraging for the species. Although the clearance of this vegetation is not expected to adversely impact the life cycle of this species, a conservative approach is being taken with further assessments undertaken in **Appendix D**.
- **Swift Parrot (*Lathamus discolour*)** – Potential to occur on site as the species passes/forages through the landscape. The small stand of native vegetation is not considered to provide any critical habitat for the species. The lack of mature trees (reduced flowering) further reduces the likelihood for the species to occupy the Study Area. The Significant Impact Criteria (SIC) and an Assessment of Significance (AoS) in accordance with the EPBC and BC Act have been prepared in **Appendix D and E**

5.4.2 Koala Habitat Protection SEPP

The Koala Habitat Protection SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for *Phascolarctos cinereus* (Koala) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline.

The Study Area was assessed by the following criterion to determine if considerations under the Koala Habitat Protection SEPP are required:

- Is the proposal a development under Part 4 EP&A Act.
- Does the LGA does not have an existing Koala Plan of Management.
- Is the lot size is >1 ha.

Although the Study Area is greater than 1 ha and covered by the Koala Development Application Map, the site is not considered core koala habitat as defined under the SEPP for the below reasons:

- The Study Area does not contain Koala feed trees.
- There are no records of the species spanning the previous 18 years within 2.5 kilometres of the Study Area.

No further considerations under the SEPP are required.

6.0 IMPACT ASSESSMENT

6.1 SUMMARY OF IMPACTS

Figure 8 depicts the Subject Land and the various associated impacts assessed within this report.

Vegetation which would be impacted by the requirement to maintain a 17-metre APZ to inner protection area (IPA) standards around the proposed dwelling could impact vegetation to the maximum extent as detailed in **Table 4**.

The majority of the impact area exists as cleared, exotic grassland.

The proponent does not intend on clearing any of the native vegetation within the APZ. The vegetation in its current density already meets the requirements of an IPA.

Table 4: Summary of Impacts

Vegetation type	Impact (ha)
PCT 659 – Bangalay – Old-man Banksia open forest on coastal sands	0.055
No PCT – Cleared Land	0.141
Total native vegetation impact	**0.196**

Direct impacts

The direct impact imposed by the proposal will occur to the native vegetation within the APZ consisting of Bangalay – Old-man Banksia open forest on coastal sands.

The total area of impacted native vegetation is 0.055 ha. The impact imposed by the proposed development on native vegetation is below the Biodiversity Offset Scheme entrance impact threshold of 0.25 ha.

No threatened flora is to be impacted by the proposal.

The native vegetation to be impacted, despite being small in area, is considered to provide potential habitat for the following highly mobile fauna:

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Large Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Regent Honeyeater (*Anthochaera Phrygia*)
- Swift Parrot (*Lathamus discolour*)

Indirect impacts

The construction of a dwelling and clearing/maintenance of an APZ is not considered to introduce any considerable additional indirect impacts on important vegetation or fauna habitat as the dwelling is proposed directly adjacent to a number of existing residential lots. The building envelope and APZ is not within a location that is not considered to fragment any biodiversity linkages.

The proposal is not considered to have any indirect impacts outside of Subject Land.

Should future use of the Study Area change, these impacts would require further assessment.

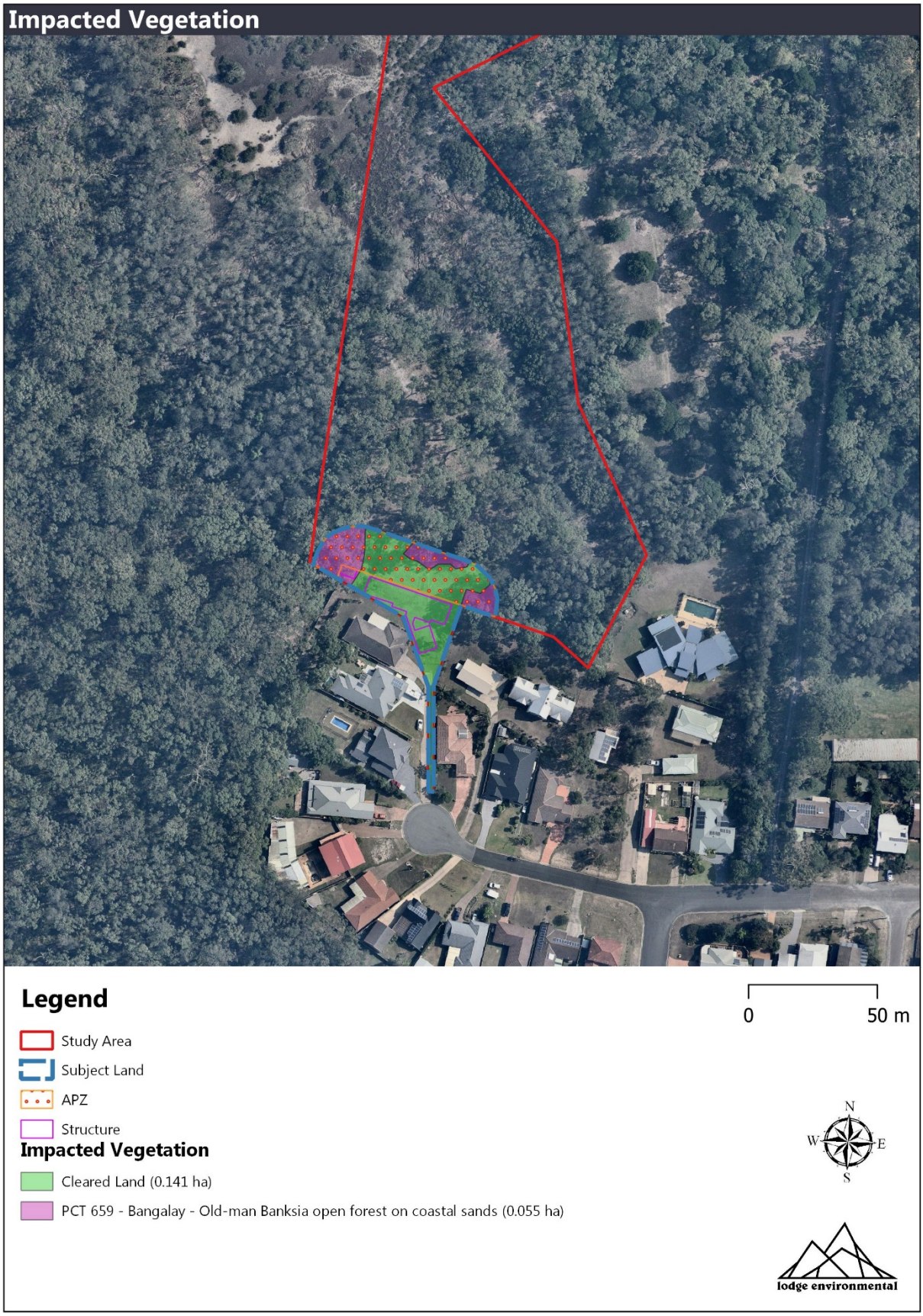

Figure 8: Total area of vegetation to be impacted

6.2 SHOALHAVEN LOCAL ENVIRONMENTAL PLAN AND DEVELOPMENT CONTROL PLAN 2014

Clause 7.5 'Terrestrial biodiversity' of SLEP 2014 applies in circumstances where the site is identified as containing "Biodiversity—habitat corridor" and "Biodiversity—significant vegetation" on the Terrestrial Biodiversity Map.

Terrestrial Biodiversity

A minor portion of the APZ within the Subject Land is covered by the Shoalhaven LEP Terrestrial biodiversity clause. Therefore, development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied with the objectives of this clause and the requirements listed in **Table 5**.

Table 5: Terrestrial Biodiversity Performance criteria (SSC LEP 2014)

Requirements	Current Performance
a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or	The residential development and associated APZ requires removal of vegetation. The associated environmental impact has been discussed within this report and an assessment of the biodiversity values was conducted. Impacts to the existing environment are considered minimal and the dwelling has been sited within cleared land.
(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or	
(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	

6.3 COASTAL MANAGEMENT SEPP 2018

The site is mapped on the State Environmental Planning Policy (Coastal Management) 2018 Coastal Wetlands and Littoral Rainforests Area Map. Clauses 10 and 11 apply to the land.

A consent authority must not grant consent for development within areas mapped by the SEPP unless the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological and ecological integrity of the coastal wetland or littoral rainforest, OR, the proposed development will not significantly impact on the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

The residential development and associated APZ requires removal of vegetation. The associated environmental impact has been discussed within this report and an assessment of the biodiversity values was conducted. Appropriate minimisation and mitigation measures are recommended to avoid any adverse or additional environmental impact outside of the proposed footprint. Impacts to the existing environment are considered minimal

6.4 SIGNIFICANCE ASSESSMENTS

6.4.1 Assessment of Significance under the EP&A Act and BC Act

Assessments using the criteria provided under the EP&A Act (i.e. Assessment of Significance (AoS)) must be considered by the consent or determining authorities when considering a development proposal or development application. This enables a decision to be made as to whether there is likely to be a significant impact on the species and hence if entry into the Biodiversity Offset Scheme (BOS) is required.

The results of the field survey have been used to inform whether significance assessments are required and for any listed species and communities. Significance assessments have been undertaken (**Appendix D**) for the following entities:

- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Large Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Regent Honeyeater (*Anthochaera Phrygia*)
- Southern Myotis (*Myotis macropus*)
- Swift Parrot (*Lathamus discolour*)

After undertaking the AoS, the proposal, under its current layout, is not considered to have any significant impact on threatened species, ecological communities or populations such that a viable local population will be placed at risk of extinction.

6.4.2 EPBC Act Significant Impact Guidelines

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where Matters of National Environmental Significance may be affected. The process includes the application of Significant Impact Criteria (SIC) for listed threatened species and ecological communities that represent a MNES that will be impacted as a result of the proposed action. Significant impact guidelines that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the assessment and help decide whether or not a referral to the Commonwealth is required.

SIC applications have been undertaken (**Appendix E**) for the following entities:

- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Regent Honeyeater (*Anthochaera Phrygia*)
- Swift Parrot (*Lathamus discolour*)

On application of the SIC (**Appendix E**), it is determined that the proposed development is unlikely to result in a significant impact to MNES (threatened and migratory species).

7.0 RECOMMENDATIONS

This report assesses the removal of the area of vegetation within the Subject Land only. The following recommendations are provided to minimise potential impacts to threatened and non-threatened vegetation communities, flora and fauna that could result from the proposed action:

- Asset Protection Zone management activities should minimise vegetation management and only remove vegetation required to achieve the IPA requirements**.** Currently this does not require any native vegetation removal.
- Care must be taken when moving equipment near vegetation to be retained. If works appear to encroach on retained vegetation, advice from a qualified Arborist should be gained to infer appropriate tree protection measures.
- Landscaping should aim to use species endemic to the area – specifically the more mesic species such as the native lilly pilly, should be used within the landscape planting regime.
- Adequate erosion and sediment control measures should be in place at all times during construction in accordance with best practice guidelines (Landcom 2004), including:
    - sediment fencing
    - vehicle and machinery movement confined to designated work areas
    - consideration given to weather, with works stopped if the onset of heavy rain is deemed likely to cause soil erosion or soil structure damage

8.0 CONCLUSION

Through the completion of the surveys conducted as part of this report, no threatened flora or fauna were recorded within the Subject Land. No habitat bearing trees or other sensitive habitats were recorded in the Subject Land. The clearing of native vegetation relates to a relatively small area (0.055 ha) required to manage an APZ. The native vegetation to be impacted is associated with a listed ecological community being Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions. The impact is minor and will not remove any species unique to the adjacent vegetation. The native vegetation provides foraging habitat to highly mobile, locally occurring threatened species, however, the impact is small and to only occur to non-unique foraging habitat.

This Flora and Fauna Assessment has adequately considered threatened species and communities in the context of the proposed development at the Subject Land by:

- conducting field survey
- adopting the precautionary principle in the assessment of threatened species
- designating appropriate recommendations to minimise potential impacts to threatened species that may transiently occur on the site as well as any other fauna

The assessments contained within this report have determined that the proposed development is unlikely to have a significant effect on the listed communities or species or their habitat in accordance with the EP&A Act, BC Act and EPBC Act provided the recommendations contained in this report are adhered to.

There will not be an impact on native vegetation above the relevant impact threshold, nor will vegetation contained on the Biodiversity Values map be impacted.

Therefore, the preparation and submission of a BDAR or referral to the Commonwealth is not required.

9.0 REFERENCES

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10.0 LIMITATIONS

This report and the associated services performed by Lodge Environmental are in accordance with the scope of services set out in the contract between Lodge Environmental and the Client. The scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to Site.

Lodge Environmental derived the data in this report primarily from visual inspections, and, limited survey and analysis made on the dates indicated. In preparing this report, Lodge Environmental has relied upon, and presumed accurate, certain information provided by government authorities, the Client and others identified herein. The report has been prepared on the basis that while Lodge Environmental believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the Client arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of the Site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, etc) may render the report inaccurate. In those circumstances, Lodge Environmental shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Lodge Environmental and the Client. Lodge Environmental accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

Appendices

Appendix A: Threatened flora and fauna likelihood table

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Ecological Communities						
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community		E	E	Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Known from parts of the Local Government Areas of Wollongong.	Low	Not recorded within the Study Area
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregion		**E**	**-**	**It is associated with coastal sand plains of marine or aeolian origin. It occurs on deep, freely draining to damp sandy soils on flat to moderate slopes within a few km of the sea and at altitudes below 100 m. Bangalay Sand Forest is characterised by the assemblage of species listed in paragraph 2 and typically comprises a relatively dense or open tree canopy, an understorey of mesophyllous or sclerophyllous small trees and shrubs, and a variable groundcover dominated by sedges, grasses or ferns.**	**High**	**Yes, recorded within Subject Land**
Illawarra and south coast lowland forest and woodland ecological community		E	CE	This community comprises vegetation types that occupy the Illawarra coastal plain and escarpment foothills. Characteristic tree species include Forest Red Gum Eucalyptus tereticornis, Thin-leaved Stringybark Eucalyptus eugenioides, Woollybutt Eucalyptus longifolia, Coast Grey Box Eucalyptus bosistoana and White Feather Honey-myrtle Melaleuca decora.	Low	Not recorded within the Study Area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion		E	CE	Characteristic tree species include Baloghia inophylla (Brush Bloodwood), Brachychiton acerifolius (Flame Tree), Dendrocnide excelsa (Giant Stinging Tree), Diploglottis australis (Native Tamarind), Ficus spp., Pennantia cunninghamii (Brown Beech), and Toona ciliate (Red Cedar). Species of Eucalyptus, Syncarpia and Acacia may also be present as emergents or incorporated into the dense canopy.	Low	Not recorded within the Study Area

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia		CE	CE	Littoral Rainforest is generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as Angophora costata, Banksia integrifolia, Eucalyptus botryoides and Eucalyptus tereticornis occur in many stands.	Low	Not recorded within the Study Area
Lowland Grassy Woodland in the South East Corner Bioregion		E	CE	Typically occurs in undulating terrain up to 500 m in elevation on granitic substrates (e.g. adamellites, granites, granodiorites, gabbros, etc.) but may also occur on locally steep sites and on acid volcanic, alluvial and fine-grained sedimentary substrates.	Low	Not recorded within the Study Area
Subtropical and Temperate Coastal Saltmarsh			V	The Subtropical and Temperate Coastal Saltmarsh (or Coastal Saltmarsh) ecological community occurs within a relatively narrow margin of the Australian coastline, within the subtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37' latitude along the east coast and south of (and including) Shark Bay at 26° on the west coast.	Low	Not recorded within the Study Area
Flora						
Thick-lipped Spider-orchid	*Caladenia tessellata*	E	V	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Also open heathland habitat. Flowers September to November.	Low	No
Leafless Tongue-orchid	*Cryptostylis hunteriana*	V	V	Occurs in a range of communities, including swamp-heath and woodland. 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). Flowers November to February.	Low	No
Yellow Gnat-orchid	*Genoplesium baueri*	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
East Lynne Midge Orchid	*Genoplesium vernale*	V	V	Grows in dry sclerophyll woodland and forest extending from close to the coast to the adjoining coastal ranges. Confined to areas with well-drained shallow soils of low fertility, often occurring near the crests of ridges and on low rises where the ground cover is more open and sedge dominated rather then being shrubby	Low	No
Biconvex Paperbark	*Melaleuca biconvexa*	V	V	Scattered and dispersed populations of this species are found between Jervis Bay and Port Macquarie. It occurs in damp places, often near streams or low-lying areas on alluvia soils of low slopes or sheltered aspects.	Low	No
Knotweed, Tall Knotweed	Persicaria elatior	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low	No
Jervis Bay Leek Orchid	*Prasophyllum affine*	E1	E	Grows on poorly drained grey clay soils that support low heathland and sedgeland communities.	Low	No
Illawarra Greenhood	*Pterostylis gibbosa*	E	E	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. Near Nowra, the species grows in an open forest of Spotted Gum (Corymbia maculata), Forest Red Gum and Grey Ironbark (coE. paniculata). Flowers September to October.	Low	No
Eastern Australian Underground Orchid	*Rhizanthella slateri*	V	E	Little known, however Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed.	Low	No
Scrub Turpentine	*Rhodamnia rubescens*	E	-	Shrub to small tree, Scrub turpentine occurs in coastal districts north from Batemans bay, NSW to inland of Bundaberg in Queensland. Littoral, warm temperate and subtropical rainforest on volcanic and sedimentary soils	Moderate	No. Species not identified within the Study Area
Magenta Lilly	*Syzygium paniculatum*	V	E	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Austral Toadflax, Toadflax	*Thesium australe*	V	V	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast.	Low	No
Aves						
Regent Honeyeater	***Anthochaera phrygia***	**CE**	**CE**	**Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.**	**Moderate**	**Yes**
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris	Low	No
Australasian Bittern	*Botaurus poiciloptilus*	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.).	Low	No
Red Knot	*Calidris canutus*	-	E, M	Mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs	Low	No
Curlew Sandpiper	*Calidris ferruginea*	E	C, M	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.	Low	No
Gang-gang Cockatoo	***Callocephalon fimbriatum***	**V**	**-**	**Prefers tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests during summer, these being at higher altitudes. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, or in dry forest in coastal areas.**	**Moderate**	**Yes**
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V	-	In NSW, widespread along coast and inland to the southern tablelands and central western plains, with a small population in the Riverina. Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Eastern Bristlebird	*Dasyornis brachypterus*	E	E	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	Low	No
Antipodean Albatross	*Diomedea antipodensis*	V	V	Marine, pelagic and aerial	Low	No
Gibson' s Albatross	*Diomedea antipodensis gibsoni*	V	V	Marine, pelagic and aerial	Low	No
Southern Royal Albatross	*Diomedea epomophora*	-	V	Marine, pelagic and aerial	Low	No
Wandering Albatross	*Diomedea exulans*	-	V	Marine, pelagic and aerial	Low	No
Northern Royal Albatross	*Diomedea sanfordi*	-	E	Marine, pelagic and aerial	Low	No
Varied Sitella	*Daphoenositta chrysoptera*	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low	No
White-fronted Chat	*Epthianura albifrons*	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	Low	No
Grey Falcon	*Falco hypoleucos*	E	V	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. 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.	Low	No
White-bellied Storm-Petrel	*Fregetta grallaria grallaria*	-	V	The White-bellied Storm-Petrel occurs across sub-tropical and tropical waters in the Tasman Sea, Coral Sea and, possibly, the central Pacific Ocean	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Little Lorikeet	*Glossopsitta pusilla*	V	-	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Low	No
Sooty Oystercatcher	*Haematopus fulinginosus*	V	-	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide.	Low	No
Pied Oystercatcher	*Haematopus longirostris*	E	-	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low Tide.	Low	No
Painted Honeyeater	*Grantiella picta*	V	V	Inhabits Boree/ Weeping Myall (Acacia *pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.	Low	No
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	Low	No
White-throated Needletail	*Hirundapus caudacutus*	-	M	Almost exclusively aerial. Takes insects on wing over a range of habitat types. Recorded most often above wooded areas, including open forest and rainforest	Low	No
Swift Parrot	***Lathamus discolor***	**E**	**CE**	**Eucalypt forests. When over-wintering on the mainland, this species is dependent on winter-flowering eucalypt species.**	**Moderate**	**Yes**
Bar-tailed Godwit	*Limosa lapponica baueri*	-	V	It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	Low	No
Square-tailed Kite	*Lophoictinia isura*	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Low	No
Southern Giant Petrel	*Macronectes giganteus*	-	E	Marine and oceanic	Low	No
Northern Giant Petrel	*Macronectes halli*	-	V	Marine and oceanic	Low	No
Orange-bellied Parrot	*Neophema chrysogaster*	-	CE	On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				including bays, lagoons, estuaries, coastal dunes and saltmarshes.		
Powerful Owl	*Ninox strenua*	V	-	Large tracts of open or closed sclerophyll forest or woodlands but can occur in fragmented landscapes as well. Gullies consisting of wet to dry sclerophyll forest with a dense understorey.	Low	No
Eastern Curlew	*Numenius madagascariensis*	-	CE	The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats.	Low	No
Fairy Prion	*Pachyptila turtur subantarctica*		V	The fairy prion is found throughout oceans and coastal areas in the Southern Hemisphere.	Low	No
Eastern Osprey	*Pandion cristatus*	V	-	In littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia. found in coastal areas but occasionally travel inland along major rivers	Low	No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V	-	The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover)	Low	No
Scarlet Robin	*Petroica boodang*	V	-	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Its habitat usually contains abundant logs and fallen timber: these are important components of its habitat. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	Low	No
Sooty Albatross	*Phoebetria fusca*	-	V	The Sooty Albatross is marine and pelagic.	Low	No
Gould' s Petrel	*Pterodroma leucoptera leucoptera*	V	E	Principal nesting habitat is located within two gullies which are characterised by steeply, sloping rock scree with a canopy of Cabbage Tree Palms. They nest predominantly in natural rock crevices among the rock scree and also in hollow fallen palm	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
				trunks, under mats of fallen palm fronds and in cavities among the buttresses of fig trees.		
Kermadec Petrel	*Pterodroma neglecta neglecta*	-	V	Marine	Low	No
Superb Fruit-Dove	*Ptilinopus superbus*	V	-	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	Low	No
Australian Painted-snipe	*Rostratula australis*	E	E	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.	Low	No
Little tern	*Sternula albifrons*	E	-	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	Low	No
Freckled duck	*Stictonetta naevosa*	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Nesting usually occurs between October and December but can take place at other times when conditions are favourable.	No	No
Buller' s Albatross	*Thalassarche bulleri*	-	V	Marine and pelagic	Low	No
Nothern Buller' s Albatross	*Thalassarche bulleri platei*	-	V	Marine and pelagic	Low	No
Shy Albatross	*Thalassarche cauta cauta*	V	V	Marine and pelagic		
Chatham Albatross	*Thalassarche eremita*	-	E	Marine and pelagic	Low	No
Campbell Albatross	*Thalassarche impavida*	-	V	Marine and pelagic	Low	No
Black-browed Albatross	*Thalassarche melanophris*	-	V	Marine and pelagic	Low	No
Salvin' s Albatross	*Thalassarche salvini*	-	V	Marine and pelagic	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
White-capped Albatross	*Thalassarche steadi*		V	Marine and pelagic	Low	No
Eastern Hooded Plover	*Thinornis rubricollis*	E	V	Prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh	Low	No
Masked Owl	*Tyto novaehollandiae*	V	-	Open forest with a sparse mid-storey layer, but with patches of dense low ground cover.	Low	No
Sooty Owl	*Tyto tenebricosa*	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum *(Pseudocheirus peregrinus)* or Sugar Glider (*Petaurus breviceps).* Nests in very large tree-hollows.	Low	No
Mammals						
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Cave-roosting bat that forages in timbered woodland and dry sclerophyll forest	Low	No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Low	No
Eastern False Pipistrelle	***Falsistrellus tasmaniensis***	**V**	**-**	**Prefers moist habitats with trees larger than 20m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.**	**Moderate**	**Yes**
Southern Brown Bandicoot (eastern)	*Isoodon obesulus obesulus*	E	E	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.	Low	No
Large Bent-winged Bat	***Miniopterus orianae oceanensis***	**V**	**-**	**Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.**	**Moderate**	**Yes**

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Eastern Freetail-bat	***Mormopterus norfolkensis***	**V**	**-**	**Hollow-roosting bat that forages in dry eucalypt forests and woodlands.**	**Moderate**	**Yes**
Southern Myotis	***Myotis macropus***	**V**	**-**	**Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.**	**Moderate**	**Yes**
Greater Glider	*Petauroides volans*	-	V	It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	Low	No
Yellow-bellied Glider	*Petaurus australis*	V	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.	Low	No
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Habitats containing numerous ledges, caves and crevices are favoured by this species.	Low	No
Koala	*Phascolarctos cinereus*	V	V	Open eucalypt forest and woodland, containing a variety of 'preferred' feed trees	Low	No
Long-nosed Potoroo	*Potorous tridactylus tridactylus*	V	V	Inhabits coastal heath and dry and wet sclerophyll forests with dense cover which provides diurnal sheltering sites and protection from predators, whilst foraging in adjacent, open areas.	Low	No
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	Open heathland, open woodland with a heathland understorey and vegetated sand dunes.	Low	No
Grey-headed Flying-fox	***Pteropus poliocephalus***	**V**	**V**	**Occur in subtropical and temperate rainforests, tall sclerophyll forests.**	**Moderate**	**Yes**
Greater Broad-nosed Bat	***Scoteanax rueppellii***	**V**	**-**	**Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest. Roosts in tree hollows and buildings.**	**Moderate**	**Yes**
White-footed Dunnart	*Sminthopsis leucopus*	V	-	Coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. Favours vegetation communities with an open understorey structure	Low	No

Common Name	Scientific Name	Legislation		Habitat Associations	Likelihood of Occurrence	Further Significance Assessment Undertaken
		BC Act	EPBC Act			
Amphibia						
Giant Burrowing Frog	*Litoria aurea*	E	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides.	Low	No
Green and Golden Bell Frog	*Litoria aurea*	E	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.	Low	No
Stuttering Frog	*Mixophyes balbus*	-	V	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	Low	No
Reptilia						
Broad-headed Snake	*Hoplocephalus bungaroides*	E	V	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges.	Low	No

Key. V=Vulnerable, E=Endangered, Ep=Endangered Population, CE=Critically Endangered, M=Migratory.
Species habitat associations have been informed predominantly from EES (2018) and DotEE (2018) species profiles.

Appendix B: Flora Species List

Scientific name	Common Name	Native	Exotic
Acacia sophorae	Coastal Wattle	Yes	
Aegiceras corniculatum	River Mangrove	Yes	
Amyema sp	Mistletoe	Yes	
Archontophoenix Cunninghamiana	Bangalay Palm	Yes	
Asparagus aethiopicus	Asparagus Weed		Yes
Avicennia marina	Grey Mangrove	Yes	
Banksia integrifolia	Coastal Banksia	Yes	
Campsis radicans	Trumpet Vine		Yes
Cassytha Pubescens	Devils Twine	Yes	
Casuarina glauca	Swamp She-Oak	Yes	
Chrysanthemoides monilifera	Bitou Bush		Yes
Cymbidium suave	Snake Orchid	Yes	
Dianella sp.		Yes	
Drosera peltata	Shield Sundew	Yes	
Enchylaena tomentosa similar	Barrier Saltbrush	Yes	
Eucalyptus botriodes	Bangalay	Yes	
Eustrephelus latifolia	Wombat Berry	Yes	
Flase sasparilla	Hardenbergia Violacea	Yes	
Gahnia clarkii	Saw Sedge	Yes	
Glycine clandestina	Twining Glycine	Yes	
Gonocarpus teucroides	Forest Raspwort	Yes	
Hydrocotyle bonariensis	Coast Pennywort		
Indogophera australis	Australian Indigo	Yes	
Ipomea purpurea	Morning Glory		Yes
Jasmine sp.	Jasmine		Yes
Juncus kraussii	Salt Marsh Rush	Yes	
Kennedia sp.		Yes	
Leptosperum polygallifoloum	Tatoon	Yes	
Leptospeum laviagatum	Coastal Tea-Tree	Yes	
Leucopogan lancelata	Lance Beard Heath	Yes	
Leucopogon parviflorus	Coastal Beard-heath	Yes	
Lomamdra longifolia	Spiny-Head Mat-Rush	Yes	
Macrazamia communis	Burrawang	Yes	
Myoporum acuminatum	Waterbrush	Yes	
Parsonsia stamnia	Common Silkpod	Yes	
Pennisetum clandestinum	Kikuyu		Yes
Phragmites auatralis	Common Reed		Yes
Pittosporum undulatum	Sweet Pittosporum	Yes	
Pteridium esculentum	Bracken Fern	Yes	
Rubus fruiticosa	Blackberry		Yes
Samolus repens	Sea Primrose	Yes	
Sarcocornia quinqueflora	Bead Weed	Yes	

Schelhammera undulata	Lilac Lily	Yes	
Senna pendula	Easter Cassia	Yes	
Spergularia marina	Salt Sandspurry	Yes	
Sporobolus virginicus	Sand Couch	Yes	
Suaeda australis	Austral Seablite	Yes	
Taraxicum officinale	Common Dandelion		Yes
Tetragonia tetragonoides	New Zealand Spinach	Yes	
Zieria smithii	Sandfly Zieria	Yes	
Tillandsia sp.	Air Plant	Yes	
Zoysia macrantha	Prickly Couch	Yes	

Appendix B: Fauna Species List

Class Name	Scientific Name	Common Name
Aves	*Alisterus scapularis*	King Parrot
	Colluricincla harmonica	Grey Shrike Thursh
	Coracias tibicen	Magpie
	Cormobates leucophaea	White-throated Tree Creeper
	Dacelo novaeguineae	Kookaburra
	Eopsaltria australis	Eastern Yellow Robin
	Lichenostomus chrysops	Yellow-faced honeyeater
	Meliphaga lewinii	Lewin's honeyeater
	Myzomela sanguinolenta	Scarlet Honeyeater
	Pachycephala pectoralis	Golden Whistler
	Pachycephala rufiventris	Rufous Whistler
	Platycercus elegans	Crimson Rosella
	Todiramphus sanctus	Sacred Kingfisher
	Trichoglossus moluccanus	Rainbow Lorikeet
	Alisterus scapularis	King Parrot
	Colluricincla harmonica	Grey Shrike Thursh
Amphibia	*Litoria dentata*	Bleating Tree Frog

Appendix D: Assessments of Significance

Threatened Ecological Communities

Bangalay Sand Forest of the Sydney Basin and South East Corner bioregion – Endangered BC Act.

Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions typically has a dense to open tree canopy, approximately 5 - 20 m tall, depending on exposure and disturbance history.

The most common tree species include Bangalay (*Eucalyptus botryoides*) and Coast Banksia (*Banksia integrifolia* subsp*. integrifolia*), while Blackbutt (*Eucalyptus pilularis*) and Lilly Pilly (*Acmena smithii*) may occur in more sheltered situations, and Swamp Oak (*Casuarina glauca*) may occur on dunes exposed to salt-bearing sea breezes or where Bangalay Sand Forest adjoins Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, as listed under the Threatened Species Conservation Act 1995.

The open shrub stratum may be dominated by sclerophyllous species, such as Old Man Banksia (*Banksia serrata*), Coast Teatree (*Leptospermum laevigatum*) and Tree Broom-heath (*Monotoca elliptica*), or mesophyllous, species, such as Coffee Bush (*Breynia oblongifolia*) and Sweet Pittosporum (*Pittosporum undulatum*), or a combination of both. Shrubs may vary in height from one to ten metres tall.

The groundcover varies from open to dense, and may be sparse where the tree canopy is dense or where there is a thick litter of leaves and branches. Dominant species include Flax-lilies (*Dianella* spp.), *Lepidosperma concavum*, Spiny-headed Mat-rush (*Lomandra longifolia*), Bracken (*Pteridium esculentum*), and grasses including Blady Grass (*Imperata cylindrica*), Weeping Grass (*Microlaena stipoides* var*. stipoides*) and Kangaroo Grass (T*hemeda australis*), while herbs, such as Slender Tick-trefoil (*Desmodium gunnii*), Kidney Weed (*Dichondra repens*), Whiteroot (*Pratia purpurascens*) and Ivy-leaved Violet (*Viola hederacea*), are scattered amongst the larger plants. Vines of *Glycine clandestina*, False Sarsparilla (*Hardenbergia violacea*), Running Postman (*Kennedia rubicunda*), Common Milk Vine (*Marsdenia rostrata*) and Snake Vine (*Stephania japonica* var*. discolor*) scramble through the groundcover and occasionally over shrubs or tree trunks.

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

Not applicable.

b. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable.

c. In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

The Bangalay Sand Forest that exists within the Subject Land exists as a thin fringe of a larger continuous patch of Bangalay Sand Forest. The proposed development would impact a total of 0.055 ha of the EEC. The adjacent patch is at least 10 ha, and the removal of the poor condition fringe would result in a total impact of 0.55% of this patch. The vegetation is only to be impacted for management as an APZ. As such, the development is not considered to have an adverse effect on the extent of the ecological community as such that its local occurrence is likely to be placed at risk of extinction.

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.

The proposal would remove a maximum total of 0.055 ha Bangalay Sand Forest. The loss of 0.055 ha is not considered to substantially or adversely modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction as this area forms the fringe of a large continuous patch of Bangalay Sand Forest. The vegetation surrounding the proposal is contiguous with the vegetation proposed for removal and will not be impacted.

In relation to the habitat of a threatened species, population or ecological community:

I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposal would modify 0.055 ha through management as an APZ.

II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will not result in any fragmentation as only a small area of vegetation is to be managed as an APZ (0.055 ha) with similar contiguous vegetation surrounding the proposal area. The proposal is not considered to fragment or isolate any areas of the community in the immediate or wider locality as the vegetation does not provide any important habitat corridors in its current state. The removal of the 0.055 ha of Bangalay Sand Forest will not fragment or isolate areas of habitat.

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

The removal (0.055 ha) of the ecological community within the Study Area is not considered to be detrimental to the long-term survival of the ecological community in the locality as it only forms a small percentage (<0.01%) of the mapped extent of the EEC within the Shoalhaven LGA (about 7000 ha) (VIS mapping 2021).

d. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for this vegetation community. In circumstances where impacts are unavoidable, it is recommended to be minimised by retaining and avoiding damage

to high quality patches and protecting important habitat features such as large old trees or stags with hollows – none of which occur within the Subject Land.

e. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan is not recommended for this ecological community at this time.

f. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Vegetation clearance is listed as a key threatening process under the BC Act. The removal of 0.055 ha is considered relatively small considering it only forms a small percentage (<0.001%) of the mapped extent of the EEC in the immediate locality (which totals about 7, 000 ha). The clearance is not considered to result in any fragmentation as contiguous vegetation surrounding the Study Area will remain intact. It is considered unlikely that the proposed would exacerbate any key threatening processes to such an extent that they would place any local occurrences of the community at risk of extinction.

Conclusion

The proposed works are considered unlikely to have a significant impact on the Endangered Ecological Community for the following reasons:

- Although 0.055 ha of vegetation will be removed, this is only for APZ management on vegetated fringes on a large continuous patch of Bangalay Sand Forest that is being retained.
- The removal will not result in any fragmentation and the surrounding contiguous vegetation will be undisturbed.
- The proposal would not substantially or adversely modify the composition of the community within the locality.

Threatened Woodland Birds

The following woodland bird species have been grouped together as they are considered to have similar foraging and roosting habitat requirements. Where substantial differences exist, the species have been discussed separately.

- **Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered (BC Act)**

The Regent Honeyeater is a striking and distinctive, medium-sized, black and yellow honeyeater with a sturdy, curved bill. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak.

Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast.

Within the Subject Land potential habitat for the Regent Honeyeater consist predominantly within the native dominated upper canopy. No preferred foraging trees were recorded in the Subject

Land, however, there are rare observations of the Regent Honeyeater feeding on Banksias, which were present.

- **Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Vulnerable (BC Act)**

These birds are primarily slate-grey, with the males easily identified by their scarlet head and wispy crest, while females have a grey head and crest and feathers edged with salmon pink on the underbelly.

In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.

The species 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.

There are records for this species within a 10 km radius of the Study Area (DPIE 2021). There is potential that the Subject Land is used on rare occasions by this species, although it is unlikely that individuals of this species are dependent upon resources in the Subject Land.

- **Swift Parrot (*Lathamus discolour*) - Endangered (BC Act)**

The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.

They migrate to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta*, *Corymbia maculata*, *C. gummifera*, *E. tereticornis*, *E. sideroxylon*, nd *E. albens*.

Within the Subject Land potential habitat for the Swift Parrot consist predominantly within the few native eucalypts in the APZ – which are not likely to be cleared.

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,

Impacts that are considered to impact on the life cycle of a species relates to impacts on stages of reproduction, growth, development, ageing and death. Woodland birds forage widely

Impacts from the proposed action on the above listed woodland birds relates to the loss of potential foraging habitat only. The development would result in the maximum removal of four trees worth of potential canopy foraging habitat across 0.055 ha. The vegetation to be removed is considered less favourable compared to the vegetation within the surrounding landscape. Intact vegetation outside of this vegetation fringe, not subject to edge effects, has a higher potential to contain all stratum layers of vegetation and is located further from any disturbances (i.e. human activity). The areas of potential foraging habitat represent a very small amount of some 7,000 ha

of more consolidated native forest which exists within a 10 km radius of the site. The woodland bird species are highly mobile and would utilise the foraging resources within the site occasionally at most.

The relative impact is expected to be very small given the remaining 7,000 ha of native forest considered potential foraging habitat within 10 kms and the fact that the species all are considered to highly mobile across all of NSW. The removal of four trees forth of foraging habitat is unlikely to impact these species' life cycle such that they are placed at risk of extinction. If the entire APZ of 0.055 ha was cleared, the maximum impact from the site would therefore occur to <0.001% of the potential foraging/movement habitat within a 10 km radius. The development is not likely to have an adverse effect on the life cycle of the species such that a viable population of the species is likely to be placed at risk of extinction.

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

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

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

Not applicable – not an endangered population.

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 development would result in the maximum removal of 0.055 ha potential habitat (assuming the entire APZ is cleared). This impact represents <0.001% of the existing vegetation within the surrounding 10 km.

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

The impact from the proposal would not fragment or isolate any potential habitat from other areas of habitat as the Study Area exists along the boundary of a large patch of the same or similar vegetation.

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

Important habitat relates to the stages of a species life cycle and reproductive success. The 0.055 ha of potential habitat for removal is not considered important to the long-term survival or reproductive success of the species considering they are able to utilise habitat state-wide. It is considered to represent poor quality habitat within the Study Area, and <0.001% of the remaining extent of available potential habitat within 10 km. This small area of potential habitat would not be important to the long-term survival of the species in the locality.

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

There are no areas of outstanding biodiversity value in the Study Area.

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

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

The maximum removal of four trees within 0.055 ha worth of potential habitat is considered a minor disturbance, particularly in relation to the surrounding habitat and high mobility of these species. Therefore, it is considered unlikely that the proposed vegetation removal would exacerbate any key threatening processes to such an extent that they would place any local populations of the species at risk of extinction.

Conclusion

The proposal will directly affect a maximum area of 0.055 ha of potential habitat to be cleared. The vegetation exists within an already disturbed landscape. Even if these woodland bird species did use the trees for intermittent use, the localised nature of the vegetation removal and the presence of abundant suitable foraging and sheltering resources in the broader landscape, indicate that the proposed action is *unlikely* to have a significant impact on woodland bird species such that it would put a local population of any of the species at risk of extinction or substantially isolate any areas of potential habitat.

In summary:

- proposed habitat clearance is very small (0.055 ha)
- these species are highly mobile and forage widely
- no species were recorded during survey
- the habitat to be removed will not isolate or fragment other foraging or nesting resources
- potential foraging habitat for these species will remain throughout the locality (approximately 7,000 ha of existing forest)

A Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Threatened Megabats

- **Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable (BC Act)**

Grey-headed Flying-fox is listed as a vulnerable species under the BC Act. It is generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops and has been recorded as travelling long distances on feeding forays (up to 50 km). Fruits and flowering plants of a wide variety of species are the main food source.

The species roosts in large 'camps' of up to 200,000 individuals. Camps are usually formed within 20 km of a regular food source and are generally close to water and along gullies. However, the species has been known to form camps in urban areas. Key threats to the species are loss of roosting and foraging sites, electrocution on powerlines, entanglement in netting and on barbed-wire, heat stress, and conflict with humans (OEH 2019).

Potential habitat for the Grey-headed Flying-fox is considered to occur across the Study Area primarily due to the relatively high plasticity in foraging habitat choice for the species. Utilisation of each environment type may differ but the presence of the species at some point in time is considered likely.

Due to the presence of the feed tree eucalypt species within the Subject Land and the relatively high plasticity of habitat choice for the species potential habitat for the Grey-headed Flying-fox is considered likely to occur across the Subject Land at some point in time.

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

The Grey-headed Flying-fox is one large interbreeding population. Impacts likely to have an adverse effect on the life cycle of Grey-Headed Flying-Fox would include impacts which resulted in the loss of significant areas of foraging habitat, increases in the mortality rate, and increases in conflicts with humans.

The proposal would remove a maximum of four eucalypt trees that are considered foraging habitat for the Grey-headed Flying-fox. The maximum removal of this patch is considered relatively small given the retention of 7,000 ha of native forest considered potential foraging habitat available in the wider locality (10km radius around the Study area). The removal of this potential foraging habitat constitutes less than 0.001% of the habitat present in the wider locality. This is considered a minor impact given the species wide foraging range (50km foraging foray).

The potential habitat present within the wider locality is likely to be of similar or better condition that the habitat to be removed.

Therefore, removal of potential foraging habitat is unlikely to have a significant impact on life cycle of this species such that a viable local population of the species would be placed at risk of extinction.

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

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

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

Not applicable – not a threatened ecological community population.

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 would remove of 0.055 ha of native vegetation and considered foraging habitat for the Grey-headed Flying-fox. This forms <0.001 % of the potential foraging habitat within the local area, with 7,000 ha present.

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

The proposal would not result in the fragmentation or isolation of any areas of foraging habitat for this species as the Study Area exists along the boundary of a large patch of the same or similar vegetation. The area to be affected would not act as a foraging link between two areas of foraging habitat. The Grey-headed Flying-fox is also highly mobile and forages up to 50 km in a feeding foray. The removal of 0.055 ha of potential foraging habitat would not prevent this species from utilising other resources within the locality.

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 0.055 ha of potential foraging habitat to be removed is not considered important to the long-term survival of the species. The areas to be affected would not act as a foraging link between two areas of foraging habitat. The Grey-headed Flying-fox is also highly mobile and forages up to 50 km in a feeding foray. The removal of 0.055ha of potential foraging habitat would not prevent this species from utilising other resources within the locality.

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

There are no areas of outstanding biodiversity value in the Study Area.

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

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Clearing of native vegetation

The proposal would involve the maximum clearing of 0.055 ha of native vegetation for APZ management which forms potential foraging habitat for the Grey-headed Flying-fox. This species is highly mobile and is known to rely on a range of foraging resources within the local occurrence. Therefore, the proposal is unlikely to exacerbate the impacts of this key threatening process.

Conclusion

The proposal is unlikely to constitute a significant impact on the Grey-headed Flying-fox given the following:

- the proposal would remove a maximum 0.055 ha of potential foraging habitat
- the Grey-headed Flying-fox is highly mobile, would not rely on the resources to be removed and would utilise a range of foraging habitat within the locality
- the habitat to be removed would not isolate or fragment other foraging resources within the local occurrence
- about 7,000 ha of native forest potential foraging habitat would be retained within the locality

A Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Threatened microchiropteran bats

The following four microchiropteran bat species have been grouped together as they are considered to have similar foraging and nesting habitat requirements. Where substantial differences exist, the species have been discussed separately.

- **Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) - Vulnerable (BC Act)**

The Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. It is also known to dwell in caves and old mind infrastructure.

They generally roost in eucalypt hollows but has also been found under loose bark on trees or in buildings. The species hibernates during winter with females breeding during late spring early summer.

Due to the diversity of environment types across the Study Area, along with the relatively high plasticity in habitat choice for the species, potential habitat for the Eastern False Pipistrelle is considered to occur within the Study Area at some point in time. Utilisation of each environment type may differ but the presence of the species at some point in time is considered likely.

- **Eastern Freetail-bat (*Mormopterus norfolkensis*) – Vulnerable (BC Act)**

The species is found along the east coast from south Queensland to southern NSW in dry eucalypt forests, woodlands, swamp forests and mangrove forests where they forage for insects among canopy gaps and on edges of vegetation and mainly roost in hollow-bearing trees. This species will utilise paddock trees and remnant vegetation in farmland where these are in proximity to larger forest remnants. This species usually forages within a few kilometres of its roost. Eastern Freetail Bat is threatened by a number of processes including loss of trees for foraging and hollow-bearing trees for roosting, and application of pesticides in or adjacent to foraging areas (EES 2018b).

There is potential for the Study Area to be used occasionally by this species for foraging, although it is unlikely that individuals rely upon resources in the Study Area.

- **Large Bentwing-bat (*Miniopterus schreibersii oceanensis*) - Vulnerable (BC Act)**

Caves are the primary roosting habitat of this species, but they also use derelict mines, storm-water tunnels, buildings and other man-made structures. Breeding or roosting colonies can number from 100 to 150,000 individuals. They form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.

The area native vegetation is considered potential foraging for the species and is therefore being assessed.

- **Southern Myotis (*Myotis macropus*) – Vulnerable (BC Act)**

This species has disproportionately large feet; more than 8 mm long, with widely-spaced toes which are distinctly hairy and with long, curved claws. It has dark-grey to reddish brown fur above and is paler below. It weighs up to 15 grams and has a wingspan of about 28 cm. It is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. The Southern Myotis generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. It forages over streams and pools catching insects and small fish by raking their feet across the water surface.

This species would likely utilise the native vegetation in the Study Area for habitat and foraging purposes, however the species would not rely on these resources.

- **Greater Broad-nosed Bat (*Scoteanax rueppellii*) – Vulnerable (BC Act)**

This species 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. It is generally associated with gullies and river systems. The species primarily roosts in tree hollows but is also known to occupy artificial structures.

This species would likely utilise the native vegetation in the Study Area for foraging purposes, however the species would not rely on these resources.

The area native vegetation is considered potential foraging for the species and is therefore being assessed.

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,

Impacts from the proposed action which may have an adverse effect on the life cycles of the species include the loss of potential foraging habitat in the form of 0.055 ha of remnant native trees species.

The potential foraging habitat to be removed is considered less favourable compared to the habitat within the surrounding landscape. Intact vegetation outside of the 0.055 ha fringe of native vegetation has a higher potential to contain all stratum layers of vegetation and is located further from any disturbances (i.e. human activity). The areas of potential habitat represent a very small amount of some 7,000 ha of more consolidated woodland which exists within a 10 km radius of the site. The species are highly mobile and would rely on the resources within the site occasionally at most.

The relative impact is expected to be very small given the remaining 7,000 ha of woodland considered for potential foraging habitat within 10 kms. The removal of 0.055 ha of foraging habitat and the existing artificial structures is unlikely to impact these species' life cycles such that they are placed at risk of extinction. The maximum area impact from the site would therefore occur to <0.001% of the potential habitat within a 10 km radius. The development is not likely to have an adverse effect on the life cycle of the species such that a viable population of the species is likely to be placed at risk of extinction.

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

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

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

Not applicable – not an endangered population.

c. In relation to the habitat of a threatened species or ecological community:

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

The development would result in the removal of 0.055 ha of potential foraging habitat. This area impact represents <0.001% of the existing native forest potential habitat within the surrounding 10 km.

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

The impact from the proposal would not fragment or isolate any potential habitat from other areas of habitat as the Subject Land a exists along the boundary of a large patch of the same or similar vegetation.

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

The 0.055 ha of potential foraging habitat proposed for removal are not considered important to the long-term survival of the species. It is considered to represent an overall poor-quality habitat within the landscape, consisting of <0.001% of the remaining extent of available potential habitat in the locality.

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

There are no areas of outstanding biodiversity value in the Study Area.

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

There is one key threatening process, as listed in Schedule 4 of the BC Act, of relevance to the proposed vegetation clearance:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

The removal of 0.055 ha of potential foraging habitat is considered a small disturbance, particularly in relation to the surrounding habitat and mobility of these species, and ability to utilise a range of habitat attributes. Therefore, it is considered unlikely that the proposed vegetation removal would exacerbate any key threatening processes to such an extent that they would place any local populations of the species at risk of extinction.

Conclusion

The proposal will directly affect a maximum area of a maximum 0.055 ha of potential foraging habitat. The potential foraging habitat exists within an already disturbed fringe of native vegetation. Even if the species did use the habitat for intermittent use, the localised nature of the vegetation removal and the presence of abundant suitable foraging resources in the broader landscape, indicate that the proposed action is *unlikely* to have a significant impact on micro-bat

species such that it would put a local population of any of the species at risk of extinction or substantially isolate any areas of potential habitat.

In summary:

- Proposed foraging habitat clearance is very small (0.055 ha)
- The foraging habitat is not considered significant in the broader landscape and subject to disturbance.
- the habitat to be removed would not provide a habitat link between other foraging resources within the local occurrence
- these species are highly mobile

A Species Impact Statement or BDAR is not recommended with respect to the potentially affected species.

Appendix E: Significant Impact Criteria

Threatened Woodland Birds

The Significant Impact Criteria was applied to the following threatened woodland birds:

- Regent Honeyeater (*Anthochaera Phrygia*) – critically endangered (EPBC Act)
- Swift Parrot (*Lathamus discolour*) – critically endangered (EPBC Act)

Criterion a: lead to a long-term decrease in the size of a population

The development is not likely to lead to a long-term decrease in a size of the above listed species populations. None of the species were recorded during the field survey. Suitable habitat exists within the surrounding area with over 7,000 ha within a 10 km radius, with the impact area totalling to a maximum 0.055 ha – i.e. <0.001% of the existing similar habitat within the surrounding area.

Criterion b: reduce the area of occupancy of the species

The development is not likely to reduce the area of occupancy of the species. Considering the impact area is small when compared the range of each species, it is not considered preferential habitat and would be used, at most, as a potential passageway throughout the landscape. Extensive suitable habitat exists, and will be retained surrounding the site, including over 7,000 ha within the surrounding 10 km radius.

Criterion c: fragment an existing population into two or more populations

The proposed works are unlikely to fragment any existing populations into two or more populations. The proposed impact is restricted to an already modified locality which is in a fringe adjacent to a large area of historic clearance and urbanisation to make way for the existing roads and dwellings. There will be no impact or change to habitat connectivity, and no increase in habitat fragmentation or isolation within wider study area.

Criterion d: adversely affect habitat critical to the survival of a species

The development will not adversely affect habitat critical to the survival of the species. The vegetation to be impacted is not considered to represent habitat of a condition that the species would depend upon.

Criterion e: disrupt the breeding cycle of a population

The development will not disrupt the breeding cycle of a population as the impact is restricted to an area that is unlikely to be used for breeding, with an expansive amount of foraging habitat to remain within 10 km.

Criterion f: modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The development is not considered likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The proposed APZ is restricted to an area with minimal clearance of Regent Honeyeater and Swift Parrot habitat. Extensive suitable habitat exists, and will be retained surrounding the site, including over 7,000 ha within the surrounding 10 km radius.

Criterion g: result in invasive species that are harmful to the species becoming established in species' habitat

The development is not likely to result in an increase in any invasive species that are harmful to the species becoming established in Regent Honeyeater habitat as invasive predators such as Myna birds already have access throughout the site.

Criterion h: Introduce disease that may cause the species to decline, or

It is not considered likely that the development will introduce a disease that would cause the species to decline.

Criterion i: interfere with the recovery of the species

The development is not considered likely to interfere with the recovery of the species. The impact is restricted to a primarily disturbed area that is not considered important to the recovery of the above listed species.

Conclusion

The proposed action is not considered to constitute a significant impact on the Regent Honeyeater or Swift Parrot and therefore a referral to the Commonwealth is not recommended.

Threatened Megabats

- **Grey-headed Flying-fox** ***(Pteropus poliocephalus)***

Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as a vulnerable threatened species under the EPBC Act.

The Grey-headed Flying-fox is one large interbreeding population. Impacts likely to have an adverse effect on the life cycle of Grey-Headed Flying-Fox would include impacts which resulted in the loss of significant areas of foraging habitat, increases in the mortality rate, and increases in conflicts with humans.

The proposal would remove of 0.055 ha of native vegetation and considered foraging habitat for the Grey-headed Flying-fox. The removal of this patch is considered relatively small given the retention of 7,000 ha of potential foraging habitat available in the wider locality (10km radius around the Study area). The removal of 0.055 ha of potential foraging habitat constitutes <0.001 % of the habitat present in the wider locality. This is considered a minor impact given the species wide foraging range.

The potential habitat present within the wider locality is likely to be of similar or better condition that the habitat to be removed.

It is unlikely that the proposal would result in increases in mortality rates through heat stress or electrocution, given the small portion of potential habitat to be removed and no expected impacts to any camps. It is unlikely that the proposal would increase conflicts with humans as it is unlikely the proposal would contribute to Grey-Headed Flying-Fox establishing a camp in the locality.

Therefore, removal of potential foraging habitat is unlikely to have a significant impact on life cycle of this species such that a viable local population of the species would be placed at risk of extinction.

Criterion a: lead to a long-term decrease in the size of an important population of a species

No important populations have been recorded within the study area. The site does not support key source populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of the species range.

Criterion b: reduce the area of occupancy of an important population

This is not an important population.

Criterion c: fragment an existing important population into two or more populations

This is not an important population. The vegetation to be impacted by the proposal is exists as a fridge of 4 trees adjacent to residential developments on the southern side. This species is also known to exist within urbanised environments and will likely continue to exist in the locality following the proposed development.

Criterion d: adversely affect habitat critical to the survival of a species

Although 0.055 ha of potential habitat for this species will be removed for the proposal, the surrounding 7,000 ha of intact native forest provides a more contiguous suitable habitat for the species.

Criterion e: disrupt the breeding cycle of an important population

No important Grey-headed Flying-fox populations have been identified in the study area and the study area is not known to support 'camps' of flying foxes previously.

Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

Although 0.055 ha of potential habitat for this species will be removed for the proposal, the surrounding 7,000 ha of intact forest provides a more contiguous suitable habitat for the species. Given the small amount of habitat to be removed, and the high mobility of the species, it is unlikely that the habitat to be removed would be considered important to the long-term survival of the species in the locality.

Given the highly mobile nature of the species and the fact that the vegetation on site does not represent primary roosting or foraging habitat the potential for fragmentation or isolation is minimal.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

The project will not result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.

Criterion h: Introduce disease that may cause the species to decline;

The project will not result in the introduction of a disease that is harmful to the Grey-headed Flying-fox.

Criterion i: Interfere substantially with the recovery of the species;

Considering the above factors, the project will not interfere substantially with the recovery of the species.

Conclusion

The proposed action is not considered to constitute a significant impact on the Grey Headed Flying Fox and therefore a referral to the Commonwealth is not recommended.