Garret Barry Planning Services

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Bermagui Golf Club Proposed Subdivision

July 2022

Project Number: 21-335

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Document verification

Project Title:	Bermagui Golf Club Proposed Subdivision
Project Number:	21-335
Project File Name:	21-335 Bermagui BDAR Final V1.1

Revision	Date	Prepared by	Reviewed by	Approved by
Working draft V1.0	16/08/2021	Alex Santiago	Louiza Romane (QA review)	Beth Noel (BAAS19015)
Final V1.2	25/08/2021	Alex Santiago	Louiza Romane (QA review)	Beth Noel (BAAS19015)
Final V1.1	23/02/2022	James Hagan	Jared Graham-Higgs	Beth Noel (BAAS19015)
Final V1.2	26/07/2022	Tammy Vesely Slight edits to lot information	Tammy Vesely	Tammy Vesely

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Acronyms and abbreviations

ASL	Above sea level
AWS	Automatic weather station
BAM	Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	Biodiversity Conservation Act 2016
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offset Scheme
BVSC	Bega Valley Shire Council
CEEC	Critically Endangered Ecological Community– as defined under relevant law applying to the proposal
DECCW	Refer to BCD
DAWE	Department of Agriculture, Water and the Environment, formally DoEE
DoE	Department of Environment
DoEE	Department of Environment and Energy
DPIE	(NSW) Department of Planning, Industry and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ha	hectares
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
km	kilometres
LGA	Local Government Area
m	Metres
MNES	Matters of National environmental significance under the *EPBC Act* (c.f.)
NPW Act	*National Parks And Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	Formally Office of Environment and Heritage, now BCD
SEPP	*State Environmental Planning Policy* (NSW)
DSEWPC	(Cwth) Department of Sustainability, Environment, Water, Population and Communities
sp/spp	Species/multiple species
TEC	Threatened Ecological Community

Executive summary

NGH has prepared this BDAR on behalf of Garret Barry Planning Services Pty Ltd. The Bermagui Golf Club subdivision (the proposal) is classified as a local development under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The proposal plans to develop 16.76 ha of land within the southern portion of Lot 245 DP 1272130, creating 187 new residential lots and non-residential lots for a playlot and sewer. **This initial Lot/DP ('previous folio identifier') referenced throughout the report has been changed twice, first to Lot 224 DP 1279383 and subsequently to Lot 228 DP 1284959 ('new folio identifier'), and that all references throughout the BDAR to Lot 245 DP 1272130 are references to Lot 228 DP 1284959.** The proposed clearing will exceed the allowable clearing thresholds of the Biodiversity Offset Scheme (BOS) as specified by the NSW Biodiversity Conservation Act 2016 (BC Act) and the Biodiversity Conservation Regulation 2017 (BC Regulation). As such, this BDAR assesses the impacts of the proposed subdivision (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM).

Avoidance and minimisation of impacts has been conducted through the planning phases which has resulted in avoidance of breaks to connectivity and minimising clearing of treed vegetation in the south-east of the Development Site. In this BDAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the BAM
- One assumed threatened species within the development site and adjacent vegetation the impacts to which have been adequately assessed.
- Mitigation measures which have been outlined to reduce the impacts to biodiversity (Section 8).

The following details the ecosystem credits and species credits generated within the Development Footprint which will need to be offset:

- 138 ecosystem credits for PCT 834 and associated TEC Lowland Grassy Woodland in the South East Bioregion
- 13 ecosystem credits for PCT 875
- 81 ecosystem credits for PCT 1220
- 12 ecosystem credits for PCT 1336
- 146 species credits for Brush-tailed Phascogale

EPBC Assessments of Significance for Regent Honeyeater, Swift Parrot, Spot-tailed Quoll, Grey-headed Flying Fox, White-throated Needletail, Koala, Greater Glider and Lowland Grassy Woodland in the South East Bioregion were undertaken. An EPBC referral has been recommended to assess the likelihood of significant impacts on Koala, Greater Glider and Lowland Grassy Woodlands in the South East Bioregion as a result of the proposed development. Significant impacts were not considered likely for all other EPBC listed threatened species and EPBC referral was not recommended. In addition, under the Koala SEPP a Koala Assessment Report has been prepared for submission with this BDAR (Appendix D).

The retirement of these credit will be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

1. Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules (which includes stewardship or the purchase of credits), or

2. Making payments into the Biodiversity Conservation Fund using the offset payments calculator.

1. Introduction

The Bermagui Golf Club subdivision (the proposal) is classified as a local development under Part 4 of the Environmental Planning and Assessment Act 1979. Part 4 development is subject to the thresholds of the Biodiversity Offset Scheme (BOS) as specified by the NSW Biodiversity Conservation Act 2016 (BC Act) and the Biodiversity Conservation Regulation 2017 (BC Regulation).

A preliminary assessment of the proposal has found that the subject land (Lot 245 DP 1272130) has a minimum lot size of 0.06 ha under Bega Valley Shire Council (BVSC) Local Environment Plan (LEP). The area clearing threshold for developments within BVSC must be less than 0.25 ha to be excluded from the BOS. The proposed development will be clearing 16.76ha. Therefore, a full Biodiversity Development Assessment Report (BDAR) is required.

This BDAR assesses the impacts of the proposed Bermagui Golf Club Subdivision according to the NSW Biodiversity Assessment Methodology (BAM). NGH has prepared this report on behalf of the proponent, Garret Barry Planning Services Pty Ltd.

1.1 The proposal

This report assesses the potential biodiversity impacts and associated credit obligation of the Bermagui Golf Club subdivision, which proposes to develop 16.76 ha of land within the southern portion of Lot 245 DP 1272130 (refer to Figure 1-1). The northern portion of the lot was previously subdivided across two stages. Clearing associated with Stage 1 works totalled 1.06 ha, however as the development was undertaken prior to the introduction of the BOS, assessment under the BAM was not required. Clearing associated with Stage 2 works totalled 3.84 ha, exceeding the clearing threshold, and triggering the BOS. A BDAR was prepared for stage 2 works and was lodged to BVSC and approved in 2019.

The proposal aims to create 187 residential new lots within Lot 245 DP 1272130 that range in area from <450-1000m^2. Additionally, the proposal will create non-residential lots for a playlot park and sewer pumping station. Clearing for new public roads will also be required to provide access to new lots. All new lots will be connected to reticulated sewer and require an asset protection zone under Planning for Bushfire Protection 2006, at a BAL 29 rating. The asset protection zone has not been considered in this report and will require additional assessment.

The final layout map in Figure 10-2 illustrates the indicative lot layout, new public roads and APZs proposed as part of this subdivision.

The following terms are used in this document:

- Development Footprint – The area of land that is directly impacted by the proposal. This includes 187 proposed lots, roads, paths, a play area, and a natural area. The Development Footprint does not include an Asset Protection Zone (APZ), which is to be defined by Garret Barry Planning Services.
- Development Site – The Development Site is the area which the BAM has been applied, within which, and following detailed design, the Development Footprint will be sited together with areas of land that are subject to potential direct and indirect impacts from the proposal.
- Subject land – Definition as per Development Site.
- Assessment area – All land within 1500 m of the outside edge of the boundary of the Development Site, with the exclusion of the ocean.

1.2 The Development Site

1.2.1 Site location

The proposal is zoned as residential land and is located on the western side of the Bermagui township. The proposal is within the Bega Valley Local Government Area (LGA) and is 34 km north-east of the Bega township. The subject land (Lot 245 DP 1272130) is privately owned and adjoins Parbery Avenue to the north and Nutleys Creek Rd to the west, as shown in Figure 1-1.

1.2.2 Site description

The Development Site comprises approximately 20 ha of freehold land. The Development Site is comprised of mildly southwards sloping terrain, with small ephemeral streams running east-west through the site. All vegetation within the Development Site has been disturbed to some degree, with the most intact vegetation occurring in the south-east of the site. Habitat values identified within the development site consist of:

- One second and two first order ephemeral streams.
- Wet sclerophyll forest dominated by Spotted gum (*Corymbia maculata*) along the southern and eastern boundaries of the Development Site and adjacent areas.
- Grassy woodland dominated by Rough-barked Apple (*Angophora floribunda*) following the first order streams.
- Rainforest dominated by Grey Myrtle (*Backhousia myrtifolia*) within the riparian zone of the second order stream.
- Heavily disturbed derived grasslands which contain a mix of native and exotic species covering the remainder of the Development Site.

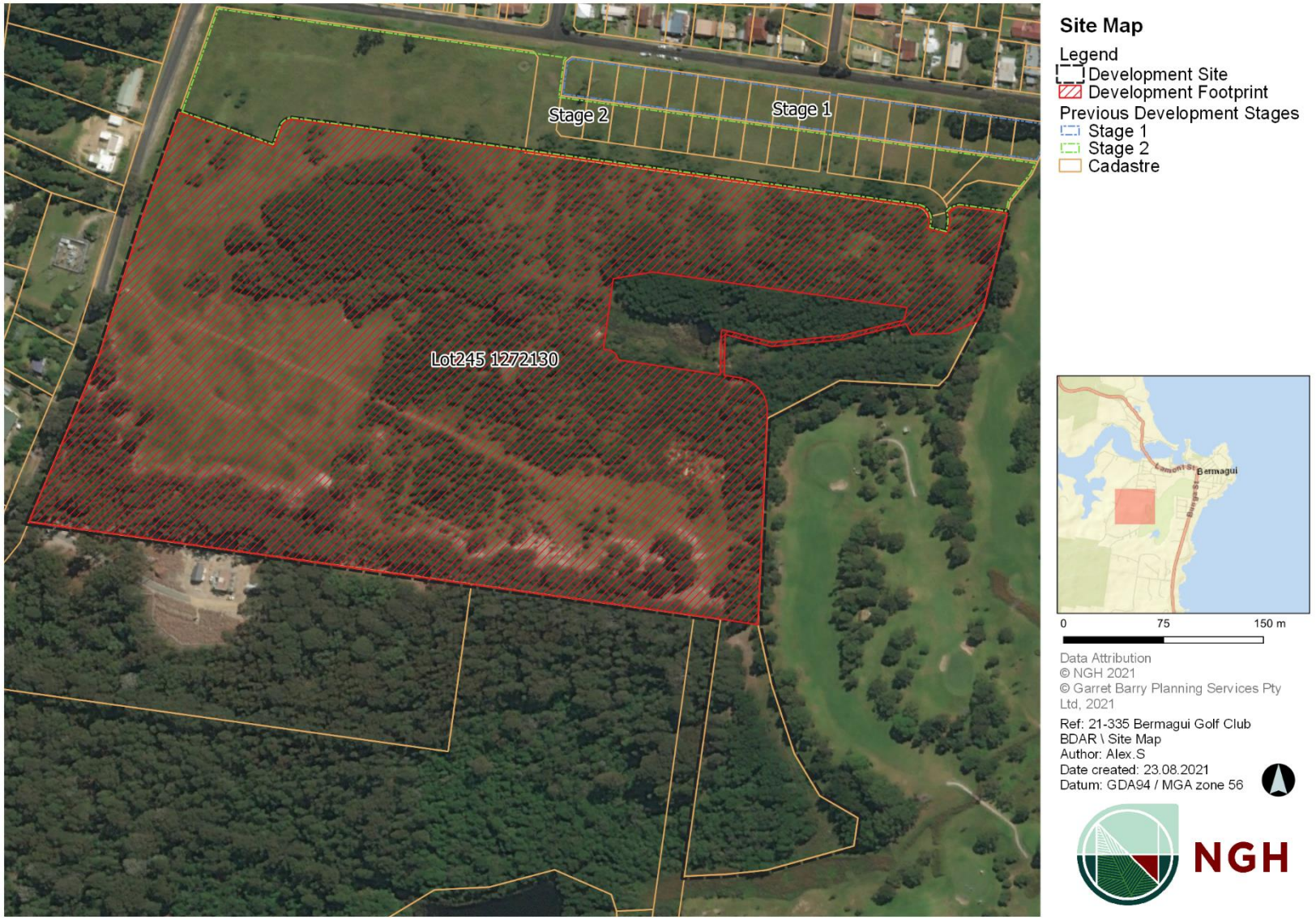

Figure 1-1 Site map

1.3 Study aims

The aim of this BDAR is to address the requirements of the BOS in accordance with the BC Act through the application of the BAM 2020. The BOS approach is outlined below:

- The BOS creates a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity.

This BDAR also includes the assessment requirements of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

1.4 Source of information used in the assessment

The following information sources were used in the development of this BDAR:

- Survey and site plans provided by Garret Barry Planning Services.
- Australian Government's Species Profiles and Threats (SPRAT) database http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
- NSW OEH's Threatened Species Profiles http://www.environment.nsw.gov.au/threatenedspeciesapp/
- DPI profiles of threatened species, population, and ecological communities
- Commonwealth Department of Environment and Energy Protected Matters Search Tool

  Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool
- Australia's IBRA Bioregions and sub-bioregions. Accessed http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2.
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx).
- NSW OEH's BioNet threatened biodiversity database

  Accessed online via login at http://www.bionet.nsw.gov.au/.
- NSW OEH Threatened Species Profiles

  Accessed online at http://www.environment.nsw.gov.au/threatenedSpeciesApp/ and www.environment.nsw.gov.au/AtlasApp/UI_Modules/
- OEH BioNet Vegetation Classification Database (OEH 2017)

  Accessed online via login at http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx
- OEH VIS Mapping
  Accessed online at http://www.environment.nsw.gov.au/research/VISmap.htm
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method.
- NSW Government SEED Mapping

Accessed online at https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU

- NSW Biodiversity Values Map
- Accessed online at https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap
- Eco Logical Australia 2015. Biometric Vegetation Compilation. Prepared for South East Local Land Services, (SELLS 2015).
- OEH 2013 Compilation map: Biometric vegetation types and endangered ecological communities of the Shoalhaven, Eurobodalla and Bega Valley local government areas. A living map. Version 2.0 Technical Report. NSW Office of Environment and Heritage, Queanbeyan.

2. Landscape features

2.1 IBRA bioregions and subregion

Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The Development Site is located within the NSW South East Corner Bioregion, and in the South East Coastal Ranges subregion (Figure 2-3), which was entered into the BAM Calculator for the proposal. This bioregion is characterised by a sub-humid climate with mild summers and winters. The geology is a combination of less eroded Sandstone to the north (Sydney Basin) with underlining Ordovician rocks with isolated intrusions of Granite to the south. The differing geology's have a strong influence on regional topography. Granites in the Bega valley weather faster than the surrounding metamorphosed sediments and are eroded into local topographic basins. Other granites with a higher proportion of quartz form steep country with areas of outcrop and rounded tors. Pre-European vegetation types includes Red Bloodwood (*Corymbia gummifera*) and Spotted Gum (*Eucalyptus maculata*) forests in lower elevations.

2.2 NSW landscape regions and area

The Development Site is primarily in the 'Bodalla - Nadgee Coastal Sands' NSW (Mitchell) Landscape (Figure 2-3), which was entered into the BAM C for the proposal. The south-western corner of the Development Site is within the Bega Coastal Foothills NSW Landscape.

2.3 Native vegetation

The Development Site is largely comprised of degraded native grassland derived from the clearing of woody vegetation. A thinly vegetated first and second order watercourse runs through the centre of the property flowing east to west (Figure 3-2). The watercourse is fringed with Grey Myrtle (*Backhousia myrtifolia*) and a mix of other rainforest species such as Lilly Pilli (*Acmena smithii*), forming a closed canopy. Thick regeneration of Native Dogwood (*Ozothamnus diosmifolius*) fringes the Grey Myrtle scrub. This land had been subjected to what appeared to be slashing. It also contained thick stands of Bracken Fern (*Pteridium esculentum*) and Matrush (*Lomandra longifolia*). Rough-barked Apple (Angophora floribunda), Forest Red Gum (*Eucalyptus tereticornis*) and Spotted Gum (*Corymbia maculata*) were also present in the upper fringes of these watercourses (see Figure 2-1).

Wet Sclerophyll Forest dominated by Spotted Gum (*Corymbia maculata*) occurred on the southern boundary of the Development Site. Lesser dominant species included Silver-top Ash (*Eucalyptus sieberi*), Mugga Ironbark (*Eucalyptus tricarpa*), Sweet flowing Pittosporum (*Pittosporum undulatum*) and Cherry Ballarat (*Exocarpos cupressiformis*) were detected. Thick regeneration of Black Wattle (*Acacia mearnsii*) and Sweet Pittosporum (*Pittosporum undulatum*) was found within the south-eastern extent of the Development Site.

As determined by GIS mapping from aerial imagery, approximately 579 ha of native vegetation occurs inside the 1500 m buffer area (that includes the subject land) (refer to Figure 3-1). The native vegetation in the landscape surrounding the Development Footprint is predominantly wet and dry sclerophyll forest dominated by Spotted gum (*Corymbia maculata*) and with other species including Blue-leaved Stringybark (*Eucalyptus agglomerata*), Silver-top Ash (*Eucalyptus sieberi*) and Mugga Ironbark (*Eucalyptus tricarpa*). Estuarine habitat and coastal dune scrub also are common within the area, fringing coastal lakes and rivers and headlands next to the sea.


Figure 2-1 Vegetated watercourse and wet sclerophyll forest to the south of the development site

2.4 Cleared areas

The cleared areas surrounding the Development Site contain a mix of land uses including agricultural land and the Bermagui township which includes recreational land, such as golf club greens and local parks and ovals. The surrounding area also consists of residential land and hardstand areas of roads, driveways, and car parks.

2.5 Rivers and streams

There is one second order water course within the Development Footprint as classified under the Strahler stream classification system (Strahler, 1952), running east to west (see Figure 2-2 and Figure 3-2). Two first-order watercourses flow into the second order water course. Factoring in drainage buffers, a total of approximately 0.42 ha of the second order watercourse and 0.45 ha of the first-order streams are likely to be impacted by the Development Footprint.

Figure 2-2 Second order stream

2.6 Wetlands

No wetlands of international importance were identified within the PMST search in or in proximity to the Development Site. One wetland of national importance, Wallaga Lake, was identified by the PMST search, which is 4.5 km north of the Development Site.

2.7 Connectivity features

Forest vegetation along the southern and eastern boundaries of the Development Site is likely to provide some connectivity for fauna between a large contiguous patch of vegetation to the south-west of the site and disturbed vegetation within the Bermagui Golf Club to the east of the site as shown on Figure 3-1.

2.8 Areas of geological significance

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the Development Site.

2.9 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value occur within the Development Site.

2.10 Site context components

Method applied

The proposal conforms to the definition of a site-based development under the BAM. The site-based development assessment methodology has been used in this BAM assessment.

Percent Native Vegetation Cover

The Percent Native Vegetation Cover within the 1500 m buffer area surrounding the Development Site prior to the development was calculated to be 58%. This was entered into the BAM calculator for the proposal.

Percent Native Vegetation was calculated using existing South-East Local Land Services (SELLS) vegetation mapping and adjusting areas using aerial imagery within the 1500m buffer. For woody vegetation, polygons were drawn around tree canopies that had spacings less than one-hundred metres from other tree canopies. Small patches of exotic groundcover lacking trees were often incorporated into woody vegetation polygons (such as the adjoining golf course) because native tree canopy spacings were less than one hundred metres apart. Where large tracks of cleared land were observed without tree canopies, these areas were assumed to contain exotic groundcover because of land management. This related to pasture improved farming land and sports ovals (refer to Figure 3-1).

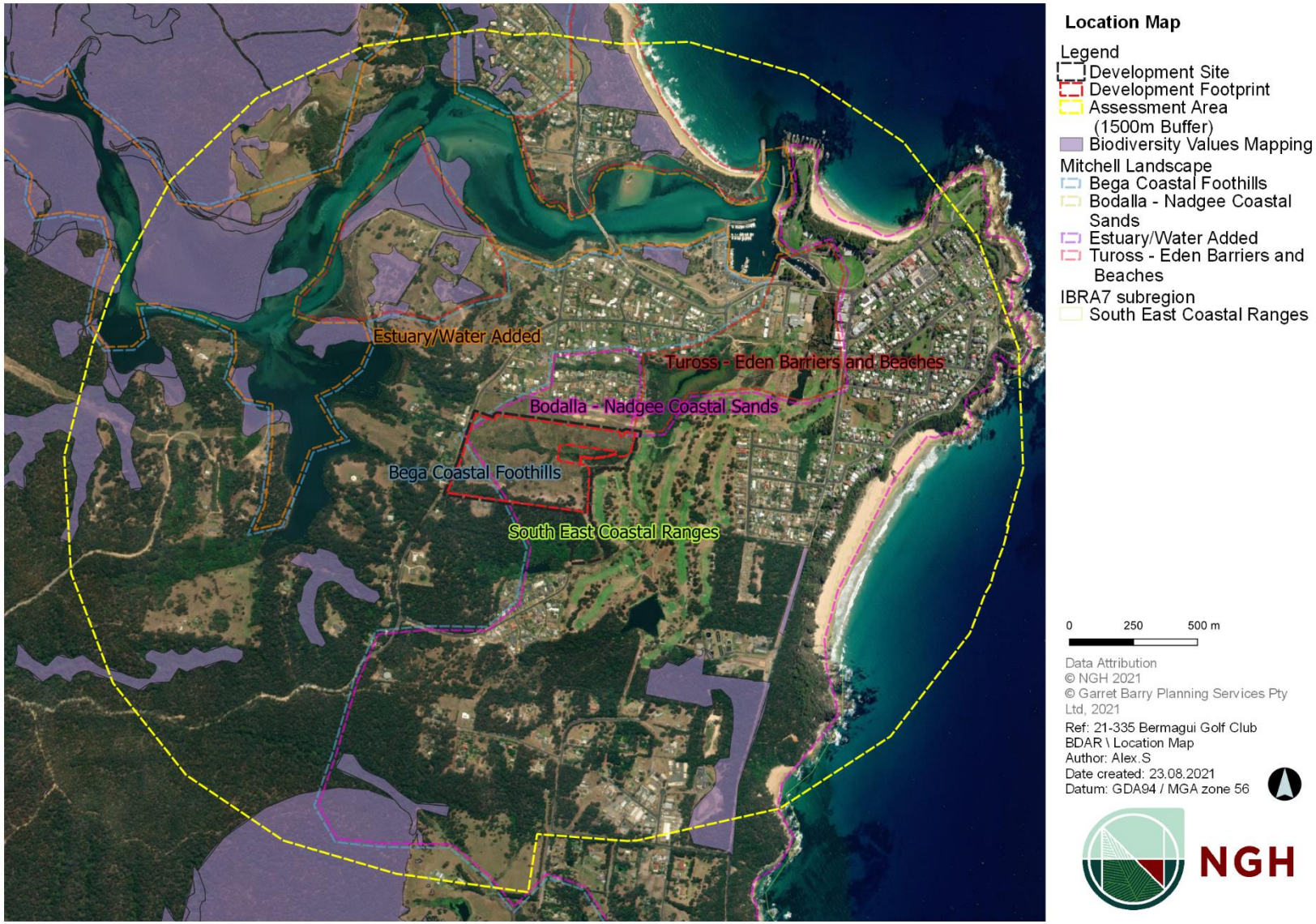

Figure 2-3 Location map

3. Native vegetation

3.1 Native vegetation extent

The Development Site is comprised entirely of native vegetation for the purpose of assessing native vegetation extent. This is in the form of derived grasslands (of varying condition states), disturbed woodland and disturbed forest (refer to Figure 3-1 below).

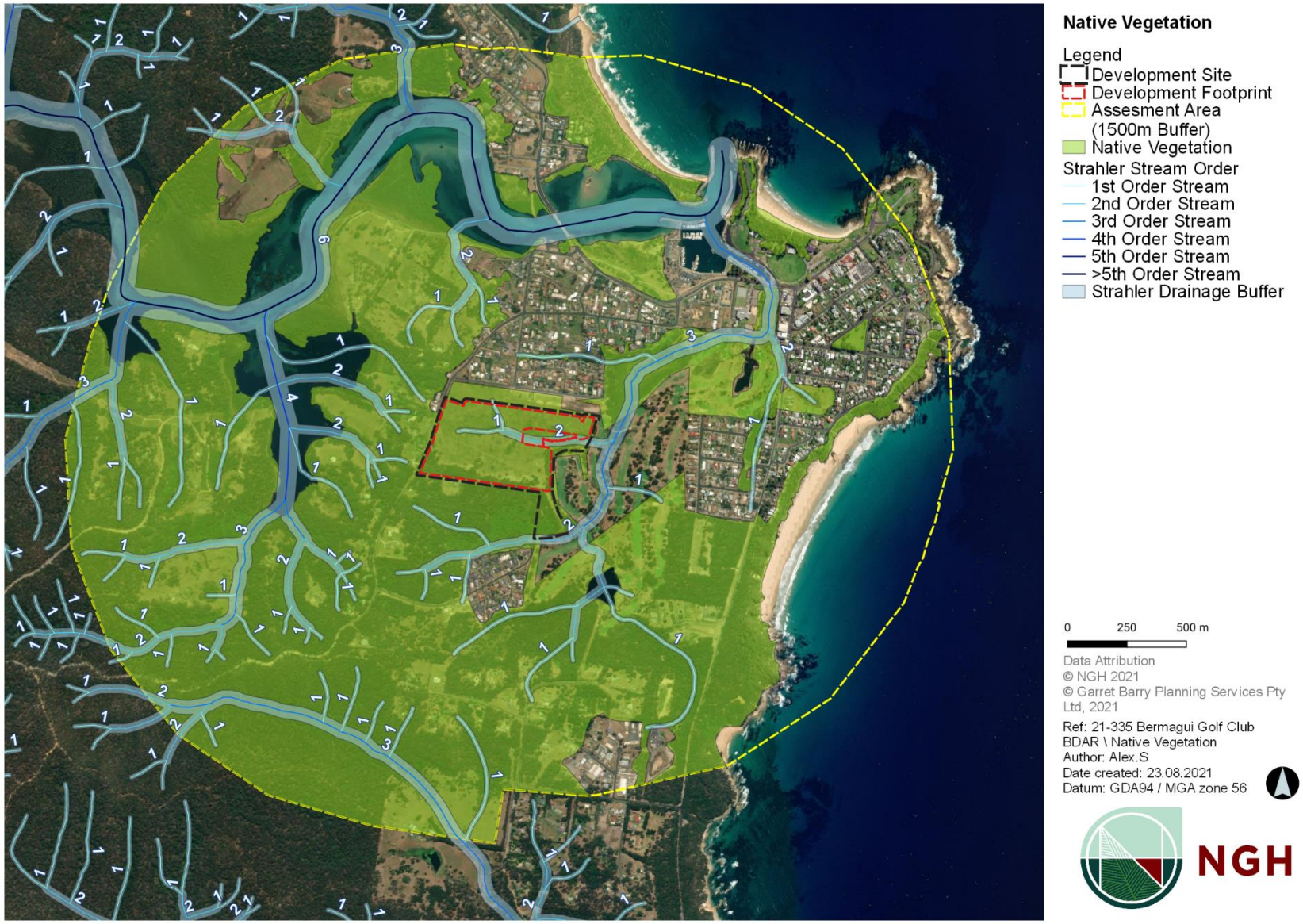

Figure 3-1 Native vegetation extent within the assessment area (1500m buffer)

3.2 Plant Community Types (PCTs)

3.2.1 Methods to assess PCTs

Review of existing information

A search was undertaken of the OEH BioNet Vegetation Classification System (BVCS) database when classifying Plant Community Types (PCTs). The South East Local Lands Service vegetation maps (SELLS, 2014) were also accessed to investigate existing mapping within and surrounding the Development Site. SELLS mapping identified the following vegetation types may have been present onsite:

1. Small patches of PCT 891 (Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner) were mapped scattered throughout the Development Site.
2. One small patch of PCT 907 (Lilly Pilly - Sassafras warm temperate rainforest in moist sheltered gullies, Sydney Basin Bioregion and South East Corner Bioregion) was mapped to the north of the Development Site.

The compilation map for Biometric vegetation types and endangered ecological communities of the Shoalhaven, Eurobodalla & Bega Valley local government areas was used to review descriptions of relevant Biometric vegetation (SEED, 2021).

Field surveys and personnel

Site visits and vegetation stratification were undertaken by NGH in 2004 and 2010, as part of a flora and fauna assessment. These data were reviewed in relation to PCT allocation and threatened species habitat, but were not entered into the BAM-C.

Site inspection and vegetation integrity plot surveys were undertaken by BAM accredited ecologists in May, July and November 2018. These data were used to determine PCTs and vegetation condition onsite, and data from BAM plots were entered into the BAM-C.

Floristic surveys

An initial site inspection was undertaken in May 2018 and subsequent targeted threatened flora surveys and vegetation integrity plots were undertaken in November 2018. The Development Site and adjacent vegetation was surveyed on foot by two ecologists, accredited under the BAM. The aim of the survey was to determine the PCTs present inside the Development Footprint and assess their structure, function and composition.

Initially, random meander searches were conducted across larger sections within and adjacent to the Development Site and surrounds to gain more information about surrounding vegetation and dominant species. This was especially important for providing information about what dominant tree species were likely to occur within the areas which lacked tree cover.

PCT identification was based on:

- native species present inside 20 x 20m plots,
- tree species observed in adjoining landforms with similar environmental attributes (soils, topography and aspect), and

- Ensuring presence of the PCT in the IBRA subregion using the BioNet Vegetation Classification Database.

Once PCTs were identified, they were then stratified into different condition states to identify vegetation zones for the purpose of undertaking surveys.

Vegetation integrity quadrats consisting of 20x20m floristic survey (composition, structure) and 20x50m (function) were replicated within each vegetation zone of the Development Footprint in accordance with the BAM,. Data was collected utilising the methodology presented in the BAM 2017 (equivalent to BAM 2020) by persons trained in and/or accredited to apply the BAM. All work was conducted under the direction of persons accredited to apply the BAM. Given the limited amount of PCT 1336 within the Development Site, the BAM plot for this PCT 1336 moderate condition was conducted in a larger patch within the Development Site, but outside of the Development Footprint. These are summarised in Table 3-1.

Table 3-1 Mapped PCTs within the Development Site

Mapped PCTS	Present within the Development Site (OEH 2018)
PCT 1336 Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion	2.16 ha
PCT 1220 Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	5.31 ha
PCT 834 Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion	10.83 ha
PCT 875 Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin Bioregion and South East Corner Bioregion	1.47 ha

3.2.2 Limitations

A thorough search of the Development Site was undertaken in accordance with the BAM, and relevant threatened flora and fauna guidelines. However, there is potential for some flora species not to be recorded during the survey due to dry conditions at the time of surveys. In particular, inconspicuous or geophytic species, which have potential to flower outside of the completed surveyed periods (i.e. December and February) or not at flower at all in a poor year depending on local conditions may not have been recorded. The drought conditions may have reduced the abundance and cover of forbs and grasses.

Additional targeted threatened flora surveys were undertaken in February 2020 following substantial rainfall in the preceding months, increasing confidence in the representation of the data collected. Regardless, a precautionary approach has been taken as to the likelihood of the presence of suitable habitat. Therefore, flora and fauna species unlikely to be detected during the time of the survey and drought conditions, are considered to be assessed adequately. Details of these surveys are included in Section 4.2.4 below.

3.2.3 PCTs identified on the Development Site

Four PCTs were identified within the Development Site:

1. PCT 1336 - Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion.
2. PCT 1220 - Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion.
3. PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion, with associated TEC Lowland Grassy Woodland in the South East Corner Bioregion.
4. PCT 875 - Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin Bioregion and South East Corner Bioregion.

Descriptions of the PCTs and associated TECs are identified and provided in Table 3-2 to Table 3-5.

Table 3-2 Description of PCT within Development Site

PCT name		
Vegetation formation	Wet Sclerophyll Forests (Shrubby sub-formation)	
Vegetation class	South Coast Wet Sclerophyll Forests	
Vegetation type	PCT ID	1336
	Common Community Name	*Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion*
Approximate extent within the Development Site	2.16 ha within development site Development footprint includes: 0.35 ha of derived grassland low condition 0.42 ha of forest moderated condition	
Species relied upon for PCT identification	Species name	Relative abundance
	Corymbia maculata	1%
	Pittosporum undulatum	50%
	Clematis glycinoides var. glycinoides	0.1%
	Geitonoplesium cymosum	0.1%
	Marsdenia rostrata	0.1%
	Notelaea venosa	0.1%
	Pandorea pandorana	0.1%
	Gahnia melanocarpa	5%
	Dichondra repens	0.1%
	Goodenia ovata	0.1%

PCT name		
	Microlaena stipoides var. stipoides	5%
	Oplismenus imbecillis	0.1%
Justification of evidence used to identify the PCT	Tree species within and in proximity to the woodland zone of this PCT, in combination with dominant shrubs and groundcover species in and in proximity to both zones were used to identify this PCT. PCTs were shortlisted based on the following factors: • PCT within Sub IBRA region South East Coastal Ranges. • Dominant canopy species was Spotted Gum (*Corymbia maculata*). PCTs shortlisted included; • PCT 1206 Spotted Gum - Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion • PCT 1212 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin Bioregion and South East Corner Bioregion. • PCT 1220 Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion. • PCT 1326 Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion • PCT 1336 Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion. PCTs 1206, 1212, and 1220 were ruled out based on the absence of the dominant mid strata species Sweet Pittosporum, and the geographic mismatch (all 3 sites are only known from areas significantly further north of the Development Site). Similarly, PCT 1326 was excluded based on geographic mismatch, as this PCT is only known from areas between Illawarra and Moruya. Floristics within the vegetation zone aligned most closely with PCT 1336 (12 species), as well as matching the landscape position and geographic occurrence.	
TEC Status	PCT 1336 is not associated with any TECs under NSW or Federal legislation.	
Estimate of percent cleared within NSW	A search of the BioNet Vegetation Classification database indicates that 35% of this PCT has been cleared post European settlement.	
Examples		

Table 3-3 Description of PCT 1220 within Development Site

PCT name		
Vegetation formation	Wet Sclerophyll Forests (Grassy sub-formation)	
Vegetation class	Southern Lowland Wet Sclerophyll forests	
Vegetation type	PCT ID	1220

<table>
<tr><th colspan="4">PCT name</th></tr>
<tr><td></td><td>Common Community Name</td><td colspan="2">Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion</td></tr>
<tr><td>Approximate extent within the Development Site</td><td colspan="3">5.31 ha within development site.
Development footprint:
0.99 ha of derived grassland low condition
2.93 ha of forest moderate condition</td></tr>
<tr><td rowspan="11">Species relied upon for PCT identification</td><td colspan="2">Species name</td><td>Relative abundance</td></tr>
<tr><td colspan="2">Corymbia maculata</td><td>15%</td></tr>
<tr><td colspan="2">Eucalyptus globoidea</td><td>1%</td></tr>
<tr><td colspan="2">Eucalyptus muelleriana</td><td>5%</td></tr>
<tr><td colspan="2">Imperata cylindrica</td><td>20%</td></tr>
<tr><td colspan="2">Hibbertia aspera</td><td>0.1%</td></tr>
<tr><td colspan="2">Dianella caerulea</td><td>0.1%</td></tr>
<tr><td colspan="2">Entolasia stricta</td><td>0.25%</td></tr>
<tr><td colspan="2">Lepidosperma laterale</td><td>0.1%</td></tr>
<tr><td colspan="2">Podolobium ilicifolium</td><td>0.1%</td></tr>
<tr><td colspan="2">Lomandra multiflora subsp. mutliflora</td><td>0.1%</td></tr>
<tr><td>Justification of evidence used to identify the PCT</td><td colspan="3">Tree species within and in proximity to the woodland zone of this PCT, in combination with dominant shrubs and groundcover species in and in proximity to both zones were used to identify this PCT. The following factors were taken into consideration when identifying this PCT.

• Dominant canopy species included Spotted Gum (Corymbia maculata), Yellow Stringybark (Eucalyptus muelleriana) and White Stringybark (E. globoidea).
• Dominant groundcover species was Blady Grass (Imperata cylindrica).

PCTs shortlisted included;

• PCT 1212 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin Bioregion and South East Corner Bioregion.
• PCT 1336 Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion.
• PCT 891 Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion.

This area has been previously mapped by SELLS (2014) as PCT 891. Although the characteristic species were somewhat aligned with the zones, this PCT was ruled out based on the dominant canopy of Spotted Gum within</td></tr>
</table>

PCT name	
	the woodland zone and the dominant groundcover of Blady Grass within both zones, neither of which are characteristic of PCT 891. Similarly, PCT 1336 was ruled out based on the canopy of White Stringybark within the woodland zone and the dominant groundcover of Blady Grass within both zones, neither of which are characteristic of PCT 891. Additionally, the characteristic species of PCT 1336 do not align well with those species recorded within these zones. PCT 1220 was identified as the most likely PCT due to the alignment of canopy, mid-storey, and groundcover characteristic species between the PCT and vegetation zones.
TEC Status	PCT 1220 is not associated with any TECs under NSW or Federal legislation.
Estimate of percent cleared within NSW	A search of the BioNet Vegetation Classification database indicates that 15% of this PCT has been cleared post European settlement.
Examples	

Table 3-4 Description of PCT 834 within Development Site

PCT name		
Vegetation formation	Grassy Woodlands	
Vegetation class	Coastal Valley Grassy Woodlands	
Vegetation type	PCT ID	834
	Common Community Name	*Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion*
Approximate extent within the Development Site	10.83 ha within development site Development footprint: 9.55 ha of derived grassland low condition 0.91 ha of woodland moderate condition	
Species relied upon for PCT identification	Species name	Relative abundance
	Angophora floribunda	30%
	Eucalyptus tereticornis	10%
	Acacia mearnsii	0.1%
	Bursaria spinosa	0.1%
	Ozothamnus diosmifolius	12.5%

PCT name		
	Desmodium varians	0.1%
	Dichelachne micrantha	0.1%
	Eragrostis leptostachya	0.1%
	Microlaena stipoides	30%
	Themeda triandra	0.5%
	Dichondra repens	0.1%
Justification of evidence used to identify the PCT	Tree species within and in proximity to the woodland zone of this PCT, in combination with dominant shrubs and groundcover species in and in proximity to both zones were used to identify this PCT. The following factors were taken into consideration when identifying this PCT. • Dominant canopy species included Rough-barked Apple (*Angophora floribunda*) and Forest Red Gum (*Eucalyptus tereticornis*). • Dominant mid-storey of White Dogwood (*Ozothamnus diosmifolius*). • Dominant groundcover species was Weeping grass (*Microlaena stipoides*). Two PCTs within the South East Coastal Ranges IBRA subregion were shortlisted based on the dominant canopy species being characteristic of the PCT: • PCT 834 Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion. • PCT 914 Maidens Gum - Yellow Box - Forest Red Gum grassy open forest of the Araluen Valley, South East Corner Bioregion. PCT 834 was determined as the most likely candidate, given the close alignment of characteristic species and species observed within plots in the canopy, mid-storey, and ground-storey (as detailed in the table above).	
TEC Status	PCT 834 is associated with two TECs under NSW legislation. These are; 1) Lowland Grassy Woodland in the South East Corner Bioregion Endangered Ecological Community (EEC). 2) Brogo Wet Vine Forest in the South East Corner Bioregion. Listing of Lowland Grassy Woodland in the South East Corner Bioregion under the BC Act requires areas which meet the following criteria (Department of Environment, Climate Change and Water 2010): • Site located within the South East Corner Bioregion of NSW. • Vegetation open forest or woodland with a grassy ground layer, or derived native grassland. • Site on low, rolling hills in an area less than 500 m in elevation. • Site in a rainshadow area which receives about 700–1100 mm rain per annum • Tree layer, if present, contains forest red gum, rough-barked apple and/or white stringybark.	

PCT name	
	The Development Site is located within the South East Corner Bioregion of NSW. PCT 834 occurs in two conditions across the Development Footprint, grassland low and woodland moderate. Both PCT 834 zones occur within rolling hills at an elevation below 500 m. The Study Site receives annual rainfall of 746 mm (BOM, 2021). The dominant canopy, mid-storey and groundcover species are consistent with that characteristic of Lowland Grassy Woodland in the South East Corner Bioregion. Given these factors, both PCT grassland low and PCT woodland moderate are considered to meet the criteria for BC listing as TEC Lowland Grassy Woodland in the South East Corner Bioregion. The vegetation identified as PCT 834 meets the condition threshold for listing under the EPBC Act by meeting the following criteria (DSEWPC, 2013): • Area within known geographical distribution of Lowland Grassy Woodlands – South East Corner Bioregion. • Area in proximity to coastal areas. • Elevation below 500 m asl. • For woodland: Tree canopy dominated by expected species for Lowland Grassy Woodlands – Forest Red Gum (*Eucalyptus tereticornis*) and Rough Barked Apple (*Angophora floribunda*). • For derived grassland: diversity of grasses (including Kangaroo Grass) and forbs. • Sub canopy present and with expected species *Acacia mearnsii*. • Grassy understorey with diversity of forbs present. • For woodland: Area > 0.25 ha with >50% native understorey cover and > 15 native understorey species. • For derived grassland: Area >2 ha with >50% native understorey cover > 10 native understorey species.
Estimate of percent cleared within NSW	A search of the BioNet Vegetation Classification database indicates that 90% of this PCT has been cleared post European settlement.
Examples	

Table 3-5 Description of PCT 875 within Development Site

PCT name		
Vegetation formation	Rainforest	
Vegetation class	Dry Rainforests	
Vegetation type	PCT ID	875
	Common Community Name	Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin Bioregion and South East Corner Bioregion
Approximate extent within the Development Site	1.47 ha within development site Development footprint: 0.62 ha forest moderate condition	

PCT name		
Species relied upon for PCT identification	Species name	Relative abundance
	Acmena smithii	0.1%
	Backhousia myrtifolia	60%
	Breynia oblongifolia	0.1%
	Myrsine howittiana	0.1%
	Notelaea venosa	1%
	Persoonia linearis	0.1%
	Pittosporum undulatum	3.5%
	Eustrephus latifolius	0.1%
	Geitonoplesium cymosum	0.1%
	Marsdenia rostrata	0.1%
	Morinda jasminoides	0.1%
	Pandorea pandorana	0.1%
	Oplismenus imbecillis	0.1%
	Doodia aspera	0.5%
Justification of evidence used to identify the PCT	To determine the PCT, dominant trees species (Backhousia myrtifolia and Pittosporum undulatum) were used to gather evidence of the upper stratum as well as dominant groundcovers within BAM plots 311 and bs 312 to identify the best matching PCT. PCTs shortlisted included; • PCT 1079 Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin Bioregion. • PCT 1212 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin Bioregion and South East Corner Bioregion. • PCT 1326 Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion. As well as matching plot data to PCTs, existing vegetation mapping was also reviewed. SELLS 2014 contains close mapping of equivalent Biometric Vegetation Type as 'SR569 'Lilly Pilly - Sassafras warm temperate rainforest in moist sheltered gullies, Sydney Basin and South East Corner'. This was located within BAM plot bs311 and correlates to PCT 907. Floristics of both PCT 875 and 907 align closely with the vegetation zone (12 matches and 11 matches respectively), including matching the dominant upper and mid strata. However, the landscape position of PCT 907 does not align with the Development Site, as this PCT occurs on foothills and escarpments between 300 - 750 m asl (site approximately 20 m asl). PCT	

PCT name	
	875 aligns with the vegetation zone in description, floristics and landscape position.
TEC Status	PCT 875 is not associated with any TECs under NSW legislation.
Estimate of percent cleared within NSW	A search of the BioNet Vegetation Classification database indicates that 10% of this PCT has been cleared post European settlement.
Examples	

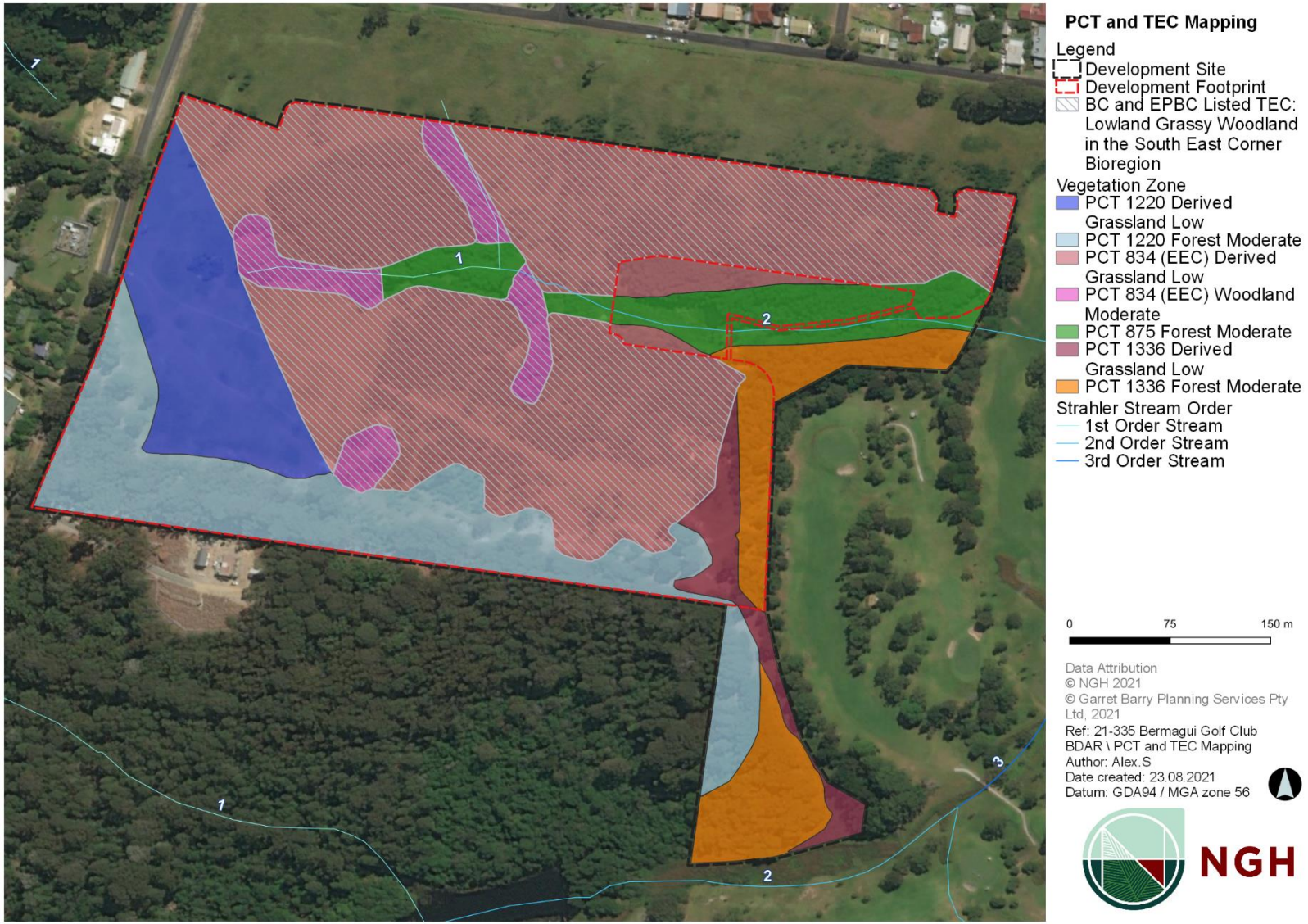

Figure 3-2 PCTs and TECs within the Development Site

3.3 Vegetation integrity assessment

3.3.1 Vegetation zones and survey effort

Field surveys were undertaken by BAM accredited ecologists in November 2018. A total of 12 vegetation integrity plots (BAM plots) were conducted over approximately 16 ha to provide a representative determination of vegetation present within the Development Site (Figure 3-3). These surveys resulted in the delineation of four PCTs and 7 vegetation zones (refer to Table 3-6). Vegetation zones were determined based on BAM plot data, where PCT, the presence of trees and shrubs (e.g. woodland or grassland), and the vegetation integrity (VI) score was determined by the BAM-C were taken into account (e.g. PCT 1336 forest moderate). Condition was considered low if the VI score was <30, moderate if the VI score was 30-65, and high if the VI score was 65+.

Table 3-6 Vegetation zones at the Development Site

Zone ID	PCT ID – veg zone	Condition description	Zone area (ha) within Development Site	Survey effort (# vegetation integrity plots)
1	**PCT 1336 grassland low**	**Grassland** This vegetation zone consisted of groundcover only and was in low condition onsite.	0.56	1 plot
2	**PCT 1336 forest moderate**	**Forest** This vegetation zone consisted of groundcover similar to PCT 1336 grassland above but had a canopy of eucalypts.	1.60	1 plot
3	**PCT 1220 grassland low**	**Grassland** This vegetation zone consisted of groundcover only and was in low condition onsite.	1.99	2 plots
4	**PCT 1220 forest moderate**	**Forest** This vegetation zone consisted of groundcover similar to PCT 1220 above but had a canopy of eucalypts.	3.32	2 plots

Zone ID	PCT ID – veg zone	Condition description	Zone area (ha) within Development Site	Survey effort (# vegetation integrity plots)
5	**PCT 834 grassland low**	**Grassland** This vegetation zone consisted of groundcover only and was considered to be in low condition onsite.	9.93	3 plots
6	**PCT 834 woodland moderate**	**Woodland** This vegetation zone consisted of groundcover similar to PCT 834 above but had a canopy of eucalypts.	0.91	1 plot
7	**PCT 875 forest moderate**	**Forest** This vegetation zone consisted of a closed thicket of small trees showing some signs of disturbance with wattle regeneration.	1.47	2 plots

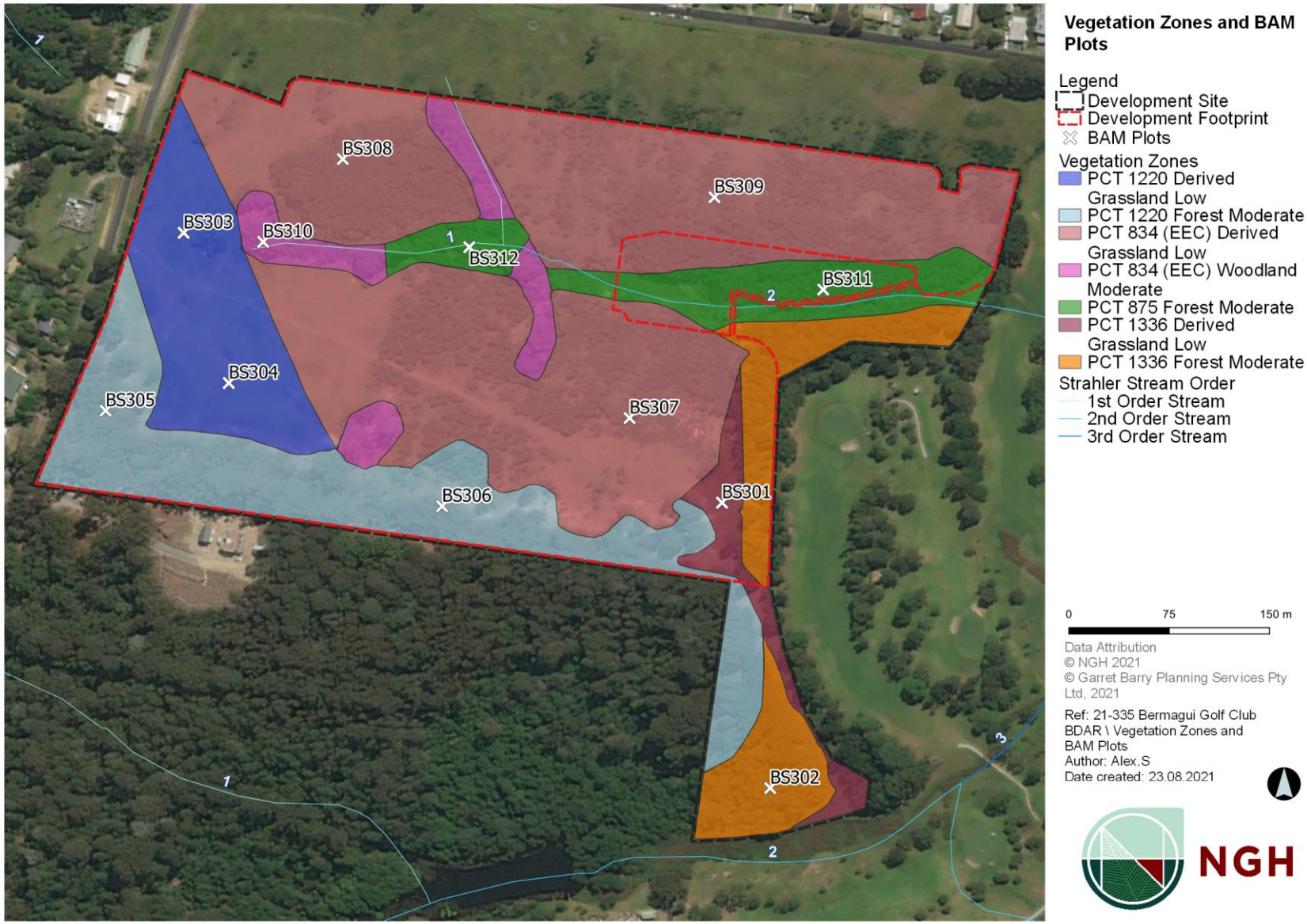

Figure 3-3 Vegetation zones and BAM Plot locations at the Development Site

3.3.2 Vegetation integrity assessment results

The results of the plot field data and photos of each plot are shown in Appendix A. The plot data from the vegetation integrity survey plots were entered into the BAM-C. The results of the vegetation integrity assessment are provided in Table 3-7.

Table 3-7 Current vegetation integrity scores for each vegetation zone within the Development Site

Zone ID	PCT/Zone	Composition score	Structure score	Function score	Vegetation Integrity Score
1	**1336** - Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion (low)	23.4	28.1	29.7	27
2	**1336** - Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion (moderate)	59	44.1	46	49.3
3	**1220** - Spotted Gum - White Stringybark - Burrawang shrubby open forest (low)	46.6	26.3	5.4	18.8
4	**1220** - Spotted Gum - White Stringybark - Burrawang shrubby open forest (moderate)	83.5	40.4	67.7	61.1
5	**834** - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands (low)	63.8	47.6	3.9	22.7
6	**834** - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands (moderate)	99.7	65	38.9	63.2
7	**875** - Grey Myrtle - Lilly Pilly dry rainforest (moderate)	73.4	52.7	45.4	56

4. Threatened species

4.1 Ecosystem credit species

The following ecosystem credit species were returned by the BAM-C as being associated with the PCTs present inside the Development Footprint. These (and corresponding vegetation zones) are assumed to be appropriate habitat and will generate credits. Table 4-1 lists all ecosystem credit species considered in the BAM calculations. Species unlikely to use grassland low vegetation zones have been removed.

Table 4-1 Ecosystem credit species predicted by the BAM-C

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Fauna			
Regent Honeyeater ***Anthochaera phrygia*** **(Foraging)**	1336_moderate 1220_moderate 834_moderate 875_moderate	Critically Endangered	Critically Endangered
Dusky Woodswallow ***Artamus cyanopterus cyanopterus***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Gang-gang Cockatoo ***Calyptorhynchus lathami*** **(Foraging)**	1336_moderate 1220_moderate 834_moderate 875_moderate	Vulnerable	Not Listed
Glossy Black-Cockatoo ***Calyptorhynchus lathami*** **(Foraging)**	1336_moderate 1220_moderate 834_moderate 875_moderate	Vulnerable	Not Listed
Speckled Warbler ***Chthonicola sagittata***	834_low 834_moderate	Vulnerable	Not Listed
Spotted Harrier ***Circus assimilis***	834_low 834_moderate	Vulnerable	Not Listed
Brown Treecreeper (eastern subspecies) ***Climacteris picumnus victoriae***	834_low 834_moderate	Vulnerable	Not Listed
Varied Sittella	1336_low	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Daphoenositta chrysoptera	1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate		
Spotted-tailed Quoll ***Dasyurus maculatus***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Endangered
Eastern False Pipistrelle ***Falsistrellus tasmaniensis***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Purple-crowned Lorikeet ***Glossopsitta porphyrocephala***	834_low 834_moderate	Vulnerable	Not Listed
Little Lorikeet ***Glossopsitta pusilla***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
White-bellied Sea-Eagle ***Haliaeetus leucogaster*** **(Foraging)**	834_low 834_moderate	Vulnerable	Not Listed
Little Eagle ***Hieraaetus morphnoides*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
White-throated Needletail ***Hirundapus caudacutus***	1336_low 1336_moderate 1220_Low	Not Listed	Vulnerable

Common Name	Associated PCT	NSW Listing Status	National Listing Status
	1220_Moderate 834_Low 834_Moderate 875_Moderate		
Broad-headed Snake ***Hoplocephalus bungaroides*** **(Foraging)**	None	Endangered	Vulnerable
Swift Parrot ***Lathamus discolor***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate	Endangered	Critically Endangered
Square-tailed Kite ***Lophoictinia isura*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate	Vulnerable	Not Listed
Hooded Robin ***Melanodryas cucullata cucullata***	834_low 834_moderate	Vulnerable	Not Listed
Eastern Coastal Free-tailed Bat ***Mormopterus norfolkensis***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Large Bent-winged Bat ***Miniopterus orianae oceanensis*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Turquoise Parrot	875_moderate	Vulnerable	Not Listed
Barking Owl ***Ninox connivens*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
	834_low 834_moderate 875_moderate		
Powerful Owl ***Ninox strenua*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Olive Whistler ***Pachycephala olivacea***	1336_low 1336_moderate 1220_low 1220_moderate	Vulnerable	Not Listed
Yellow-bellied Glider ***Petaurus australis***	None	Vulnerable	Not Listed
Scarlet Robin ***Petroica phoenicea***	834_moderate 875_moderate	Vulnerable	Not Listed
Flame Robin ***Petroica phoenicea***	834_moderate 875_moderate	Vulnerable	Not Listed
Koala ***Phascolarctos cinereus*** **(Foraging)**	1336_moderate 1220_moderate 834_moderate	Vulnerable	Endangered
Golden-tipped Bat ***Phoniscus papuensis***	1336_low 1336_moderate 1220_low 1220_moderate 875_moderate	Vulnerable	Not Listed
Grey-headed Flying-fox ***Pteropus poliocephalus*** **(Foraging)**	1336_moderate 1220_moderate 834_moderate 875_moderate	Vulnerable	Vulnerable
Superb Fruit-Dove ***Ptilinopus superbus***	875_moderate	Vulnerable	Not Listed
Yellow-bellied Sheathtail-bat ***Saccolaimus flaviventris***	1336_low 1336_moderate 1220_low 1220_moderate	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
	875_moderate		
Greater Broad-nosed Bat ***Scoteanax rueppellii***	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed
Diamond Firetail ***Stagonopleura guttata***	834_low 834_moderate	Vulnerable	Not Listed
Masked Owl ***Tyto novaehollandiae*** **(Foraging)**	1336_low 1336_moderate 1220_low 1220_moderate 834_low 834_moderate 875_moderate	Vulnerable	Not Listed

4.2 Species credit species

4.2.1 Species credit species to be assessed

The BAM Calculator predicted the following species credit species to occur at the Development Site (refer to Table 4-2 below).

Table 4-2 Candidate species credit species requiring assessment

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
FAUNA							
Regent Honeyeater *Anthochaera phrygia* (breeding only)	Inhabits dry open forest woodland feeding on eucalypt nectar in particular Mugga Ironbark, Yellow Box and Swamp Mahogany. Occasional records on South Coast. Nests in tall eucalypts. Only small eucalypts located within zones 2, 4, 6, and 7.	High	Critically Endangered	Critically Endangered	No tall eucalypts were detected onsite. All mature trees were investigated, with no nests being detected. This site is not located within 'important areas' mapping to indicate key Regent Honeyeater habitat according to BioNet Ecological Data.	Excluded	Habitat constraints. Outside of mapped breeding areas.
Bush Stone-Curlew *Burhinus grallarius*	Relies on open forests and woodlands with sparse grassy ground layer and standing or fallen timber. Records found within 1.5km.	High	Endangered	Not Listed	Lack of key habitat components including fallen timber resources. Tree patches are disturbed by stock and lacking large woody debris.	Excluded	Habitat constraints. Key habitat features (fallen timber) absent.
Gang-gang Cockatoo	Found in tall mountain forests and woodlands particularly heavily	High	Endangered	Not Listed	No hollow bearing trees were detected inside the	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees with hollows

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Callocephalon fimbriatum **(breeding only)**	timbered habitat. Records found within 3km.				Development Footprint, which are essential breeding habitat according to BioNet Ecological Data.		greater than 9 cm diameter) absent.
Glossy Black-Cockatoo ***Calyptorhynchus lathami*** **(breeding only)**	Inhabits open forest and woodlands where stands of Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*Allocasuarina torulosa*) are present for foraging.	High	Vulnerable	Not Listed	No hollow bearing trees were detected inside the Development Footprint, which are essential breeding habitat according to BioNet Ecological Data.	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees with hollows greater than 15 cm diameter) absent.
Eastern Pygmy-possum ***Cercartetus nanus***	Inhabits woodlands and heaths and rainforest vegetation. Feeds on nectar and pollen from banksias, eucalypts and bottlebrushes. Shelters in dreys, hollows, abandoned bird nests and in shredded bark.	High	Vulnerable	Not Listed	Lack of key habitat components including a dense shrub layer dominated by Proteaceae and Myrtaceae species, hollow-bearing trees, or nectar resources.	Excluded	Habitat quality. Absent of sufficiently dense mid-storey layer dominated by species form the families Proteaceae and Myrtaceae.
Large-eared Pied Bat ***Chalinolobus dwyeri***	Found in well-timbered areas containing gullies. Roosts in caves, crevices, cliffs, old mines and dis-used nests of the Fairy	Very High	Vulnerable	Vulnerable	This species is geographically limited to north of Batemans Bay and were therefore excluded.	Excluded	Geographic restrictions. This species is geographically restricted to area north of Batemans Bay.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	Martin. Geographically restricted to areas north of Batemans Bay.						
White-bellied Sea-Eagle *Haliaeetus leucogaster* (breeding only)	Habitat characterised by large areas of open water including rivers, swamps, lakes and the sea. Records within 10km. Nests in tall living or dead trees.	High	Vulnerable	Not Listed	Development Site within approximately 1 km of ocean. Some mature eucalypts present onsite.	Included	Development Site within approximately 1 km of ocean. Some mature eucalypts present onsite.
Giant Burrowing Frog *Heleioporus australiacus*	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except clay soils. Can travel 300m away from breeding sites which are first or second order streams. Records within 10km.	Moderate	Vulnerable	Vulnerable	Woodlands present as PCT 834 within the Development Site. All treed zones (moderate condition) were considered suitable, Grassland zones (low condition) were considered too far degraded due to cattle trampling, with little litter cover being present.	Included	This species occupies a broad range of habitat types and could not be excluded based on habitat.
Little Eagle *Hieraaetus morphnoides* (breeding only)	Occupies eucalypt forest, woodland or open woodland. Nests in tall living trees. Preys on birds, reptiles, carrion and large	Moderate	Vulnerable	Not Listed	No large old trees were identified within the Development Footprint. Smaller trees present were	Included	This species has broadly defined habitat constraints and is known to occur within the region.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	insects. Recorded within 10km.				considered potentially suitable.		
Broad-headed Snake *Hoplocephalus bungaroides* (breeding only)	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Can utilise crevices and hollows within 500m of escarpments in summer. Geographically restricted to areas north of the Kings Highway.	Very High	Endangered	Vulnerable	No suitable breeding habitat was inside within the Development Footprint.	Excluded	Habitat and geographic constraints. This species is geographically restricted to areas north of the Kings Highway. Additionally, no suitable rocky outcrops or escarpments were identified onsite.
Southern Brown Bandicoot *Isoodon obesulus*	Requires dense groundcover in a variety of habitats. Preference for sandy soils.	High	Endangered	Endangered	Treed PCT zones (moderate condition) were considered suitable habitat	Included	Areas containing dense groundcover were deemed potentially suitable habitat for this species.
Swift Parrot *Lathamus discolor* (breeding only)	Occur in areas where eucalypts flower profusely and abundant lerps. Species include Swamp Mahogany (E. robusta), Spotted Gum (C. maculata), Red Bloodwood (C. gummifera). Breeds in Tasmania in old trees with hollows.	Moderate	Endangered	Critically Endangered	This species does not breed on the mainland and thus no breeding habitat exists	Excluded	Habitat constraints. Outside of mapped breeding areas.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Green and Golden Bell Frog *Litoria aurea*	Inhabits semi-permanent/ephemeral wet areas.	High	Endangered	Vulnerable	Tree zones near riparian areas were identified as potentially suitable habitat for this species.	Included	Riparian areas were deemed potentially suitable habitat for this species.
Square-tailed Kite *Lophoictinia isura*	Inhabits timbered habitats including dry woodlands and open forests with preference for timbered watercourses. Feeds on passerines, especially honeyeaters and nestlings. Recorded within 10km.	Moderate	Vulnerable	Not Listed	Some mature Eucalypts present within the Development Site were considered potentially suitable.	Included	Some mature Eucalypts present within the Development Site.
Large Bentwing Bat *Miniopterus schreibersii oceanensis* (breeding)	Uses caves, derelict mines, storm-water tunnels, buildings and other manmade structures. Hunts in forested areas catching moths and other flying insects in tree tops.	Very High	Vulnerable	Not Listed	No caves, tunnels, mines, culverts were identified within the Development Footprint (BioNet Ecological Data).	Excluded	Habitat constraints. No caves were identified within or in proximity to the site.
Stuttering Frog *Mixophyes balbus*	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	Very High	Endangered	Vulnerable	All treed zones (moderate condition) were considered potential habitat. Grassland zones (low condition) were considered too far	Included	This species occupies a broad range of habitat types and could not be excluded based on habitat.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
					degraded due to cattle trampling, with little litter cover being present.		
Southern Myotis *Myotis macropus*	Roosts in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forages over streams and pools catching small fish.	High	Vulnerable	Not Listed	First and second order streams identified onsite, both of which are <3m width. No hollow bearing trees, bridges, caves, mines or artificial structures were identified within 200m of the stream. (BioNet Ecological Data).	Excluded	Habitat constraints. No caves were identified within or in proximity to the site.
Barking Owl *Ninox connivens* (breeding only)	Inhabits woodland and open forest including fragmented landscapes. Roosts in shaded tree canopies or thick understory. Needs large hollow bearing trees for breeding. Hunts small arboreal marsupials. Recorded within 10km.	High	Vulnerable	Not Listed	No large hollow bearing trees were identified within the Development Footprint (BioNet Ecological Data).	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees with hollows greater than 20 cm diameter) absent.
Powerful Owl *Ninox strenua* (breeding only)	Inhabits woodland, open sclerophyll forest to tall open wet forest	High	Vulnerable	Not Listed	No large hollow bearing trees were identified within the	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees with hollows

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	and rainforest. Main prey are medium sized arboreal mammals. They nest in large hollows in large eucalypts.				Development Footprint (BioNet Ecological Data).		greater than 20 cm diameter) absent.
Greater Glider population in the Eurobodalla local government area *Petauroides volans*	Geographically restricted to areas between Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. This species requires large hollow-bearing trees for persistence.	High	Endangered Population	Not Listed	No large hollow bearing trees were identified within the Development Footprint (BioNet Ecological Data).	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees) absent.
Squirrel Glider ***Petaurus norfolcensis***	Prefers Black-butt-Bloodwood forest with a heath understory in coastal areas. Requires abundance tree hollows for refuge and nesting. Distributed across all of eastern Australia mainland.	High	Vulnerable	Not Listed	All treed zones (moderate condition) were considered to provide suitable habitat.	Included	Habitat considered unlikely to support this species, given the absence of hollow-bearing trees.
Brush-tailed Rock-wallaby	Occupy rocky escarpments, outcrops and cliffs with a preference for complex	Very High	Endangered	Vulnerable	No rocky escarpments, outcrops or cliffs were identified	Excluded	Habitat constraints. Absence of key habitat features (rocky outcrops, escarpments, or cliffs)

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Petrogale penicillata	structures with fissures, caves and ledges, often facing north.				within the Development Footprint.		identified within 1 km of the site.
Brush-tailed Phascogale ***Phascogale tapoatafa***	Prefers dry sclerophyll forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Agile climber preferring rough-barked trees. Nests in tree hollows and will use many different hollows. Feeds on nectar, vertebrates and other invertebrates.	High	Vulnerable	Not Listed	Although no hollow-bearing trees were identified within the Development Site, which are generally required for nesting (breeding) (Van der Ree, Bennett & Soderquist, 2006). A precautionary approach has been taken to assume all forested areas are suitable foraging habitat.	Included	Although Brush-tailed Phascogale appears to preferentially forage on certain species of *Eucalyptus* (Mansfield et al., 2017), these species are not clearly defined. A precautionary approach has been taken to assume all forested areas are suitable foraging habitat.
Koala ***Phascolarctos cinereus*** **(breeding only)**	Inhabits eucalypt woodlands and forests. Spends most time in trees but will descend to traverse open ground. Multiple records within 10km.	High	Vulnerable	Endangered	Primary koala food tree Forest Red Gum *Eucalyptus tereticornis* was present throughout PCT 834 (moderate condition).	Included	Preferred feed tree Forest Red Gum was identified throughout PCT 834.
Long-nosed Potoroo ***Potorous tridactylus***	Requires a dense shrub layer or high canopy cover exceeding 70%.	High	Vulnerable	Vulnerable	Dense shrub layer mostly absent. Precautionary approach taken to assume all wooded	Included	Although an absence of key habitat requirements (shrub layer exceeding 70% coverage) recorded within the Development

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
					areas include potentially suitable habitat.		Site, a precautionary approach has been taken to assume suitable habitat in all wooded areas.
Grey-headed Flying-fox *Pteropus poliocephalus* **(breeding)**	Inhabits temperate rainforest, tall sclerophyll forest and woodlands, heaths and swamps, urban gardens and fruit crops. Camps close to water common in gullies and vegetation with dense canopy.	High	Vulnerable	Vulnerable	No breeding camps observed (BioNet Ecological Data).	Excluded	Habitat constraints. Breeding camps absent from site.
Masked Owl ***Tyto novaehollandiae***	Inhabits dry eucalypt forests and woodlands often hunting on forest edges including roadsides. Needs large hollow bearing trees for breeding or sometimes caves for nesting.	High	Vulnerable	Not Listed	No large hollow bearing trees inside the Development Footprint (BioNet Ecological Data).	Excluded	Habitat constraints. Key habitat features (hollow-bearing trees with hollows greater than 20 cm diameter) absent.
FLORA							
Chef's Cap Correa *Correa baeuerlenii*	Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash (Eucalyptus sieberi), Yellow Stringybark (E. muelleriana), Blue-	High	Vulnerable	Vulnerable	Absence of associated species within riparian zones.	Excluded	Habitat quality. Riparian areas within the site are dominated by Grey Myrtle, with no Eucalypts present. Additionally, there are no records of this species within a 10

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
	leafed Stringybark (E. agglomerata) and Spotted Gum (Corymbia maculata), or she-oak woodland. It may also be found in near-coastal rocky sites.						km buffer of the Development Site.
East Lynne Midge Orchid ***Genoplesium vernale***	Inhabits dry sclerophyll woodland and forest from coast to coastal ranges. Confined to shallow, low fertile soils often on ridges with sedge dominated cover rather than shrubby.	Moderate	Vulnerable	Vulnerable	Outside geographical range (Clyde Catchment).	Excluded	Geographic limitations. Species restricted to the Clyde catchment.
Austral Toadflax ***Thesium australe***	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often associated with Kangaroo grass.	Moderate	Vulnerable	Vulnerable	Although Kangaroo Grass is largely absent from the Development Footprint. Habitat was considered to be present within grassland zones.	Included	Species unlikely to be present, as associated species absent.

4.2.2 Inclusions and exclusions based on habitat features and habitat quality

Under Section 6.4.1.17 of the BAM, a species credit species can be considered unlikely to occur on a Development Site (or within specific vegetation zones) if following field assessment it is determined that the habitat is substantially degraded such that the species is unlikely to utilise the Development Site (or specific vegetation zones). These species are identified in Table 4 3 along with justification regarding the habitats present.

Table 4-3 Species credit species excluded based on habitat quality

Species credit species	Habitat components and abundance on site	Reason for exclusion
FAUNA		
Eastern Pygmy-possum ***Cercartetus nanus***	Inhabits woodlands and heaths and rainforest vegetation. Feeds on nectar and pollen from banksias, eucalypts and bottlebrushes. Vegetation within the Development Site is largely degraded, with low shrub density and species composition, with preferred nectar resources from the genera Proteaceae and Myrtaceae absent.	Absence of sufficiently dense mid-storey layer dominated by species from the families Proteaceae and Myrtaceae.
FLORA		
Chef's Cap Correa ***Correa baeuerlenii***	Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash (Eucalyptus sieberi), Yellow Stringybark (E. muelleriana), Blue-leafed Stringybark (E. agglomerata) and Spotted Gum (Corymbia maculata), or she-oak woodland.	Two PCTs occur on watercourses within the Development Site, PCT 875 and PCT 834. PCT 875 is dominated by Grey Myrtle, with no Eucalypts or She-oaks present. PCT 834 contains Eucalypts, however none are associated with this species. Additionally, there are no Bionet records within 10 km of the Development Site and targeted flora surveys in the areas surrounding riparian zones did not identify any individuals.

4.2.3 Candidate species requiring confirmation of presence or absence

Of the 30 species listed in Table 4-2, 11 are considered to have suitable habitats present within the Development Footprint. Therefore, targeted survey was conducted to confirm presence or absence of these species for the purposes of identifying or excluding species polygons. The 11 species requiring targeted survey (Table 4-4) are:

1. White-bellied Sea-eagle
2. Giant Burrowing Frog
3. Little Eagle
4. Southern Brown Bandicoot
5. Green and Golden Bell Frog
6. Square-tailed Kite
7. Stuttering Frog
8. Squirrel Glider
9. Brush-tailed Phascogale (assumed present)
10. Koala
11. Austral Toadflax

Further details about the targeted survey program can be found in section 4.2.5 below and species that were surveyed can be viewed in Table 4-4.

The species listed in Table 4-4 are those that are considered to have some habitat present inside the Development Footprint and where targeted surveys are required within suitable habitat. Targeted surveys for Giant Burrowing Frog, Southern Brown Bandicoot, Green and Golden Bell Frog, Stuttering Frog, Squirrel Glider and Koala were conducted between 7 and 31 December 2018. Targeted surveys for White-bellied Sea-eagle, Little Eagle, Square-tailed Kite, and Austral Toadflax were conducted in October 2020 and January 2021.

Details of the survey methodologies and results are provided for each species below. Targeted survey locations are mapped in Figure 4-1 and Figure 4-2. Species polygon data is also detailed for each vegetation zone within Table 4-4 below.

Table 4-4 Summary of species credit species surveyed at the Development Site

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Survey methods	Present on site?	Species polygon area or count
White-bellied Sea-eagle *Haliaeetus leucogaster*	High	Surveyed	Inspection of all mature trees within the Development Footprint for large raptor stick nests	Absent	N/A
Giant Burrowing Frog *Heleioporus australiacus*	Moderate	Surveyed	Spotlighting and call-playback	Absent	N/A

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Survey methods	Present on site?	Species polygon area or count
Little Eagle ***Hieraaetus morphnoides***	Moderate	Surveyed	Inspection of all mature trees within the Development Footprint for large raptor stick nests	Absent	N/A
Southern Brown Bandicoot ***Isoodon obesulus***	High	Surveyed	Camera trap deployment and spotlighting	Absent	N/A
Green and Golden Bell Frog ***Litoria aurea***	High	Surveyed	Spotlighting and call-playback	Absent	N/A
Square-tailed Kite ***Lophoictinia isura***	Moderate	Surveyed	Inspection of all mature trees within the Development Footprint for large raptor stick nests	Absent	N/A
Stuttering Frog ***Mixophyes balbus***	Very High	Surveyed	Spotlighting and call-playback	Absent	N/A
Brush-tailed Phascogale ***Phascogale tapoatafa***	High	Assumed to occur	-	Assumed Present. Species polygon drawn around edge of all treed PCTs, as defined by Bionet Ecological Data, 2021.	• PCT 1336 forest moderate: 0.42 ha. • PCT 1220 forest moderate: 2.93 ha. • PCT 834 woodland moderate: 0.91. • PCT 875 forest moderate: 0.62 ha.
Koala ***Phascolarctos cinereus***	High	Surveyed	Koala SAT surveys and spotlighting	Absent	Although this species has been ruled out through the BAM, the Koala SEPP requires an assessment report for this species be prepared to accompany a development application

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Survey methods	Present on site?	Species polygon area or count
Austral Toadflax *Thesium australe*	Moderate	Surveyed	Targeted flora survey – random meander	Absent	N/A

4.2.4 Weather

Weather conditions recorded for these dates from the Bureau of Meteorology (BOM) at the Montague Island Automatic Weather Station (AWS) (ID: 94939) are detailed in Table 4-5.

Table 4-5 Weather summary

Survey Date	Temperature (ºC)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Survey
7/12/2018	21	Nil (last rain 2mm on 2/12/2018)	Windy (>20km/h on ridge; 10-15km/h in gully)	Spotlighting (Amphibians and Koala) Call Playback (Amphibians and Koala)
10/12/2018	19	Nil (last rain 6mm on 9/12/2018)	Calm (5-10km/h)	Spotlighting (Amphibians and Koala) Call Playback (Amphibians and Koala) Dip Netting (Amphibians)
17/12/2018	20	Nil (last rain 25mm on 16/12/2018)	Calm (5-10km/h)	Spotlighting (Amphibians and Koala) Call Playback (Amphibians and Koala) Dip Netting (Amphibians)
8/12/2018 – 29/12/2018	-	-	-	Remote camera deployment (x8) (Southern Brown Bandicoot and Koala)
27/10/2021	19	-	-	Diurnal threatened raptor survey
22/01/2021	21	1.9 mm	-	Austral Toadflax targeted survey

4.2.5 Candidate species survey and results

Diurnal avifauna (White-bellied Sea-Eagle, Little Eagle, Square-tailed Kite*)*

Survey effort

Inspection of all mature trees within the Development Footprint for large raptor stick nests was conducted on the 27 of October 2020. Survey was conducted over 1-hour during suitable weather conditions, with any remnants of large nests being recorded.

Survey results

Targeted stick nest searches did not identify any large raptor stick nests, or evidence of disused raptor nests. No individual raptors were recorded during the survey.

Nocturnal avifauna

Survey effort

Threatened nocturnal avifauna were ruled out from requiring survey, given the absence of suitable habitat. No incidental sightings of threatened nocturnal avifauna occurred during the 2010, 2018 or 2020 surveys.

Survey results

To note, one Masked Owl was heard calling during the 2010 targeted fauna surveys, however habitat within the Development Footprint would not form suitable breeding habitat for Masked Owls primarily due to absence of hollow bearing trees and understory. It may be possible for the Masked Owl to forage occasionally within the Development Footprint (and it is included as an ecosystem credit species in this assessment in this regard), however, no breeding or roosting habitat features are present to justify targeted surveys for this species.

Mammals (Southern Brown Bandicoot, Squirrel Glider, Koala*)*

Survey effort

Targeted mammal surveys conducted by NGH in 2018 consisted of camera trap deployment, spotlighting, and Koala SAT surveys, as detailed below.

2018 surveys:

Spotlighting (searches on foot for nocturnal vertebrate fauna) was conducted over three evenings in December 2018 by a trained ecologist, during suitable weather conditions (19-21 degrees C, light wind, no rain). 12V 50W spotlights were used for approximately 6 spotlighting hours (2 hours per night). The majority of the Development Site was traversed during spotlighting, with a particular focus on wooded areas and gullies (Figure 4-1). Call play-back for Koala was conducted for a total of 10-minutes during each spotlighting survey.

A total of 8 motion sensor camera traps were deployed for 21 continuous days and nights (traps running 24/day) in December 2018 (07/12/2018 – 31/12/2018) across the study area, for a total of 168 trap nights. All species identified on camera traps were recorded (see Appendix A.2). The majority of species recorded across the period were common macropods and birds.

A total of two Koala SAT surveys were conducted in accordance with Phillips and Callaghan (2011). SAT surveys were done in PCT 834 woodland and 1220 forest. Surveys began at an identified Koala feed tree, then conducted extensive searches for Koala scat and scratches around this tree and the nearest 29 trees.

Survey results

No threatened mammals were detected during any of the targeted threatened mammal surveys. Spotlighting in 2018 identified only 1 mammal species, the Brushtail Possum *Trichosurus vulpecula*. Camera traps identified native species Eastern Grey Kangaroo *Macropus giganteus*, Swamp Wallaby *Wallabia bicolor*, Red-necked Wallaby *Macropus rufogriseus*, Short-beaked Echidna *Tachyglossus aculeatus*, and pest species Red Fox *Vulpes vulpes*, Black Rat *Rattus rattus*, Rabbit *Oryctolagus cuniculus.* SAT surveys did not identify any signs of use of habitat by Koala.

Amphibians *(*Giant Burrowing Frog *Heleioporus australiacus*, Green and Golden Bell Frog *Litoria aurea*, Stuttering Frog *Mixophyes balbus)*

Survey effort

Target amphibian surveys were conducted across the study area over 3-nights (07/12/2018, 10/12/2018, and 17/12/2018) in December 2018 by an ecologist (Figure 4-1). Surveys were undertaken between 8:30pm and 9:30pm each night under conditions deemed suitable – 19-21 degrees C, light wind, no rain.

The first night's survey consisted of 1 hour spotlighting at the dam, 30 minutes call-playback at the dam, and 30 minutes' walk and vocal recognition through the upper gully. The second night consisted of 1 hour spotlighting at the dam, 30 minutes call-playback, and 30 minutes dip netting. The third night consisted of 1 hour spotlighting at the dam, 30 minutes call-playback, 30 minutes dip netting, and 30 minutes' walk and vocal recognition through the upper gully.

In addition, diurnal searches for Giant Burrowing Frog and Stuttering Frog were also undertaken during camera deployment. Approximately 10 minutes at each camera site (80 minutes) & approximately 1 hour undertaken within Koala SAT survey area, for a total of 2 hours and 20 minutes diurnal search survey time.

Survey results

A total of 5 amphibians were detected during the surveys, Common Eastern Froglet *Crinia signifera,* Eastern sign-bearing froglet *Crinia parasignifera,* Striped Marsh Frog *Limnodynastes peronii,* Peron's Tree Frog *Litoria peronii,* and Whistling Tree Frog *Litoria vereauxii.* None of the species detected are listed as threatened under the BC Act or EPBC Act.

Threatened Flora (Austral Toadflax)

Survey effort

Targeted surveys for Austral Toadflax were conducted over 3-hours in January 2020, using the random meander survey method, as outlined by DPIE (2020) (Figure 4-2). Given Austral Toadflax is only known to occur within grasslands, surveys prioritised areas of derived grasslands (Figure 4-2).

Survey results

No threatened flora were identified through targeted surveys.

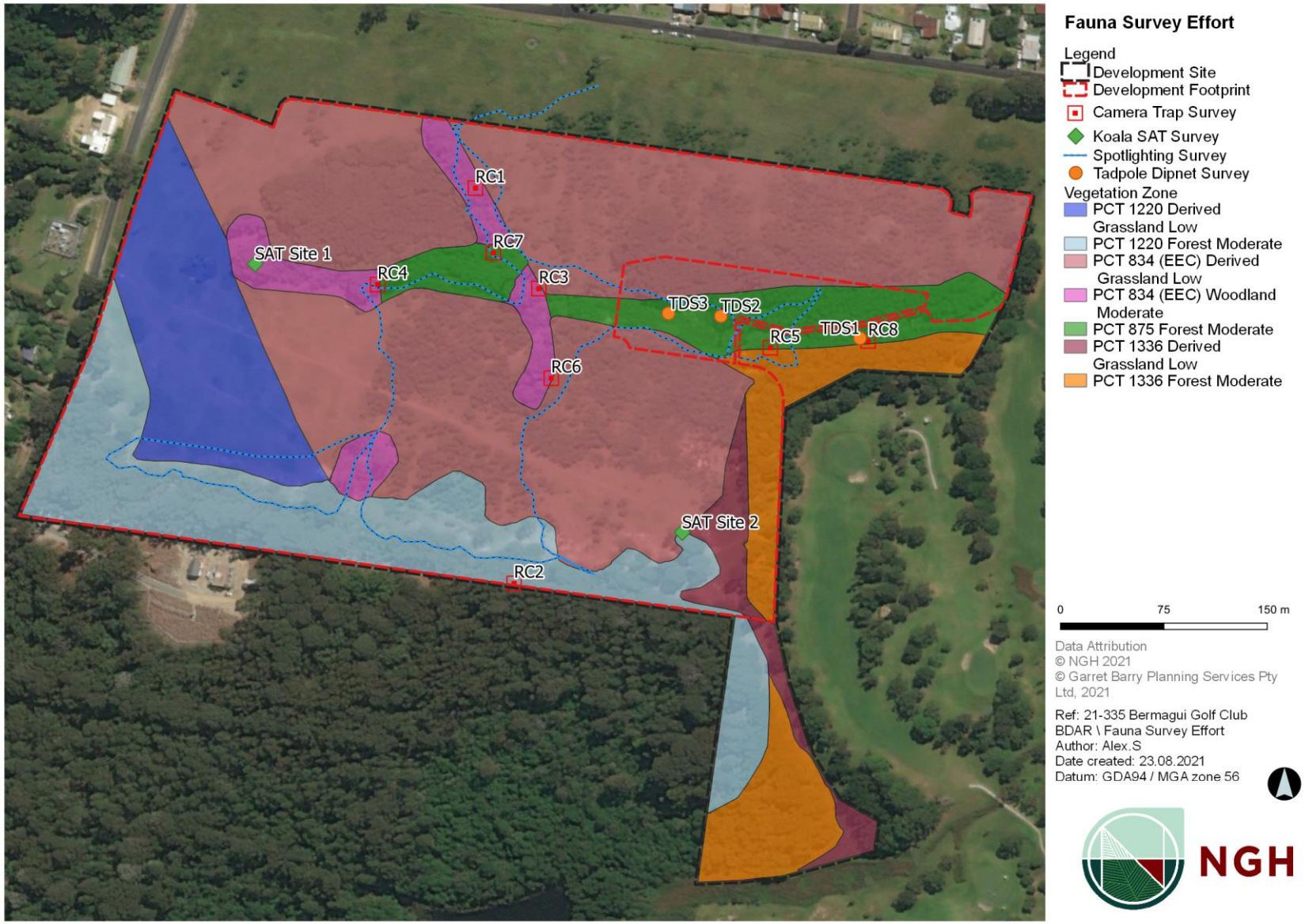

Figure 4-1 Fauna survey effort and targeted survey locations

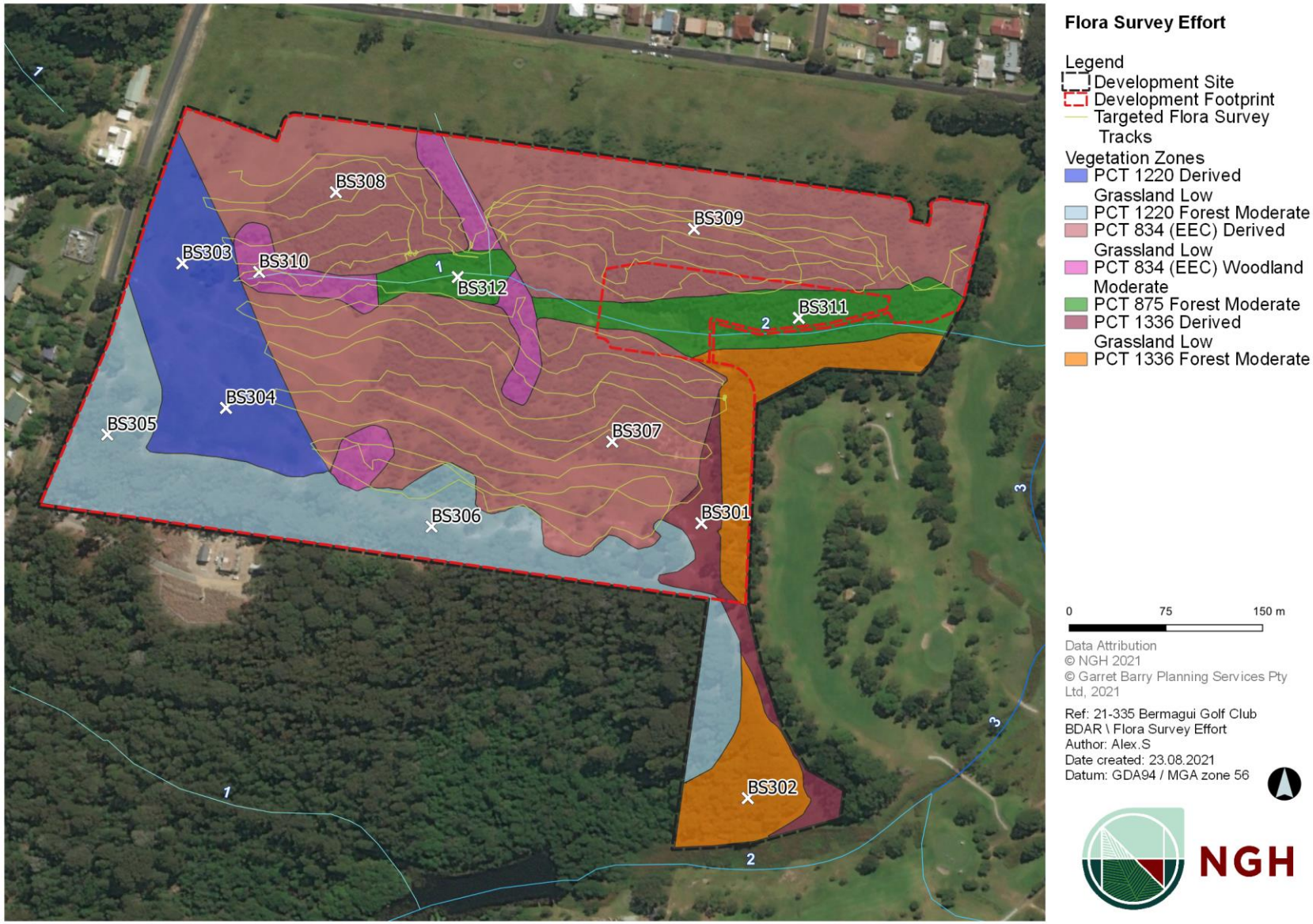

Figure 4-2 Flora survey effort and targeted survey locations

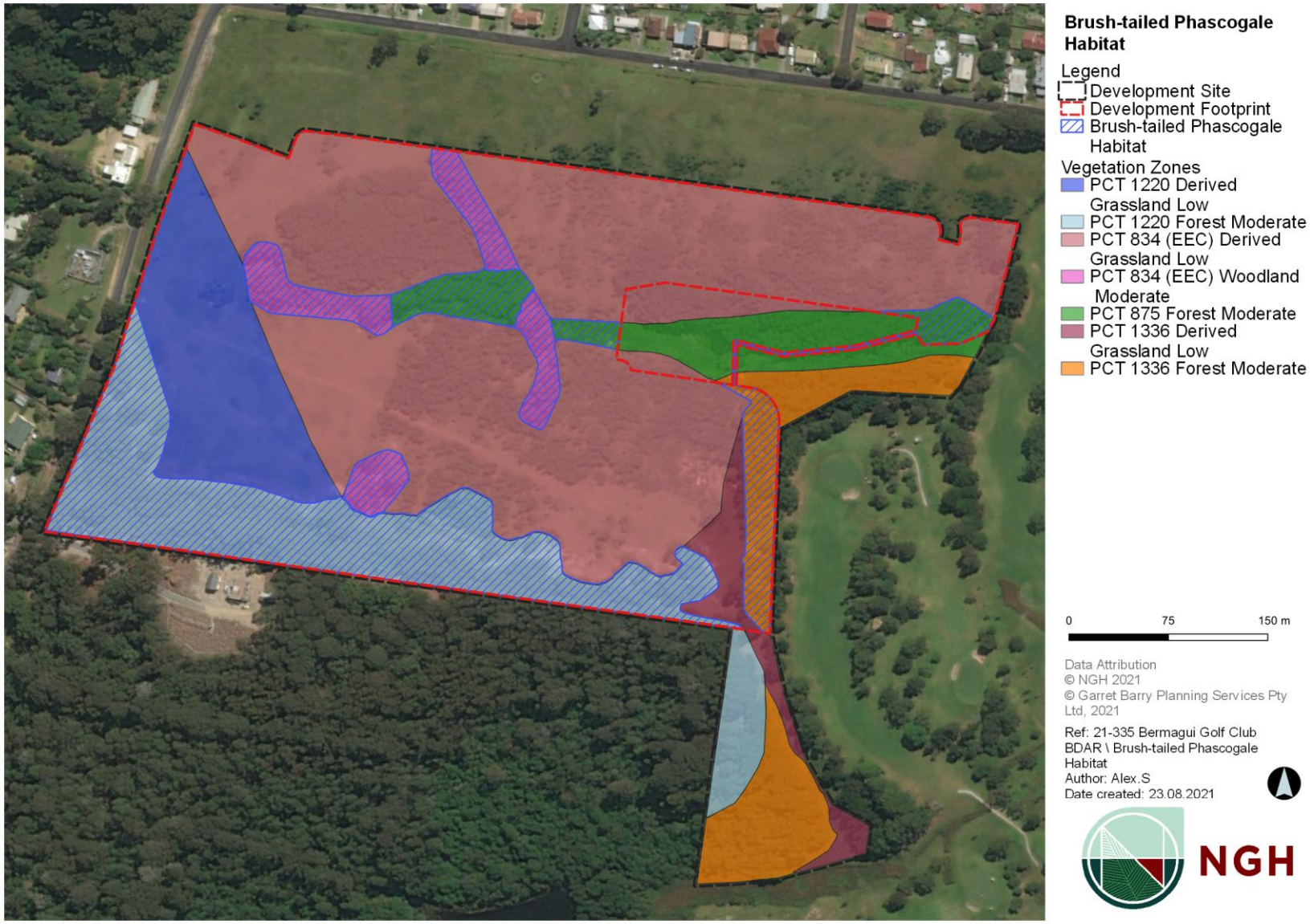

Figure 4-3 Brush-tailed Phascogale habitat within the Development footprint

4.3 Additional habitat features relevant to prescribed biodiversity impacts

4.3.1 Occurrences of karst, caves, crevices and cliffs

As verified by the field inspection, there are no occurrences of karst, caves, crevices, or cliffs in the Development Site.

4.3.2 Occurrences of rock

As verified by the field inspection, there are no occurrences of surface rock in the Development Site.

4.3.3 Human made structures

As verified by the field inspection, there are no occurrences of human made structures inside the subject land.

No parts of the subject land contain ‘non-native vegetation’. The majority of cleared land constitutes PCT 834 derived grassland.

4.3.4 Hydrological processes that sustain and interact with the rivers, streams and wetlands

There is one first and second order drainage line to the south of the subject site. This stream is ephemeral and was not flowing at the time of survey. One farm dam was present on the second order stream. There will be construction of a sediment basin within the upper reaches of a first order watercourse. Methods to assist in the prevention of environmental impacts of construction are detailed in chapter 8 below.

The development may indirectly impact on hydrological processes if polluted water (from construction sites and sediment ponds) flows downslope into riparian zones. This may occur during stormwater events, especially if there are inappropriate erosion and sediment controls onsite during the construction phase of development. Any consent issued by BVSC is likely to have standard erosion and sediment control conditions. Ameliorating indirect impacts is also detailed in chapter 8 below.

5. Matters of national environmental significance

An EPBC Act protected matters report was undertaken on the 13 of July 2021 (10 km buffer of the Development Site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the Development Site (see Appendix E). Relevant to biodiversity these include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species

The potential for these MNES to occur at the site are discussed below.

5.1 Wetlands of international importance

No wetlands of international importance were returned from the protected matters report.

5.2 Threatened ecological communities

Six TECs were returned from the protected matters report which include;

1. Coastal Swamp oak (Casuarina glauca) Forest of New South Wales and South East Queensland Endangered Ecological Community.
2. Illawarra and south coast lowland forest and woodland ecological community Critically Endangered Ecological Community.
3. Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Critically Endangered Ecological Community.
4. Lowland Grassy Woodland in the South East Corner Bioregion Critically Endangered Ecological Community.
5. River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
6. Subtropical and Temperate Coastal Saltmarsh Vulnerable Ecological Community.

TECs 1, 2, 3, 5 and 6 were excluded as being present within the Development Footprint during site inspections and are not associated with any vegetation mapping within the subject land.

In relation to TEC 4 (Lowland Grassy Woodland in the South East Corner Bioregion Critically Endangered Ecological Community), PCT 834 woodland moderate and derived grassland moderate zones meet EPBC requirements for listing as Lowland Grassy Woodland in the South East Corner Bioregion under the EPBC Act based on alignment with the following criteria (Department of Sustainability, Environment, Water, Population and Communities, 2013):

1. Area within known geographical distribution of Lowland Grassy Woodlands – South East Corner Bioregion.
2. Area in proximity to coastal areas.
3. Elevation below 500 m asl.

4. For woodland: Tree canopy dominated by expected species for Lowland Grassy Woodlands – Forest Red Gum (*Eucalyptus tereticornis*) and Rough Barked Apple (*Angophora floribunda*).

   For derived grassland: diversity of grasses (including Kangaroo Grass) and forbs.
5. Sub canopy present and with expected species Acacia mearnsii.
6. Grassy understorey with diversity of forbs present.
7. For woodland: Area > 0.25 ha with >50% native understorey cover and > 15 native understorey species.
8. For derived grassland: Area >2 ha with >50% native understorey cover > 10 native understorey species.

All of PCT 834 meets the criteria for EPBC listed Lowland Grassy Woodland CEEC.

5.3 Threatened species

Sixty-eight EPBC listed threatened species were returned from the protected matters report. Of these, 15 species were excluded from assessment based on being exclusively marine species (2 fish, 5 whales, 5 turtles, and 3 sharks). Suitability of habitat within the Development Site was assessed for the remaining 53 threatened species (Appendix F). Seven EPBC listed threatened species were identified as having potential to occur within the Development Site:

1. Regent Honeyeater *Anthochaera phrygia* – Critically Endangered
2. Spot-tailed Quoll *Dasyurus maculatus* – Endangered
3. Swift Parrot *Lathamus discolor* – Critically Endangered
4. Grey-headed Flying-fox *Pteropus poliocephalus* – Vulnerable
5. Koala *Phascolarctos cinereus* – Endangered
6. Greater Glider *Petauroides Volans* - Vulnerable
7. White-throated Needletail *Hirundapus caudacutus* – Vulnerable, Migratory

An assessment of significant impact has been conducted for each of the above seven species and are presented in Appendix G.

5.4 Migratory species

Fifty-five EPBC listed migratory species were returned from the protected matters search. Suitability of habitat within the Development Site was assessed for all 55 migratory species (Appendix F). Two EPBC listed migratory species were identified as having potential to occur within the Development Site:

1. White-throated Needletail *Hirundapus caudacutus* – Vulnerable, Migratory
2. Fork-tailed Swift *Apus pacificus* - Migratory

An assessment of significant impact has been conducted for each of the above two species and are presented in Appendix G

6. Avoid and minimise impacts

6.1 Avoiding and minimising impacts on native vegetation and habitat

6.1.1 Site selection – consideration of alternative locations/routes

Two distinct vegetation conditions were identified within the Development Site, moderate condition forests and low condition derived grasslands. Moderate condition forests represent suitable habitat for a greater number of threatened species than low condition derived grasslands (see Table 4-1). Given this, the majority of vegetation within the Development Footprint was located in areas that have been subjected to moderate and high disturbance levels (71% within low condition derived grasslands). The site contains 29% moderate condition forest vegetation concentrated in two main areas. One being in the middle of the two first order streams and adjected second order stream (PCTs 875, 834), this area contains the *Lowland Grassy Woodland* EEC. The second patch occurs along the southern and southwestern boundaries (PCTs 1220, 1336) to the east and south of the site.

A portion of these patches of moderate condition forest vegetation (PCTs 1220, 1336) on the east and south-east of the Development Site (representing 11% of the Development Site) have been avoided through design. This maintains some degree of connectivity between the Bermagui Golf Club vegetation and the large contiguous patch of vegetation to the south-west.

6.1.2 Proposal planning phase – detailed design

Avoidance and minimization of impacts to biodiversity values through design is ongoing. This section will be completed for the final BDAR.

Biodiversity Assessment Method 32 7.2.2

Design the proposal to avoid or minimise prescribed impacts

1. *Design measures that can avoid or minimise prescribed impacts include:*
    - *a) engineering solutions, such as proven techniques to:*
        - *i. minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers*
        - *ii. restore connectivity and movement corridors*
    - *b) design elements that minimise interactions with threatened entities, such as:*
        - *i. designing turbines to dissuade perching and minimise the diameter of the rotor swept area*
        - *ii. designing fencing to prevent animal entry to transport corridors*
        - *iii. providing vegetated buffers rehabilitated with native species*
    - *c) maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation*
    - *d) maintaining hydrological processes that sustain threatened entities*
    - *e) controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.*

2. *The proposed measures must be evidence-based and directed towards the threatened entities identified in Chapter 6. The BDAR or BCAR must document the designs that are proposed to avoid or minimise prescribed impacts*

7. Impacts unable to be avoided

7.1 Direct impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts, such as habitat clearance and ongoing existence of infrastructure. These are summarised in Table 7-1.

Table 7-1 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence
Direct impacts					
Clearing for building envelopes, roads and underground utilities and APZs (to be confirmed)	A total of 10.46 ha of LGW 4.88 ha of Brush-tailed Phascogale foraging habitat	one-off event	Construction (Permanent impact)	• Loss of 10.46 ha of Lowland Grassy Woodland in the South East Corner Bioregion Endangered Ecological Community (9.55 derived grassland and 0.91 forest). • Loss of 4.88 ha of potential Brush-tailed Phascogale foraging habitat.	Direct loss of 11.89 ha of groundcover habitat and loss of 4.88 ha of treed habitat.
Displacement of resident fauna	A total of 10.46 ha of LGW 4.88 ha of Brush-tailed Phascogale foraging habitat	one-off event	Construction (Permanent impact)	• Loss of 4.88 ha of potential Brush-tailed Phascogale foraging habitat.	Displacement of native fauna expected to impact common ground dwelling and arboreal mammals, reptiles and native birds utilizing habitat for foraging and breeding. Displacement of threatened species likely to be limited to loss of some foraging habitat for Brush-tailed Phascogale and potentially Koala.
Injury or death of fauna	A total of 10.46 ha of LGW 4.88 ha of Brush-tailed Phascogale foraging habitat	one-off event	Construction	• Potential injury or death of Brush-tailed Phascogale as a result of tree clearing. This is considered unlikely as no hollow-bearing trees have been identified within the Development Site.	Possible loss of native fauna expected to only be on small common ground dwelling mammals (i.e. native mice and rats) and reptiles. These species are however mobile and are likely to vacate the development site into adjacent habitats. Additionally, loss of native fauna will be mitigated by employment of trained ecologists/fauna spotters being present during all clearing activities.

7.1.1 Changes in vegetation integrity scores

The changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in Table 7-2below.

Table 7-2 Current and future vegetation integrity scores for each vegetation zone within the Development footprint

Zone ID	PCT/Zone	EEC and/or threatened species habitat?	Area within Development Site (ha)	Area Impacted (ha) development footprint	Current vegetation Integrity Score	Future vegetation Integrity Score
1	PCT 1336 Low	-	0.56	0.35	27	0
2	PCT 1336 Moderate	Brush-tailed Phascogale foraging habitat	1.60	0.42	49.3	0
3	PCT 1220 Low	-	1.99	1.99	18.8	0
4	PCT 1220 Moderate	Brush-tailed Phascogale foraging habitat	3.32	2.93	61.1	0
5	PCT 834 Low	Lowland Grassy Woodland in the South East Corner Bioregion	9.93	9.55	22.7	0
6	PCT 834 Moderate	Lowland Grassy Woodland in the South East Corner Bioregion	0.91	0.91	63.2	0
7	PCT 875 Moderate	Brush-tailed Phascogale foraging habitat	1.47	0.62	56	0

7.1.2 Loss of species credit species habitat or individuals

The loss of species credit species habitat or individuals as a result of clearing is documented in Table 7-3below.

Table 7-3 Summary of species credit species loss at the Development Site

Species Credit Species	Biodiversity Risk Weighting	Area of habitat or count of individuals lost
Brush-tailed Phascogale *Phascogale tapoatafa*	High	• PCT 1336 forest moderate: 0.42 ha. • PCT 1220 forest moderate: 2.93 ha. • PCT 834 woodland moderate: 0.91 ha. • PCT 875 forest moderate: 0.62 ha.

7.1.3 Loss of hollow-bearing trees

No hollow-bearing trees were identified within the Development Site. As such, no hollow-bearing trees are expected to be impacted by the proposed works.

7.2 Indirect impacts

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light and/or noise. Table 7-4 details the type, frequency, intensity, duration and consequence of the direct and indirect impacts of the proposal.

Table 7-4 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Rare	Construction and operation: long-term	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Impacts on movement and survival of threatened species between patches of vegetation in the south-west and north-east. • Potential increase in weed and predator encroachment within surrounding vegetation, including Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint (Lindenmayer & Fischer, 2007).
Reduced viability of adjacent habitat due to edge effects	• Approximately 900 m of edges to the east and south of the Development Footprint, created by the Development Footprint boundary.	Permanent impact	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint • Brush-tailed Phascogale	• Increases in forest edges as a result of the proposed development are considered relatively low, given the mostly straight Development Footprint boundaries. • Minor increases in edge effects resulting from the proposed development may result in an increase in weed and pest encroachment within adjoining vegetation, including Lowland Grassy Woodlands (Lindenmayer & Fischer, 2007). • Edge effects may also increase predation risk on native fauna,

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
					including Brush-tailed Phascogale (May & Norton, 1996).
Reduced viability of adjacent habitat due to noise, dust or light spill	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Ongoing	Construction and operation: long-term	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint • Brush-tailed Phascogale	• Potential disturbance of nocturnal fauna (including Brush-tailed Phascogale) as a result of increase light and noise pollution resulting from the proposed development. • Potential reduction in habitat viability for fauna in adjacent habitat due to noise, dust and light pollution from construction and ongoing residential occupation (Newport, Shorthouse & Manning, 2014).
Transport of weeds and pathogens from the site to adjacent vegetation	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Ongoing	Construction and operation: long-term	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Potential for increased transport of weeds and *pathogens (such as Phytophthora cinnimomi*) in adjoining vegetation (including Lowland Grassy Woodland) due to increased human traffic and residential gardens (Lindenmayer & Fischer, 2007; Burgess et al., 2017).
Loss of breeding habitats	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition	Rare	Construction: short-term	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion	• Indirect impacts to breeding habitat are considered unlikely, given the absence of identified breeding

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
	grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)			to the east of the Development Footprint	habitat for threatened species within the Development Site.
Trampling of threatened flora species	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Rare	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Although no threatened flora were identified within the Development Site, presence within adjoining vegetation cannot be ruled out. • Trampling of threatened flora is considered unlikely as a result of the development, however there is some risk due to increase human traffic within the area.
Rubbish dumping	Unknown	Occasional	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Risk of rubbish dumping within vegetation adjoining the Development Site is increase by an increase in human dwellings. • Rubbish dumping may reduce habitat quality within adjoining vegetation, however the increase in rubbish dumping is not considered likely to be significant enough to reduce habitat quality.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Wood collection	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Occasional	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Incidence of wood collection from vegetation adjoining the Development Site has the potential to increase due to increased human dwellings. • Wood collection from adjoining vegetation has the potential to reduce availability of habitat for small mammals and reptiles.
Bush rock removal and disturbance	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Rare	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• No bush rock was identified within the Development Site, however it cannot be ruled out from occurring within the broader vegetation. • Removal of bush rock would reduce the availability of habitat for small native fauna, primarily reptiles. • Removal of bush rock is not considered likely as result of the development.
Increase in predatory species populations	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint).	Ongoing	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint	• Minor increases in edge effects resulting from the proposed development may result in increased predation risk on native fauna, including Brush-tailed Phascogale (May & Norton, 1996).

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
	• Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)			• Brush-tailed Phascogale	• Abundance of feral cats has potential to increase as a result of human dwellings.
Increase in pest animal populations	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Ongoing	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint • Brush-tailed Phascogale	• Potential increase in pest species resulting from increased human dwellings within the area, including rodents, cats and foxes. • Potential impact on Brush-tailed Phascogale from predation by feral species, specifically Feral Cat, Red Fox and domestic dogs.
Increased risk of fire	• 2.03 ha of PCT 1336 and 875 moderate condition forests and PCT 834 low condition grasslands to the east of the site (including vegetation avoided in the Development Footprint). • Approximately 30 ha of contiguous forest vegetation to the south of the Development Footprint (including vegetation avoided in the Development Footprint)	Rare	Operation: long-term.	• TEC: Lowland Grassy Woodland in the South East Corner Bioregion to the east of the Development Footprint • Brush-tailed Phascogale	• Though considered unlikely, potential increase in human-caused ignition due to increased human occupancy within the area.

7.3 Prescribed impacts

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.
- Impacts of development on the connectivity on movement of threatened species that maintains their life cycle.
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

These are discussed in detail below, and the necessary information required by Section 9.2 of the BAM is provided.

7.3.1 Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

Contiguous connectivity within the Development Site is restricted to the southern and eastern boundaries, while connectivity within the northern and eastern sections of the Development is broken by cleared areas, housing and roads. Vegetation within the southern boundary represents the northern edge of a relatively large (approximately 30 ha) patch of forest. The eastern boundary represents a linear strip of moderate condition forest which provides continuous treed vegetation from the southern patch to vegetation within the Bermagui Golf Course.

Brush-tailed Phascogale (*Phascogale tapoatafa*) has been recorded approximately 4 km to the north and south of the Development Site, though these records are from 1986 and 1994 respectively. Breeding habitat (hollow-bearing trees) (Van der Ree, Bennett & Soderquist, 2006) has not been recorded within the Development Site but cannot be ruled out from occurring within adjoining vegetation. Although Brush-tailed Phascogale appears to preferentially forage on certain species of Eucalyptus (Mansfield et al., 2017), preferred foraging tree species are not clearly defined. Additionally, Van der Ree, Bennett & Soderquist (2006) show Brush-tailed Phascogale to be capable of persisting in heavily disturbed linear patches of vegetation. In consideration of the above, a precautionary approach has been taken to assume all forested areas are suitable foraging habitat.

Given the potential for foraging and breeding habitat to occur in both the southern vegetation patch and the Bermagui Golf Club vegetation, clearing of treed vegetation within the Development Site may reduce connectivity for this species across the landscape.

7.3.2 Impacts of development on the movement of threatened species that maintains their life cycle

Brush-tailed Phascogale is known to utilise multiple nest trees across a home range of approximately 8 ha (van der Ree, Soderquist, & Bennett, 2001). Although suitable nest trees (hollow-bearing trees) were not identified within the Development Site, it is possible that suitable trees are present in both the southern vegetation patch and the Bermagui Golf Club. Given this, breaks in connectivity through clearing of vegetation within the Development Site may result in disruptions to the breeding cycle of this species by reducing access to suitable nest trees.

7.3.3 Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

Injury or death by vehicle strikes represent a potential threat for Brush-tail Phascogale, as this species is a somewhat frequent roadkill victim, with most recorded incidents of death being recorded on rural roads with low traffic volumes (Terry, 2020).

7.4 Impacts to biodiversity values that are uncertain

Brush-tailed Phascogale has been assumed present based on their relatively large home ranges and the broad habitat types they are known to inhabit. It is difficult to detect this species and although known habitat preferences do not align well within the Development Site, presence could not be ruled out. As habitat use and the number of individuals present within the site are unknown, there is uncertainty as to the impact of the proposed development on Brush-tailed Phascogale.

7.5 Impacts to matters of national environmental significance

An EPBC Act habitat assessment evaluation (Appendix F) was undertaken for species predicted to occur within the broader study locality (10 km radius). An EPBC Act Assessment of Significance (Appendix G) was completed for each species and TECs that has a moderate to high likelihood to presence within the Development Site or was recorded during the surveys.

7.5.1 Threatened Ecological Communities

Only one EPBC listed TEC was identified within the Development Site, Lowland Grassy Woodland in the South East Corner Bioregion. This TEC was associated with both woodland and derived grassland zones of PCT 834, as described in Section 5.2. The development proposes to clear a total of 10.83 ha of Lowland Grassy Woodland (9.93 ha derived grassland and 0.91 ha woodland). As such, an EPBC Act Assessment of Significance (AoS) was completed to assess the likelihood of significant impacts to Lowland Grassy Woodlands as a result of the proposed development (Appendix G). The assessment for *Lowland Grassy Woodland* revealed that the proposed impact area represents a locally unique patch based on its size (≥ 10 ha) and the clearing area represents 10.77 percent of the local remaining extent within 10km to the Development Site. The AoS could not exclude the possibility of significant impacts to Lowland Grassy Woodland and recommended an EPBC referral.

7.5.2 Threatened Species

Seven EPBC listed threatened species were identified as having potential to occur within the Development Site, based on Appendix F. These were:

1. Regent Honeyeater *Anthochaera phrygia* – Critically Endangered
2. Spotted-tailed Quoll *Dasyurus maculatus* – Endangered
3. Swift Parrot *Lathamus discolor* – Critically Endangered
4. Grey-headed Flying Fox *Pteropus poliocephalus* – Vulnerable
5. Koala *Phascolarctos cinereus* – Endangered
6. Greater Glider *Petauroides Volans* – Vulnerable
7. White-throated Needletail *Hirundapus caudacutus* – Vulnerable

EPBC Act Assessments of Significance were completed to determine the likelihood of significant impacts as a result of the proposed development on Regent Honeyeater, Spotted-tailed Quoll, Swift Parrot, Grey-headed Flying Fox, Koala, Greater Glider and White-throated Needletail (refer to Appendix G). Five of these assessments concluded that a significant impact because of the proposed development was unlikely, and EPBC referral would not be required. Koala and Greater Glider were assessed based on the after-effects of the 2019-20 bushfires combined with the impacts of the proposal. The local habitat for both species (within 5 km) was found to be largely unburned and minimally impacted on by the fires. Because the low-moderate condition of vegetation within the Development Site is unlikely that Greater Glider or Koala will rely on this habitat for foraging or breeding. For this reason, the proposed impacts on vegetation were found to be unlikely to produce any significant impacts to these species. The assessments revealed some impacts to Greater Glider and Koala may arise from invasive species and increased traffic because of residential housing development. Impacts to Koala are addressed in further detail in Section 7.5.3 below.

7.5.3 Koala

The EPBC Act Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is utilised in Table 7-5 as it applies to the proposal. Impact areas that score five or more using this tool contain habitat critical to the survival of the Koala.

In relation to the Development Footprint, the following PCTs contain 'Koala use trees' in accordance with the Koala SEPP 2021:

PCT 1220 forest moderate:

- Silvertop Ash *Eucalyptus sieberi* (22% cover)
- Spotted Gum *Corymbia maculata* (16% cover)
- Yellow Stringybark *Eucalyptus muelleriana* (5% cover)
- Black She-oak *Allocasuarina littoralis* (2% cover)
- White Stringybark *Eucalyptus globoidea* (1% cover)

PCT 834 woodland moderate:

- Forest Red Gum *Eucalyptus tereticornis* (10% cover)
- Rough-barked Apple *Angophora floribunda* (30% cover)
- Black She-oak *Allocasuarina littoralis* (0.1% cover)
- Woollybutt *Eucalyptus longifolia* (0.1% cover)

PCT 1336 forest moderate:

- Spotted Gum *Corymbia maculata* (1% cover)

The assessment in Table 7-5 resulted in a score of 6 and, as such, the habitat within the Development Site is considered critical to the survival of the koala and an assessment of significant impact according to the EPBC Act significant impact criteria was required. The EPBC assessment of significance found the impact of the proposal to be not significant based on the following criteria.

The proposal will not:

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

- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of the species
- disrupt the breeding cycle of a population
- modify, destroy, isolate of decrease the availability of habitat to the extent that the species is likely to decline, or
- introduce disease that may cause the species to decline

Table 7-5 Koala habitat assessment tool for coastal areas (DoE 2014)

Attribute	Score	Coastal	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 2 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.	
	0 (low)	None of the above.	✓ No records of species within 2 km within the last 5 years
Vegetation composition	+2 (high)	Has forest or woodland with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata	✓ All treed areas contain Koala feed tree species
	+1 (medium)	Has forest or woodland with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 500 ha	✓ Impacted vegetation is part of a patch of approximately 32 ha of unbroken habitat. Connectivity to broader habitat (>10,000ha) broken by 2-4 minor roads. Adjacent Bermagui Golf Course provides buffer to township and connectivity to broader landscape.
	+1 (medium)	Area is part of a contiguous landscape < 500 ha, but ≥ 300 ha	

Attribute	Score	Coastal	Applicable to the proposal?
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	✓ No koala mortality recorded, though development has potential to increase threat of vehicle strike or dog attack. Considered a high to very-high risk threat to koala populations in Murrah Area of Regional Koala Significance (ARKS) see Koala Assessment Report (Appendix D)
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ No recent records of koala occurrence within proximity of the site. However, given the presence of koala use trees within the site, it is uncertain whether the habitat is important for koala.
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
Total	**6**	**Decision: Habitat considered critical to the survival of Koala, EPBC referral required.**	

7.5.4 Migratory species

Two EPBC listed migratory species were identified as having potential to occur within the Development Site, based on Appendix F. These were:

1. White-throated Needletail *Hirundapus caudacutus* – Vulnerable, Migratory
2. Fork-tailed Swift *Apus pacificus* - Migratory

An EPBC Act Assessments of Significance was completed for both species, to determine the likelihood of significant impacts to each species as a result of the proposed development. The AoS concluded that a significant impact as a result of the proposed development was unlikely, and EPBC referral would not be required.

7.6 Assumptions and predictions

Where survey has been undertaken for candidate species requiring confirmation of presence or absence, this has been done employing appropriate methods and timing. Nevertheless, it is an unavoidable limitation that not all species that utilise an area will be detected. This is generally due to their cryptic nature or mobility and unpredictable movement throughout their habitat and prevailing drought conditions.

Where survey for candidate species requiring confirmation of presence or absence was not undertaken, this is stated explicitly in the assessment, and measures identified to address the limitation are identified, i.e. absence of suitable habitat for a species.

8. Mitigating and managing impacts

8.1 Mitigation measures

A general summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure, and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 Direct impacts

- Timing of works should avoid Brush-tailed Phascogale breeding season, from May-July (Soderquist, 1993; Bionet Ecological Data, 2021).
- Suitably qualified ecologist or fauna spotter to conduct pre-clearance surveys and be present during clearing works to reduce incidents of injury or death of native fauna or to relocate where required.
- Habitat features (fallen timber, hollow logs, embedded rocks) to be relocated to adjoining vegetation under supervision of an ecologist.

8.1.2 Indirect impacts

- Preparation of a vegetation management plan to regulate activity in vegetation and habitat adjacent to the proposed development.
- Clearing protocols implemented to reduce inadvertent damage to adjoining vegetation.
- Temporary fencing to protect adjoining vegetation.
- Planned timing to mitigate impacts from noise and light pollution.
- Hygiene protocols to limit spread of environmental weeds and pathogens.

8.1.3 Prescribed impacts

- Linear strip of vegetation to the east of the Development Site to be retained to maintain treed connectivity between vegetation to the south of the Development Site and vegetation within the Bermagui Golf Club.
- Fencing natural areas to the south and east of the Development Site to reduce incidents of road strike on native fauna.

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Timing works to avoid critical life cycle events such as breeding or nursing	• Tree removal works should be timed to avoid May to July which is common breeding season for Brush-tailed Phascogale.	Works conducted between August-April	Regular	Contractor	Moderate	Injury or death to threatened fauna.
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events	• Staged clearing, supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required	Construction	Regular	Construction contractor	Moderate	High risk and consequences could include injury or death of fauna
Relocation of habitat features (fallen timber, hollow logs and embedded rock) from within the Development Site.	• All fallen timber and hollow logs should be relocated outside of the construction area under the supervision of an ecologist or spotter catcher. All fauna should also be relocated if discovered.	Construction	Regular	Construction contractor	Low	Moderate risk and consequences could include loss of fauna resulting from inability to relocate to suitable habitat due to exposure or predation.
Induct all staff prior to construction to identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance;	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing.	Prior to and during construction	Regular	Construction Contractor	High	Low risk of inadvertent clearing of native vegetation and fauna habitat intended for conservation onsite

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	• No stockpiling or storage within dripline of any mature trees. • No stockpiling or storage within riparian buffers.					
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Documented clearance protocols to mark and protect vegetation to be retained. • Use handheld machinery where possible and have elevated work platform check hollows prior to tree felling.	Pre construction	Regular	Construction contractor	High	Low risk if protocol followed. If not then a high risk exists to surrounding vegetation
Limiting impacts of noise and light pollution resulting from construction	• Limit works to daytime, to minimise noise and light pollution on nocturnal fauna.	Construction	Regular	Construction contractor	Low	Low risk if protocol followed. Moderate risk of disturbance to nocturnal fauna ecology if not followed.
Install temporary fencing to protect significant environmental features such as vegetation on eastern boundary of site	• Prior to construction commencing, exclusion fences and signage would be installed around habitat to be retained.	Construction	Regularly	Construction Contractor	Low	Low risk if protocol followed. If not then a moderate risk exists to surrounding vegetation
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	• Ensure machinery and equipment as clean and free	Construction	Regular	Construction contractor	Moderate	Low risk if protocol is following. Moderate risk if not followed due to weed invasion causing

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	from pathogens and weeds prior to entering site					loss of native species and impacts to threatened fauna
Preparation of a simple Vegetation Management Plan (VMP) for the site	VMP to include; • How to remove and disposal of vegetation and topsoil containing weeds declared under the Biosecurity Act 2015 during and after construction. • Reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora.	Construction, operation	One off	Developer	Moderate	New weeds into the site, plant diseases and inappropriate species established as part of landscaping of the subdivision which could affect adjoining native vegetation and fauna habitat.
Prescribed biodiversity impacts						
Staff training and site briefing to communicate impacts of traffic strikes on native fauna during construction phase	• Awareness training during site inductions regarding enforcing site speed limits; and • Site speed limits to be enforced to minimise fauna strike.	Construction	Regular	Contractor	Moderate	Fauna strikes from vehicles, including Brush-tailed Phascogale.
Permanent fencing installed to protect vegetation adjoining the Development Site on the southern and eastern boundaries.	• Fencing to be installed across entire length of adjoining vegetation patches. • Fencing to be sufficient to limit ground dwelling fauna entering roads.	Operation	Regular	Construction Contractor	Moderate	Fauna strikes from vehicles, including Brush-tailed Phascogale.

8.2 Adaptive management strategy

Adaptive management during construction and operation will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and is key to the successful implementation of the relevant management plans. This will allow ongoing flexibility to manage objectives, allow for relevant feedback and modifications. Construction management plans will contain management plans for flora and fauna, which will have an adaptive management component. This includes measures to monitor predicted impacts of vehicle strikes, thresholds for species mortality, based on relevant literature, which will trigger adaptive management actions, and any measures proposed to mitigate potential impacts.

9. Serious and Irreversible Impacts (SAII)

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1 Potential serious and irreversible impact entities

9.1.1 Threatened ecological communities

Two TECs occur within the Development Footprint, Lowland Grassy Woodland in the South East Corner Bioregion and Brogo Wet Vine Forest in the South East Corner Bioregion. Neither of these is listed as at risk of serious and irreversible impact.

9.1.2 Threatened species

Several SAII species have been identified as candidate species. SAII's have been ruled out for all candidate species, as detailed below. The following SAII species were identified as candidate species by the NSW BAM-C:

- Regent Honeyeater
- Swift Parrot
- Stuttering Frog
- Broad-headed Snake
- Large-eared Pied Bat
- Large Bent-winged Bat
- Brush-tailed Rock Wallaby

Additionally, the following SAII species were identified by the EPBC PMST search:

- Curlew Sandpiper
- Orange-bellied Parrot
- Eastern Curlew
- Hooded Plover
- Smoky Mouse
- Thick-lipped Spider Orchid

- Warty Zieria

Regent Honeyeater, Swift Parrot, and Orange-bellied Parrot

Serious and Irreversible Impacts to Regent Honeyeater, Swift Parrot, and Orange-bellied Parrot are listed as any action that will cause a further decline of the species that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. Assessments of Significance (AoS) have been completed for Regent Honeyeater and Swift Parrot (Appendix G). The Development Footprint is located outside of known breeding habitat and mapped important areas for all 3 species (DPIE 2021b), and as such a SAII is not considered likely to occur.

Stuttering Frog

Serious and Irreversible Impacts to Stuttering Frog are listed as any impact on a species that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable. This species has been ruled out as occurring within the Development Footprint through survey and therefore a SAII to this species is considered unlikely to occur.

Broad-headed Snake

Serious and Irreversible Impacts to Broad-headed Snake are listed as any impact on a species that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable. This species has been ruled out as occurring within the Development Footprint based on the absence of suitable habitat (sandstone escarpments and hollow-bearing trees) within the Development Footprint. As such a SAII is considered unlikely.

Brush-tailed Rock Wallaby

Serious and Irreversible Impacts to Brush-tailed Rock Wallaby are listed as any impact on a species that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable. Both species have been ruled out as occurring within the Development Footprint based on the absence of suitable habitat (rocky escarpments, outcrops and cliffs) within the Development Footprint. As such a SAII is considered unlikely.

Large-eared Pied Bat and Large Bent-winged Bat

Serious and Irreversible Impacts to Large-eared Pied Bat and Large Bent-winged Bat are listed as any impact on a species that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable. Both species were ruled out as occurring within the Development Footprint due to an absence of suitable breeding habitat. As such a SAII is considered unlikely.

Curlew Sandpiper

Serious and Irreversible Impacts to Curlew Sandpiper are listed as any impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. The Development Footprint is located outside of mapped important areas for this species (DPIE 2021b), and as such a SAII is considered unlikely.

Eastern Curlew

Serious and Irreversible Impacts to Eastern Curlew are listed as any action that will cause a further decline of the species that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. The Development Footprint is located outside of mapped important areas for this species (DPIE 2021b), and as such a SAII is considered unlikely.

Hooded Plover

Serious and Irreversible Impacts to Hooded Plover are listed as any action that will cause a further decline of the species that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline and will further reduce the population size of the species that is currently observed, estimated, inferred or reasonably suspected to have a very small population size. The Development Footprint is located outside of mapped important areas for this species (DPIE 2021b), and as such a SAII is considered unlikely.

Smoky Mouse

Serious and Irreversible Impacts to Smoky Mouse are listed as any action that will cause a further decline of the species that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. This species has been excluded based on the absence of suitable habitat (heathland) within the Development Footprint.

Thick-lipped Spider Orchid

Serious and Irreversible Impacts to Thick-lipped Spider Orchid are listed as any action that will cause a further decline of the species that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline and will further reduce the population size of the species that is currently observed, estimated, inferred or reasonably suspected to have a very small population size. This species has been excluded from occurring as the Development Footprint as it is outside of the known range. As such a SAII is considered unlikely.

Warty Zieria

Serious and Irreversible Impacts to Warty Zieria are listed as any impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. This species has been ruled out from occurring based on the absence of suitable habitat (rocky outcrops) within the Development Footprint.

10. Requirement to offset

10.1 Impacts requiring an offset

10.1.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or

b) vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or

c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset, and the ecosystem credits required, are documented in Table 10-1 and mapped in Figure 10-1.

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	PCT 1336 Low	Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion	0.35	27	4
2	PCT 1336 Moderate	Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion	0.42	49.3	8
3	PCT 1220 Low	Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	1.99	18.8	14
4	PCT 1220 Moderate	Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	2.93	61.1	67
5	PCT 834 Low	Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion	9.55	22.7	109
6	PCT 834 Moderate	Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion	0.91	63.2	29
7	PCT 875 Moderate	Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin	0.62	56	13

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
		Bioregion and South East Corner Bioregion			

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix C.

10.1.2 Species credits

With the exclusion of Brush-tailed Phascogale, all candidate threatened species credit species were ruled out through targeted survey or lack of suitable habitat within the Development Footprint. Brush-tailed Phascogale was assumed present in all potentially suitable treed habitat (Figure 10-1), given the low detectability of this species through survey. Table 10-2 shows the credits generated for each vegetation zone within the development footprint.

Table 10-2 Species credit species generated that require offsets

PCT - Zone	Species	Zone area (ha)	Biodiversity Risk Weighting	Ecosystem credits required
PCT 834 moderate	Brush-tailed Phascogale	0.91	2	29
PCT 875 moderate	Brush-tailed Phascogale	0.62	2	17
PCT 1220 moderate	Brush-tailed Phascogale	2.93	2	90
PCT 1336 moderate	Brush-tailed Phascogale	0.42	2	10
TOTAL		4.88		146

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix C.

10.1.3 Offsets required under the EPBC Act

Assessments of Significance for the Regent Honeyeater, Swift Parrot, Spotted-tailed Quoll, Grey-headed Flying Fox, White-throated Needletail, Greater Glider and Koala determined the potential for these species to be significantly impacted by the proposal, or where the determination is uncertain, referral was recommended. Additionally, an Assessment of Significance was completed from the TEC Lowland Grassy Woodland in the South East Corner, which recommended referral given uncertainty of impacts. The requirement to settle an EPBC offset obligations will be undertaken in accordance with the NSW offset rules where applicable to do so, consistent with the endorsed bilateral agreement.

10.2 Impacts not requiring an offset

Impacts to PCTs that do not meet the thresholds identified in Section 10.1.1 of the BAM do not require offsets. All PCTs and vegetation zones identified within the Development Footprint exceed the threshold for offsetting, and as such an offset obligation will be generated.

10.3 Areas not requiring assessment

BAM Section 10.4 identifies areas not requiring assessment i.e. Category 1 - Exempt Land. As all areas within the Development Footprint have been identified as requiring offsets.

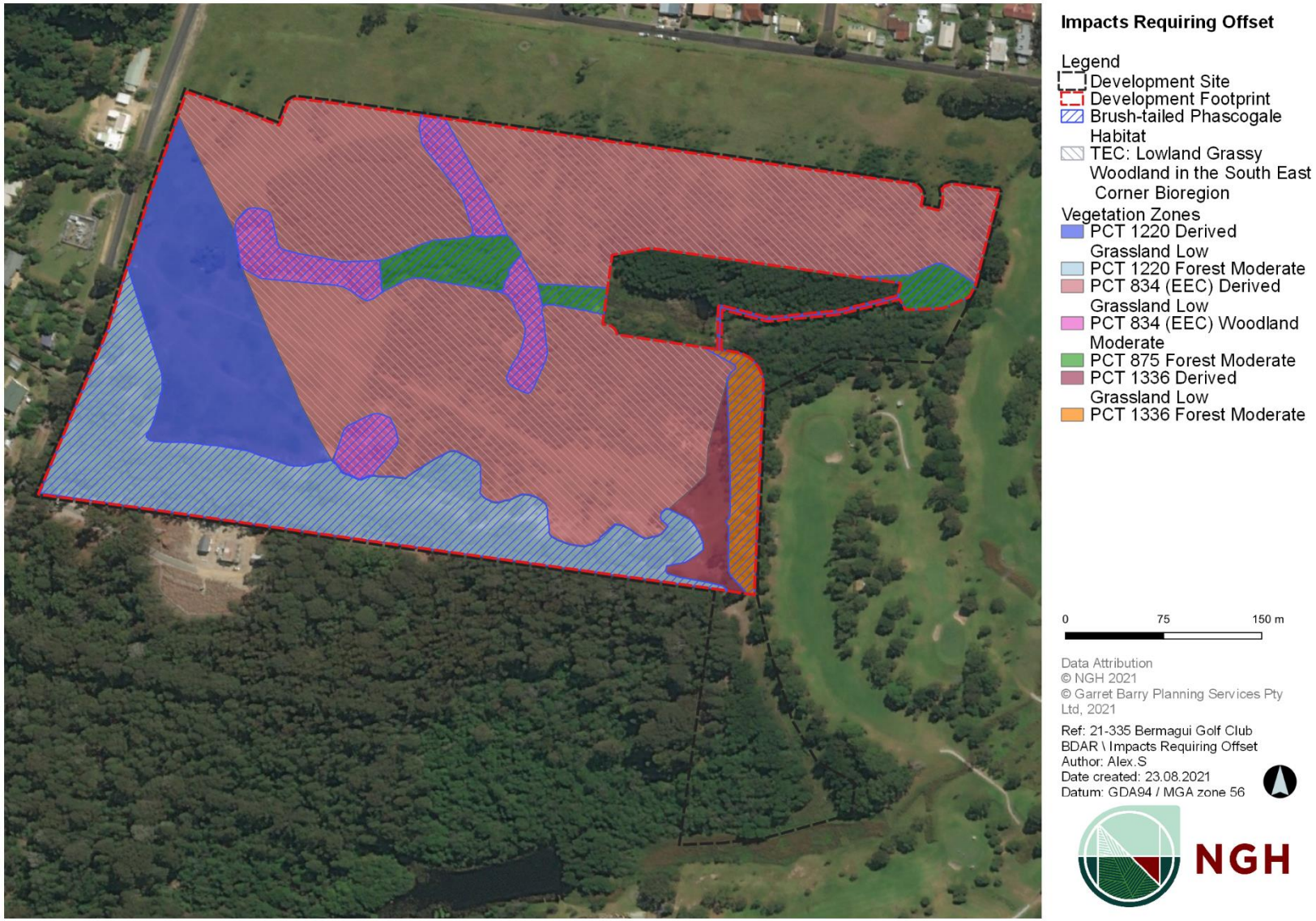

Figure 10-1 Impacts requiring offset

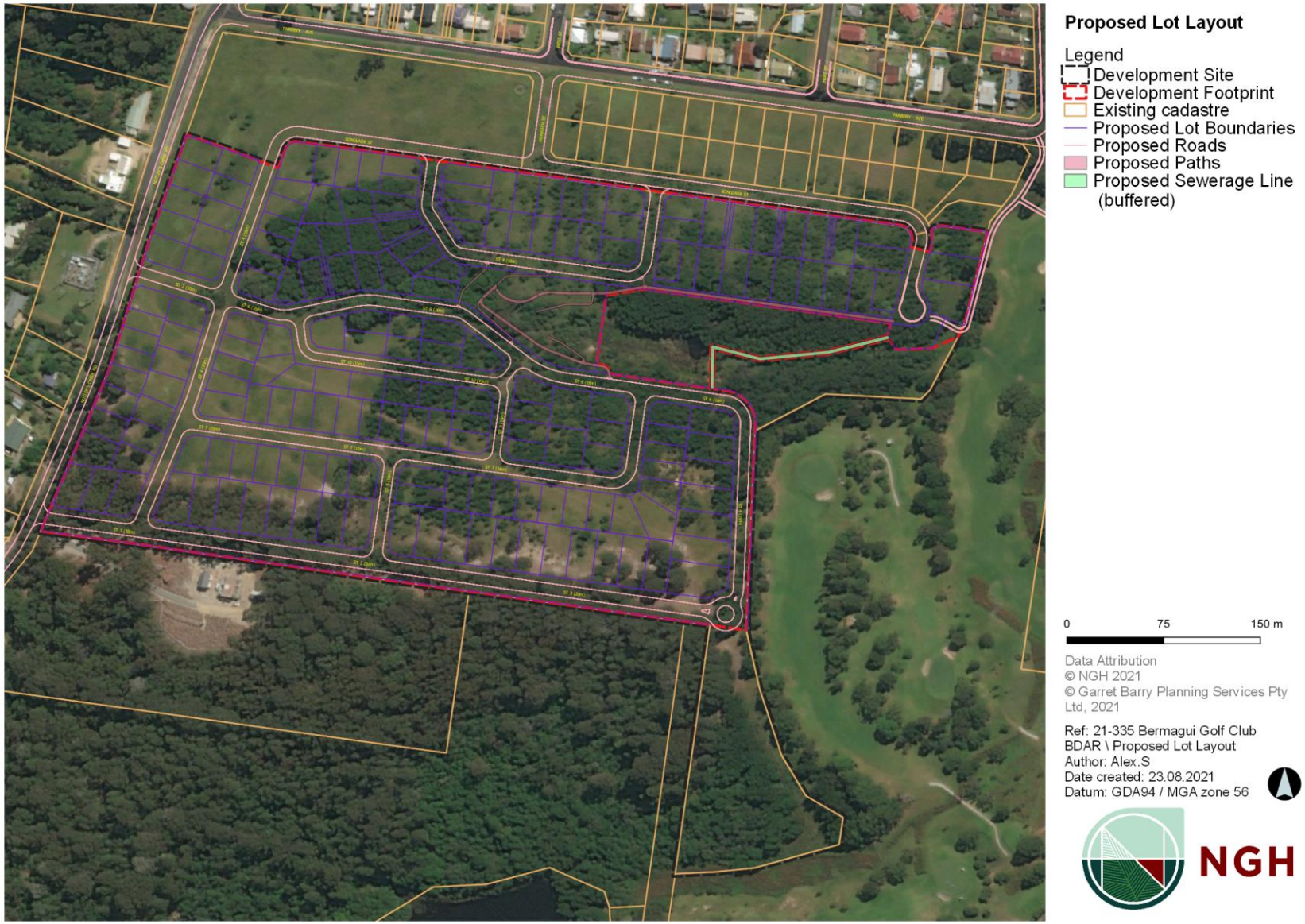

Figure 10-2 Proposed development layout

11. Conclusion

NGH has prepared this BDAR on behalf of Garret Barry Planning Services Pty Ltd. The Bermagui Golf Club subdivision proposal is classified as a local development under Part 4 of the Environmental Planning and Assessment Act 1979. The proposed clearing will exceed the allowable clearing thresholds of the Biodiversity Offset Scheme (BOS) as specified by the NSW Biodiversity Conservation Act 2016 (BC Act) and the Biodiversity Conservation Regulation 2017 (BC Regulation). As such, this BDAR assessed the impacts of the proposal according to the NSW Biodiversity Assessment Methodology (BAM).

Avoidance and minimisation of impacts has been conducted through the planning phases which has resulted in avoidance of breaks to connectivity and minimising clearing of treed vegetation in the south-east of the Development Site. In this BDAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the BAM
- One assumed threatened species within the development site and adjacent vegetation the impacts to which have been adequately assessed.
- Mitigation measures which have been outlined to reduce the impacts to biodiversity (Section 8).

The following details the ecosystem credits and species credits generated within the Development Footprint which will need to be offset:

- 138 ecosystem credits for PCT 834 and associated TEC Lowland Grassy Woodland in the South East Bioregion
- 13 ecosystem credits for PCT 875
- 81 ecosystem credits for PCT 1220
- 12 ecosystem credits for PCT 1336
- 146 species credits for Brush-tailed Phascogale

EPBC Assessments of Significance for Regent Honeyeater, Swift Parrot, Spotted-tailed Quoll, Grey-headed Flying Fox, White-throated Needletail, Koala, Greater Glider and Lowland Grassy Woodland in the South East Bioregion were undertaken. EPBC referral has been recommended to assess the likelihood of significant impacts Lowland Grassy Woodlands in the South East Bioregion as a result of the proposed development. Further referrals for Koala and Greater-Glider were recommended to assess the potential for significant impacts on these species as a result of the proposal. Significant impacts were not considered likely for all other EPBC listed threatened species and EPBC referral was not recommended.

In addition, under the Koala SEPP 2021 a Koala Assessment Report has been prepared for submission with this BDAR (see Appendix D).

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by either:

1. Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules (which includes stewardship or the purchase of credits), or
2. Making payments into the Biodiversity Conservation Fund using the offset payments calculator

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Appendix A Survey data

A.1 Plot data

A.2 Fauna survey results

Appendix B Personnel

Name	Title	Qualifications	Role

Appendix C BAM calculator credit report

Appendix D Koala assessment report

Garret Barry Planning Services

NGH

Koala Assessment Report

Bermagui Golf Club Subdivision

March 2022

Project Number: 21-355

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1. Document verification

Project Title:	Bermagui Golf Club Subdivision
Project Number:	21-355
Project File Name:	Koala Assessment Report

Revision	Date	Prepared by	Reviewed by	Approved by
Final v.1	2/03/2022	James Hagan	Rebecca Reid & Jared Graham-Higgs (minor changes)	Beth Noel
Rev v.2	11/03/2022	Nick Graham-Higgs (minor changes)	Nick Graham-Higgs	Nick Graham-Higgs
	[Enter the date]			

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Figures

Tables

Appendices

Acronyms and abbreviations

ARKS	Area of Regional Koala Significance
BC Act	*Biodiversity Conservation Act 2016*
BAM	Biodiversity Assessment Method
DA	Development Application
DAWE	Department of Agriculture, Water and Environment (Federal)
DPIE	Department of Planning, Industry and Environment (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ha	hectares
km	kilometres
KMA	Koala Management Area
KPoM	Koala Plan of Management
LGA	Local Government Area
m	metres
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

1. Introduction

NGH have been engaged by Garret Barry Planning Services Pty. Ltd. (Garret Barry Planning) to conduct a Koala Assessment Report as required under the State Environmental Planning Policy (SEP) (Koala Habitat Protection) 2021 ('Koala SEPP 2021'). The Koala Assessment Report will be submitted along with a Biodiversity Development Assessment Report (BDAR) for the proposed Bermagui Golf Club subdivision.

The aim of the Koala SEPP 2021 is to encourage the conservation and management of areas with native vegetation that provide habitat for koalas. These conservation and management actions will aid to support the long-term viability of permanent free-living populations over their present range, plus, reverse the current trend of koala population decline. This is especially important in the year 2022 as the kolas Commonwealth listing has been updated to Endangered.

This report aims to address the Koala SEPP 2021 by presenting a Koala Assessment Report that demonstrates an understanding of the principles outlined in the Koala SEPP 2021, ensuring koala habitat is properly considered during the development assessment process. This further provides a process for consent authorities to fully consider impacts on koala habitat when reviewing the Bermagui Golf Club proposal.

1.1 Proposal and Development Site

The Bermagui Golf Club Subdivision proposes to develop on Lot 245, DP 1272130, adjacent to Parbery Avenue and Nutleys Creek Road located in the Bega Valley LGA (Local Government Area). The proposal intends to develop 19.78 hectares of land of which 16.76 ha will be occupied by 187 new dwellings, roads, footpaths, playlot park and sewer pumping station (Figure 1-1). The Development Site (19.78 ha) refers to the area of land where the BAM (Biodiversity Assessment Method) has been applied and that which is subject to potential direct or indirect impacts. The Development Footprint (16.76 ha) refers to the area of land that will be directly impacted by the proposal and consists of subdivided lots and associated infrastructure. The retained areas (3.02 ha) consist of patches of moderate condition forest vegetation and some low condition grassland to the south and east of the Development Site. The development is expected to impact on 4.36 hectares of habitat potentially suited to koalas (Figure 1-1 and Figure 2-3).

All new lots will require an asset protection zone under Planning for Bushfire Protection 2006, at a BAL 29 rating. The asset protection zone has not been confirmed and is still subject to client confirmation.

The entirety of the Development Site is zoned R3: Medium Density Residential under the Bega Valley Local Environmental Plan 2013 and is located within the South Coast Koala Management Area (KMA).

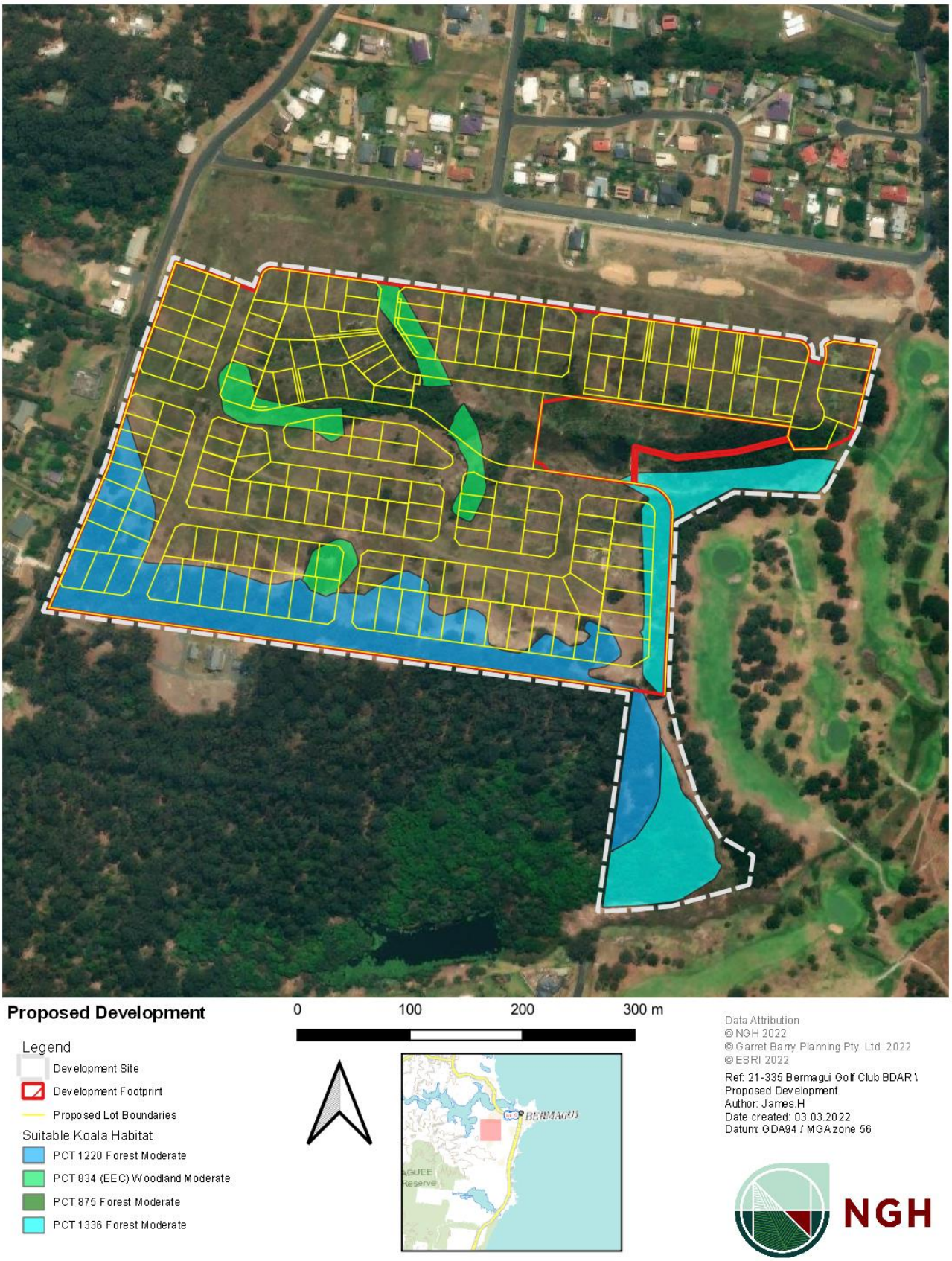

Figure 1-1 Overview of Development Site, including development footprint, proposed Lot boundaries and suitable Koala habitat.

1.2 Criteria for applying the Koala SEPP 2021

There are several criteria used to determine whether a Koala Assessment Report is required for a proposed development, dependent on the LGA, zoning, and the nature of the development (NSW Department of Planning, Industry and Environment, 2021).

As the Development Site is in the Bega Valley LGA and no specific exemptions apply, the Koala SEPP 2021 is applicable to this development. There are several further criteria used to determine whether the Koala SEPP is applicable, outlined below (Table 1-1).

Table 1-1 Criteria used to determine whether the Koala SEPP 2021 is required to be addressed when undertaking a development.

Criteria	Applicable to this development?
1. Does the development require a DA? If No, you do not need to consider the Koala SEPP **If Yes, continue to 2**	Yes – the development requires a DA
2. Does an approved Koala Plan of Management (KPoM) apply to the land? If Yes, ensure the DA is consistent with that plan **If No, continue to 3**	No – Bega Valley Shire Council does not currently have an approved KpoM
3. Is the land >1 ha in size? If No, you do not need to consider the Koala SEPP **If Yes, continue to 4**	Yes – the proposed development area is 16.77 hectares
4. Is the development application likely to have a low or no impact on koala habitat (e.g., home-based childcare)? If Yes, you do not need to consider the Koala SEPP **If No, a Koala Assessment Report is required. A suitably qualified and experienced person must be engaged to survey the land and prepare a Koala Assessment Report.**	No – the development is not low impact. **A Koala Assessment Report is required (this report).**

2. Site assessment and context

2.1 Field survey

Field surveying was undertaken by NGH ecologists between 27-29 November 2018 to identify general ecological constraints within the Development Site for the DA. This field survey included ground truthing of existing vegetation mapping, stratifying vegetation condition, identifying plant community types, and characterising habitat features that may be used by threatened species across the Development Site. The PCTs mapped by NGH are presented in Figure 2-1, overlayed with the development footprint, which was digitised using the proposed Lots layout provided by Garret Barry Planning.

NGH ecologists determined that the Development Site contained four Plant Community Types (PCTs) further divided into vegetation zones of varying condition (Figure 2-1):

- *PCT 1336 Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion*
- *PCT 1220 Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion*
- *PCT 834 Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion*
- *PCT 875 Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin Bioregion and South East Corner Bioregion*

Assessment of NGH flora survey results identified PCTs within the Development Site containing 'Koala use trees' in accordance with the Koala SEPP 2021:

Species identified in PCT 1220 Forest moderate:

- Silvertop Ash *Eucalyptus sieberi* (22% cover)
- Spotted Gum *Corymbia maculata* (16% cover)
- Yellow Stringybark *Eucalyptus muelleriana* (5% cover)
- Black She-oak *Allocasuarina littoralis* (2% cover)
- White Stringybark *Eucalyptus globoidea* (1% cover)

Species identified in PCT 834 woodland moderate:

- Forest Red Gum *Eucalyptus tereticornis* (10% cover)
- Rough-barked Apple *Angophora floribunda* (30% cover)
- Black She-oak *Allocasuarina littoralis* (0.1% cover)
- Woollybutt *Eucalyptus longifolia* (0.1% cover)

Species identified in PCT 1336 forest moderate:

- Spotted Gum *Corymbia maculata* (1% cover)

All PCT's listed above occur within the Development Site. Vegetation Integrity (VI) survey plots were used to determine the condition of each PCT in accordance with the BAM and have been summarised in Table 2-1 Summary of vegetation integrity assessment for potential Koala habitat

PCTs.below. The VI score represents the degree to which the composition, structure and function of the vegetation type at a site differs from the benchmark value. The benchmark value is considered optimal and given the VI score of 100.

The condition classes of vegetation mapped within the Development Site are based on the following VI Scores: Low (0-34), Moderate (35-65), High (65+). The distribution and extent of the PCTs mentioned above is discussed in Section 2.2.2 and a map has been provided (Figure 2-3).

Table 2-1 Summary of vegetation integrity assessment for potential Koala habitat PCTs.

PCT/Zone	Composition score	Structure score	Function score	VI score
1336 - Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion (moderate)	59	44.1	46	49.3
1220 - Spotted Gum - White Stringybark - Burrawang shrubby open forest (moderate)	83.5	40.4	67.7	61.1
834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands (moderate)	99.7	65	38.9	63.2

The vegetation within the Development Footprint was categorised into two condition classes (Low and Moderate) with the majority of the site classified as derived grasslands (Table 2-2).

The 10.84 ha area of PCT 834 identified on site met the criteria for the Threatened Ecological Community (TEC) *Lowland Grassy Woodlands of the South East Corner Bioregion (Lowland Grassy Woodlands)* under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) guidelines. Both grassland and woodland areas meet the criteria for TEC listing (Table 2-2).

Table 2-2 Area of PCTs within the Development Site based on condition, and percentage to be removed.

PCT	Class	Condition	Area within Development Site (ha)	Area within Development Footprint (ha)
1336	Grassland	Low	0.56	0.35
1336	Forest	Moderate	1.60	0.42
1220	Grassland	Low	1.99	1.99
1220	Forest	Moderate	3.32	2.93

PCT	Class	Condition	Area within Development Site (ha)	Area within Development Footprint (ha)
834	Grassland	Low	9.93	9.55
834	Woodland	Moderate	0.91	0.91
875	Forest	Moderate	1.47	0.62

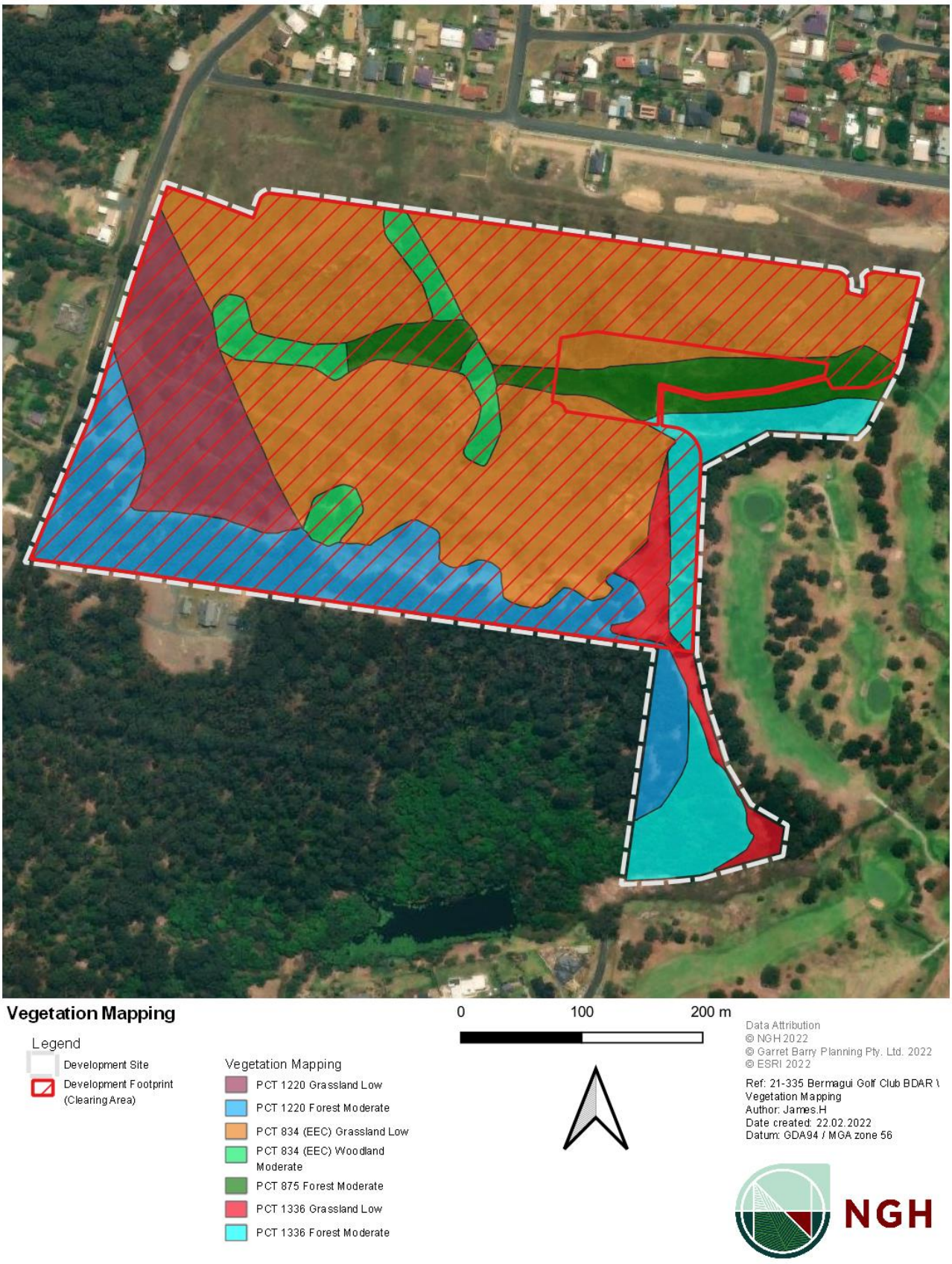

Figure 2-1 PCT mapping, and vegetation stratification data collected by NGH, 2018

2.2 Core koala habitat within the Study Area

2.2.1 Definitions

The Koala SEPP 2021 refers to a number of terms that are important to define when assessing a site for the presence of **core koala habitat** under the Koala SEPP 2021. These terms are detailed below.

Area of land

An **area of land** includes both the Development Footprint and the surrounding area that may suffer **indirect** impacts from the development (that is contained within the subject lot and adjoining land within the same ownership). The Koala SEPP 2021 applies to both direct and indirect impacts to habitat within these areas, therefore all habitat on the landholding should be considered even if no vegetation is to be cleared.

Historical koala occupation

This is determined by considering koala records within the last 18 years, within 2.5 km of the Development Site for the South Coast KMA. Koala records refer to NSW BioNet Atlas records with a locational accuracy of ≤1,000 m.

Highly suitable koala habitat

Highly suitable koala habitat refers to areas where 15% or greater of the total number of trees within any Plant Community Type (PCT) are the regionally relevant species as listed in Schedule 2 of the SEPP (Appendix A).

Core koala habitat

Core koala habitat refers to:

- an **area of land** which has been assessed by a suitably qualified and experienced person as being **highly suitable koala habitat** and where koalas are recorded as being present at the time of assessment, OR
- an **area of land** which has been assessed by a suitably qualified and experienced person as being **highly suitable koala habitat** and where koalas have been recorded as being present in the previous 18 years.

2.2.2 Core koala habitat within the Development Site – highly suitable koala habitat

A review of the NGH site survey data determined that all tree species found in the three Eucalypt dominant PCT zones (834, 1220, 1336) which had an intact canopy are listed as regionally relevant tree species for the South Coast KMA Under Schedule 2 of the Koala SEPP 2021 (Table 2-3, Fig 2.2, Appendix A). The stratification of vegetation type and condition revealed that the site is comprised mostly (63%) of derived grasslands. The remaining treed vegetation that contains Eucalypt species totalled 5.83 hectares (29%). As such the development site contains approximately 6 hectares of suitable koala habitat (Figure 2-3). Because the existing areas of forest, that could be defined as potentially suitable koala habitat inside the Development Site, are degraded and generally lack connectivity to existing forested areas adjacent to the Development

Site, it is inferred that the site contains potential low quality foraging habitat for koalas but does not contain core koala habitat.

Table 2-3 Koala tree species identified NGH as present in different areas of the Development Site

PCT	PCT condition	Tree species recorded within PCTs
1336	Intact canopy, low condition disturbed ground cover vegetation	*Corymbia maculata*
1220	Intact canopy, low condition disturbed ground cover vegetation	*Corymbia maculata* *Eucalyptus globoidea* *Eucalyptus muelleriana* *Allocasuarina littoralis*
834	Intact canopy, low condition disturbed ground cover vegetation	*Eucalyptus tereticornis* *Angophora floribunda* *Allocasuarina littoralis*

2.2.3 Core koala habitat within the Development Site – historical koala records

Two koala Spot Assessment Technique (SAT) surveys were conducted within the Subject Land in accordance with Phillips and Callaghan (2011). SAT surveys were completed in PCT 834 woodland and 1220 forest. Each survey assessed 29 trees plus one chosen centre tree, during which the ecologist spent approximately 1 minuet at the base of each tree searching for koala scats, then another short period scanning the entire tree for signs of koala scratches or individuals foraging.

Nocturnal spotlighting and call playback surveys for koalas and other nocturnal fauna were conducted in December 2018. The majority of the Subject Land was traversed over three evenings, two hours of effort each night, for a total of six hours. Call playback was conducted for approximately 10 minutes during each spotlighting event.

No koalas were recorded during the survey effort by NGH, and SAT surveys did not identify any signs of use of habitat by koala. A *NSW BioNet Atlas* search was conducted for koala records dated between 2004-2022 (the last 18 years) within 2,500 m of the Development Site and returned two results with spatial accuracies ≤1,000 m. None of these records are from directly within the Development Site, predicting no historical koala occupation of the Development Site. The Development Site therefore does not meet the criteria for core koala habitat under this definition.

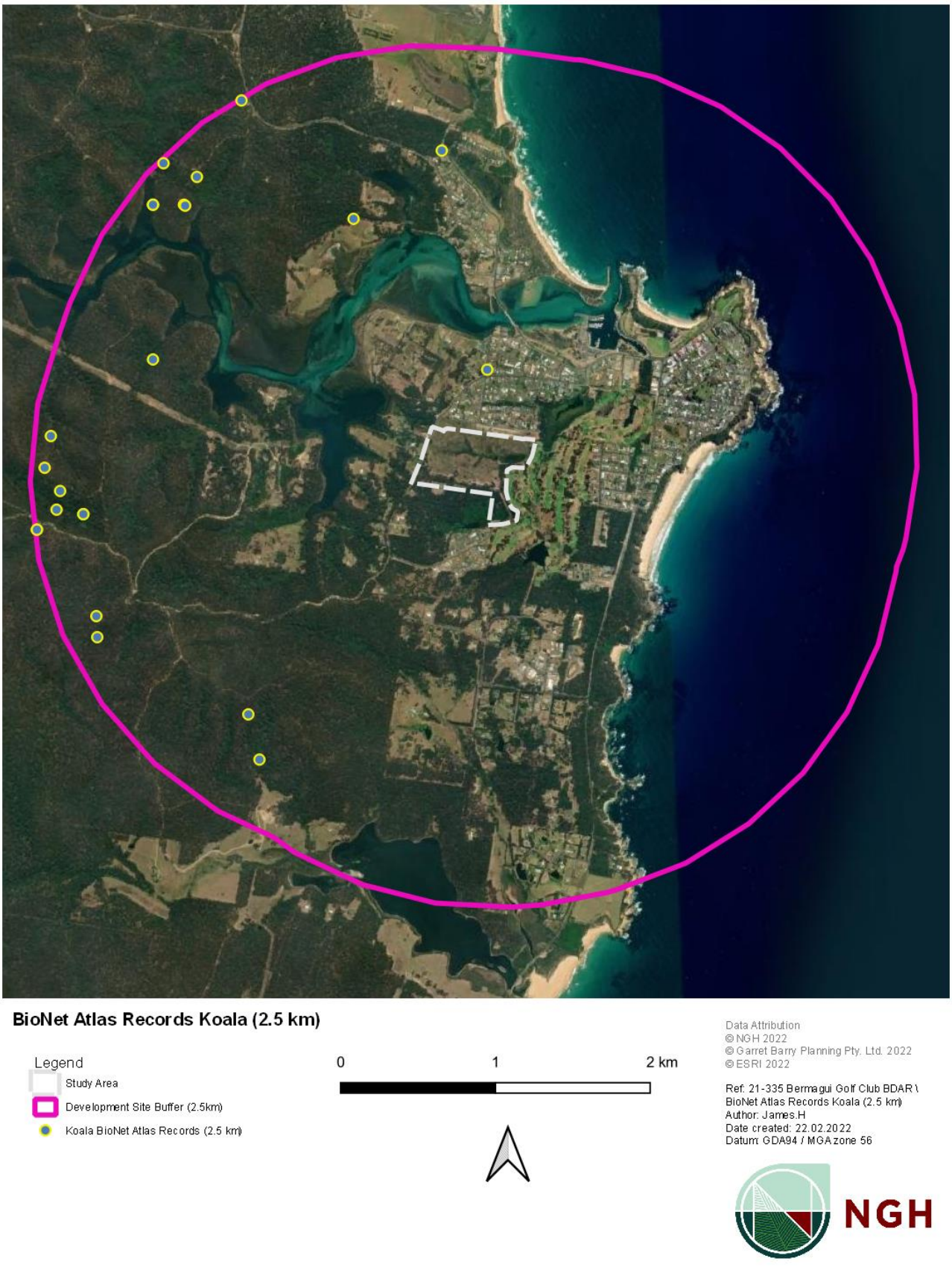

Figure 2-2 NSW BioNet Atlas Koala records (2.5 km)

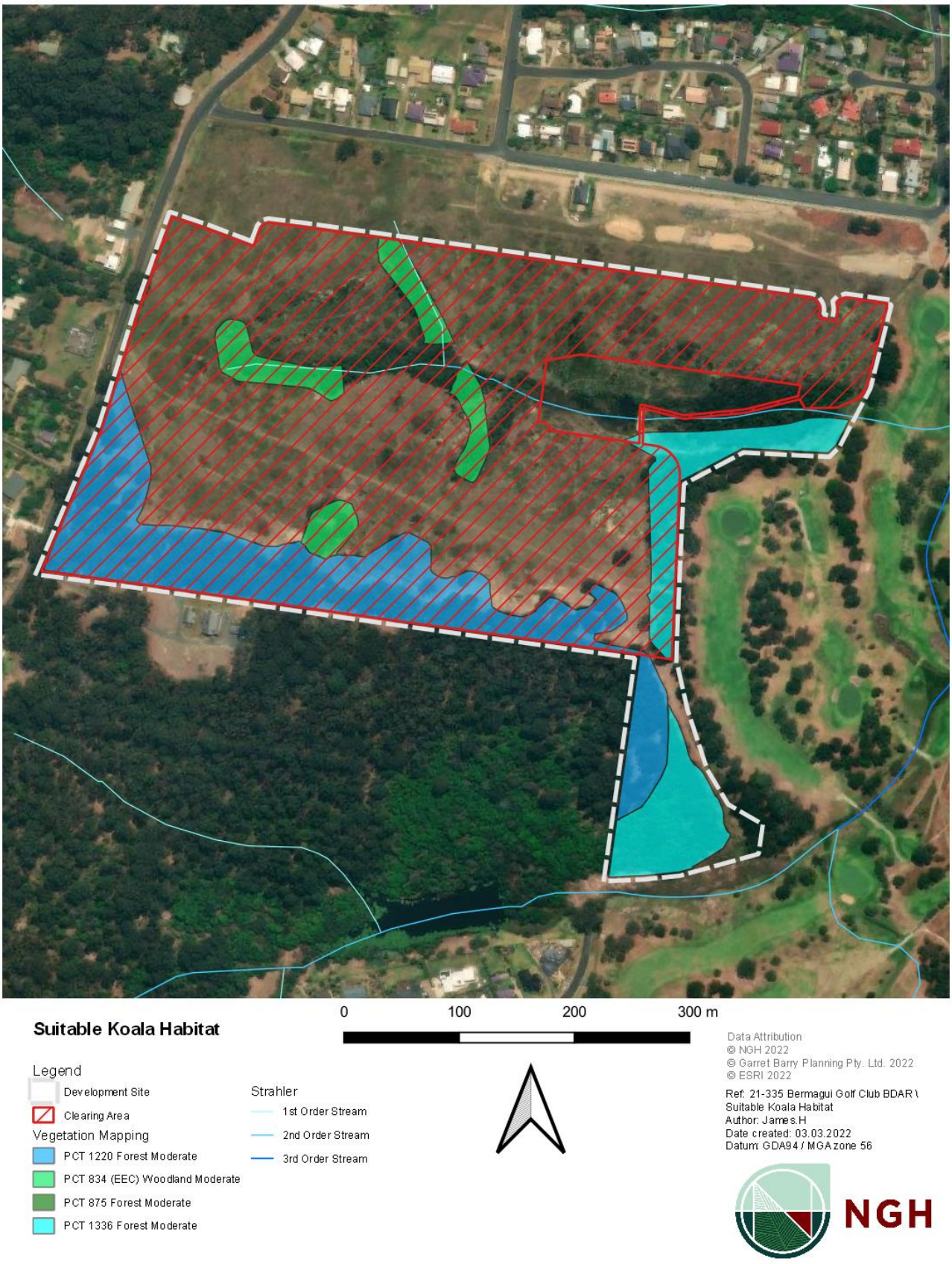

Figure 2-3 Suitable koala habitat within the Development Site

2.3 Koalas within the greater regional context

2.3.1 Koala Activity

A study of the distribution and abundance of koala populations in the Bega /Bermagui region, compared the findings to results from previous surveys undertaken in 2007-09 (State of NSW and Office of Environment and Heritage, 2016). The area surveyed consisted of 26,000 ha of forest, including National Park, Nature Reserve, State Forest and private land. The survey area stretched between Bermagui State Forest in the north and Mumbulla State Forest in the south (Between Bermagui and Tathra). Koala evidence was sighted at 105 of 918 survey sites giving an occupancy rate of 11.44% in the survey area. The highest concentration of activity was in Mumbulla State Forest extending east into Mimosa National Park with two small clusters of activity identified around Murrah State Forest and Bermagui Nature Reserve (State of NSW and Office of Environment and Heritage, 2016).

Figure 2-4 below gives a representation of the density and distribution of Koala observations (as per Bionet records between 1965-2017) in the region to the south and southwest of the Development Site between Tathra and Bermagui. The map highlights the use of relatively contiguous habitat within the reserves and National Parks around Bermagui with few records present within the urban areas as shown on Figure 2-4.

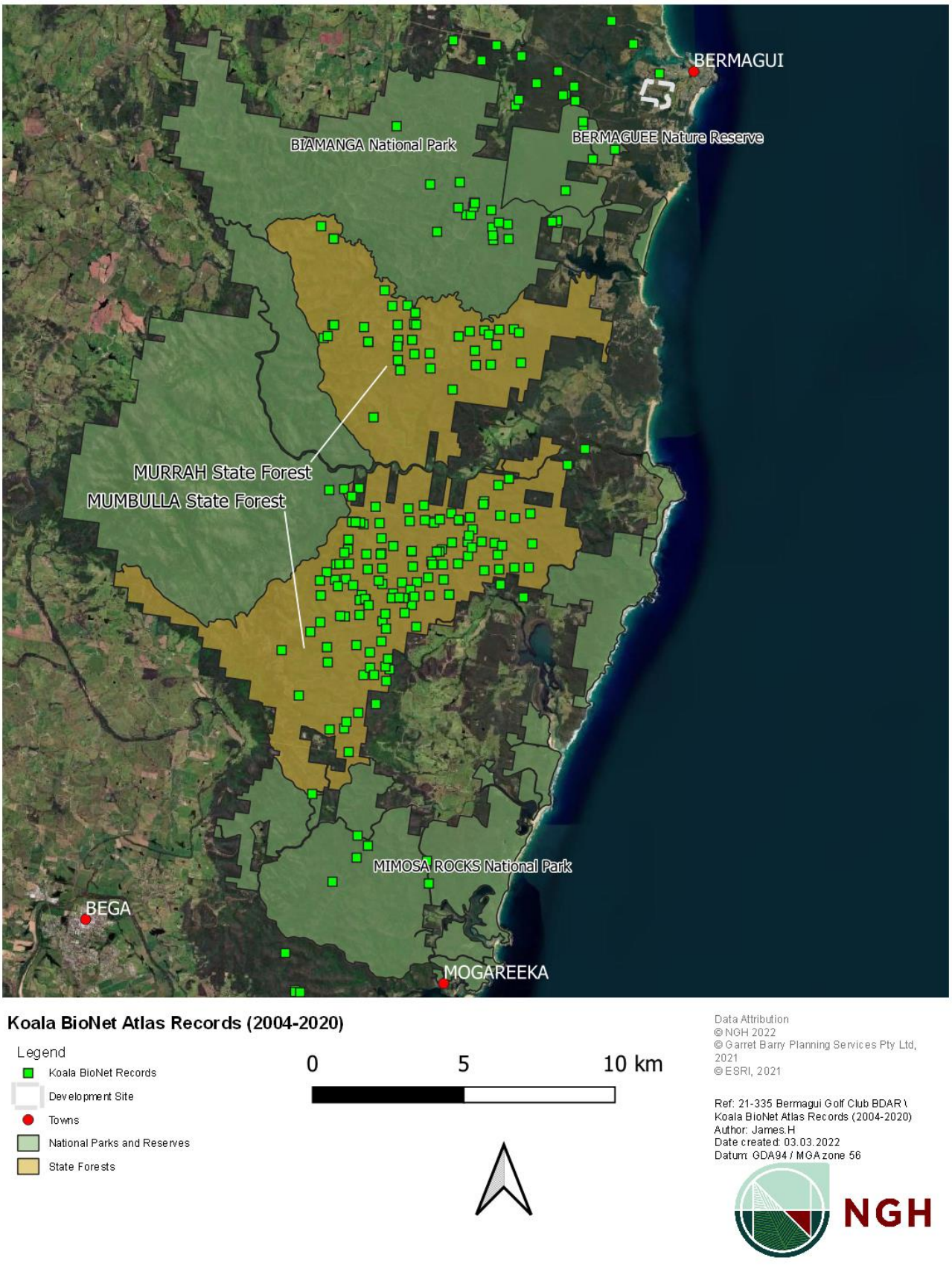

Figure 2-4: Koala BioNet Atlas records occurring within broader region of the Development Site between 2004 and 2020.

2.3.2 Areas of Regional Koala Significance (ARKS)

The 2020 report by the DPIE, *Framework for the spatial prioritisation of koala conservation actions in NSW,* maps Areas of Regional Koala Significance (ARKS) across NSW based on where koalas are known to occur in moderate to high densities. The assessment identifies critical threats likely affecting each of the ARKS at a regional scale, the sensitivity to loss of koalas from each of the ARKS, and the likely resilience of each of the ARKS to future impacts (NSW Department of Planning, Industry and Environment, 2020).

The resilience class is a function of habitat and occupancy values, and the level of risk they are exposed to by threatening processes. This translates to an overall estimate of koalas persisting across the region. There are three classes, Low, Moderate and High. Accurate koala population data is not widely available across NSW and resilience class does not therefore directly translate into a measure of population viability; for the purposes of the DPIE report is to serve as a broad surrogate (NSW Department of Planning, Industry and Environment, 2020).

The security class is a function of the koala population's sensitivity to loss and the protections in place for koalas in the region, based on the area of land within that region dedicated to conservation. Sensitivity to loss has been calculated based on the capacity of available functional habitat to support a minimum of 50 breeding females. There are three classes, Low, Moderate and High.

Threats to koalas listed in the report include habitat loss and fragmentation, fire, vehicle strike, dog attack, disease, heat stress, and reduction in the suitability of habitat from the effects of climate change.

The Development Site is located within the 82,402 ha Murrah ARKS (Figure 2-5). It has been assessed as having high resilience and security. Koalas in this ARKS are at very high risk of vehicle strikes, high risk of threat dog attacks, moderate risk of threat from habitat fragmentation and wildfire, and a low risk of threat from disease, heat stress and climate change.

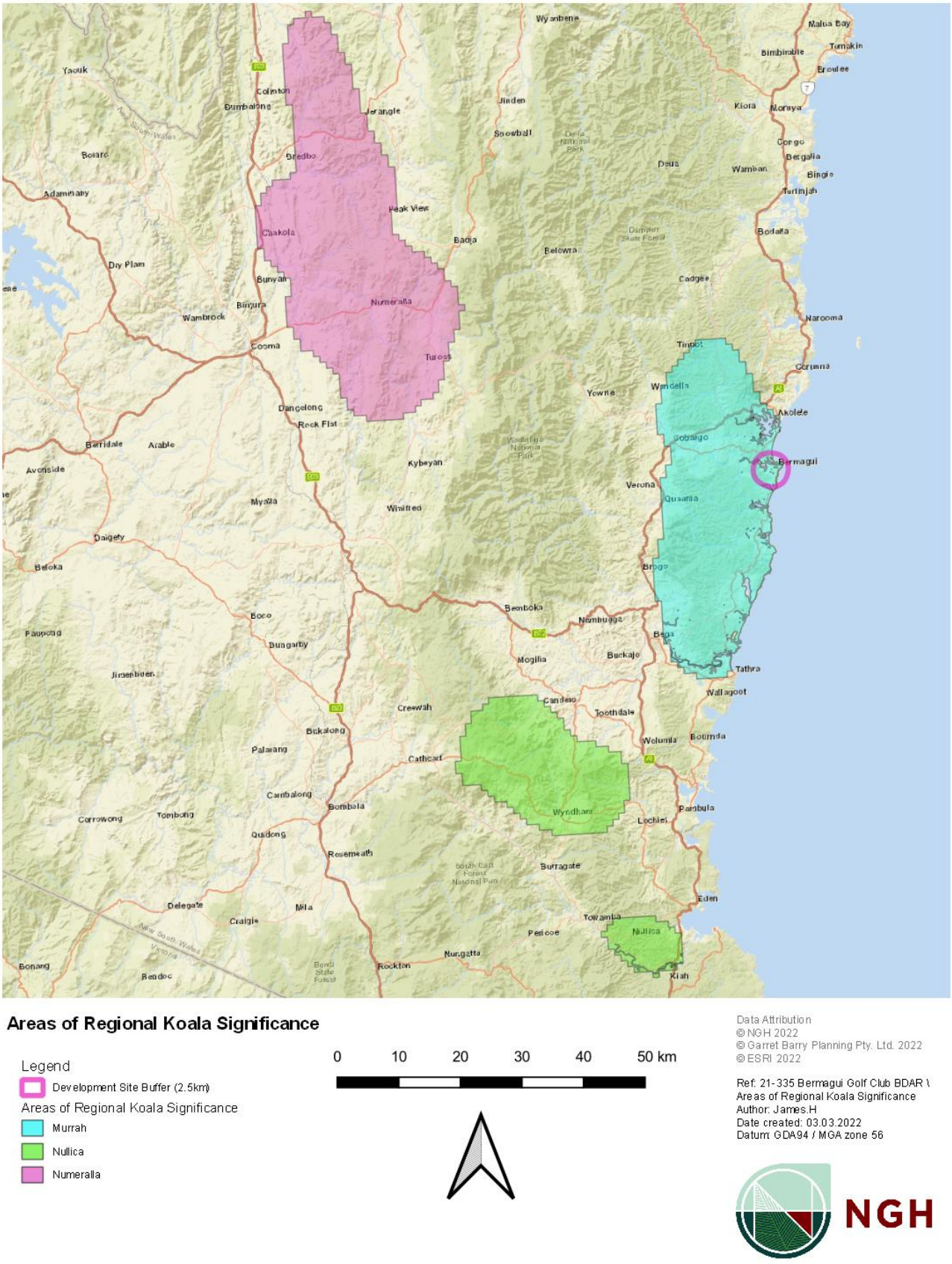

Figure 2-5 Areas of Regional Koala Significance (ARKS)

2.4 Proposed development impacts and mitigation

The proposal is expected to impact directly on the potential habitat of koala by the removal of key use tree species within the development footprint. Further assessment of the habitat qualities and historical records suggests that this vegetation does not represent core koala habitat. It is expected that the development will increase the threats to koalas associated with dog attacks and vehicle strikes.

Measures have been recommended to mitigate the project impacts on certain threatened species in the BDAR (Section 8, pg. 69). Although these have not been formulated for the koala specifically some have potential to mitigate impacts on the koala. Mitigation measures include:

- The retention of a linear strip of vegetation to the east of the Development Site to be retained to maintain treed connectivity between vegetation to the south of the Development Site and vegetation within the Bermagui Golf Club. This section of vegetation has the potential to facilitate movement of koalas into the retained patches of vegetation in the Development Site which could potentially act as important koala refugia during extreme heat and fire weather.
- A patch (0.38 ha) of existing vegetation to the south-east of the Development Site is to be retained to maintain some treed connectivity between vegetation to the south of the development and Bermagui Golf Club. This section has potential to continue to allow the movement of koalas from local forests into the Development Site and onto Bermagui Golf Course and will continue to provide an incidental food source for koala migrating through the landscape outside of the national park reserves.
- Further, consideration would be given to the installation of a fence, with the design and location being subject to addition consideration. Well maintained fencing is an effective way to prevent koalas accessing roads and containing introduced species from areas where koalas may occur. A well-maintained fence would have no: gaps or holes, open gates, trees or shrubs growing within three metres of fence line, vegetation growing on or overhanging fence, or debris built up around fence (Department of Planning, Industry and Environment, 2020). Fencing would help achieve the following advantages for koalas:
    - Allow for the guided movement of koalas to areas of habitat and restrict movement to high-risk areas
    - Prevent access to roads and funnel movements towards underpasses/culverts (where necessary)
    - Exclude domestic pets (dog/cat) from koala habitat
    - Reduce vehicle strike probability

2.4.1 EPBC assessment

As set out by the EPBC Act referral guidelines for koala (DoE, 2014) a habitat assessment of the Development Site was conducted as part of the BDAR (Refer Appendix B). The assessment resulted in a score of 6, signifying the uncertainty of whether habitat within the development site was critical to the survival of the koala or not. As such an EPBC referral was required and an assessment of significant impact has been compiled according to EPBC Act significant impact criteria. Further, under the recommendation of DAWE the assessment of significant impact for koala took into consideration the potential impacts of the 2019-20 bushfires on regional habitat availability and quality.

3. Koala Assessment Report – detailed criteria and Development assessment

3.1 Principles

The Koala SEPP 2021 Factsheet outlines seven guiding principles, further broken down into 13 criteria, which must be addressed when assessing a Development within the contact of the Koala SEPP 2021 (NSW Department of Planning, Industry and Environment, 2021). Addressed below are these criteria in reference to the details of the proposed development. All criteria are addressed in detail in Section 2 of this report.

3.1.1 Principle 1. Understand koala habitat values

Criterion 1. The site is established as containing core koala habitat if a site area survey undertaken by a suitably qualified and experienced person has identified the presence of core koala habitat.

The site survey undertaken by qualified NGH ecologists involved detailed vegetation mapping including assessment of vegetation integrity, confirmation of Plant Community Types, and confirmation of tree species present within the Development Site. Qualified NGH ecologists used the information contained within the NGH Biodiversity Development Assessment Report and the definitions set out in the *Koala SEPP 2021* to determine that the Development Site does not contain core koala habitat. This determination was based on the following:

- No historical occupation of koalas has been recorded onsite,
- No signs of, or individual koalas were sighted during the SAT surveys, and
- Habitat present onsite is degraded and considered low quality koala foraging habitat.

Criterion 2. Further analysis is undertaken to understand the broader values of the core koala habitat, including information about the koala population using the habitat and any specific ecological functions the habitat might serve.

Accurate koala population data is not widely available across NSW, however the site falls within the Murrah ARKS. The koala populations within this region have been assessed as having high resilience and security. However, koala in this ARKS are at very high risk of vehicle strikes, high risk of threat dog attacks, moderate risk of threat from habitat fragmentation and wildfire, and a low risk of threat from disease, heat stress and climate change. (See section 2.3.2). Koala populations within the South Coast KMA are small and patchy in distribution (The Office of Environment and Heritage, 2018), there are also several indicators to suggest they are in decline (Eco Logical Pty. Ltd., 2006).

Based on a basic analysis of koala records from Atlas of Living Australia within 5 km of the Development Site it can be suggested that koalas have persisted in the area since record keeping began (1940) and have been steadily declining since 1990 (see Figure 3-1).

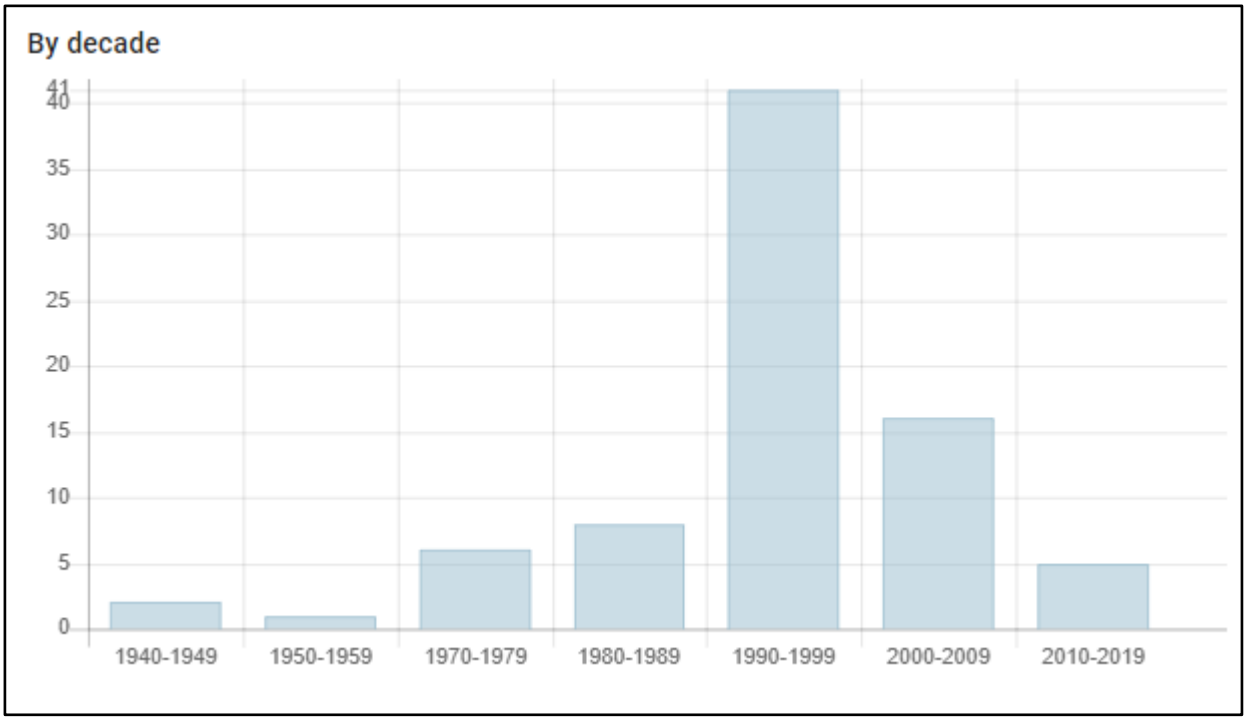

Figure 3-1: Graph showing koala records by decade within 5 kms of the Development Site. Source: (Atlas of Living Australia, 2022).

The Development Site is comprised predominantly of low condition derived grassland (63% of the Development Site) with the remainder considered as suitable koala habitat, based on the presence of feed trees outlined for the South Coast KMA in the Koala SEPP 2021. The clearing of 4.26 hectares of suitable koala habitat represents a small amount (<0.001%) of available habitat within the broader area (30 km). There is approximately 25,000 ha of contiguous koala habitat in floral reserves and National Parks in the areas south of Bermagui towards Bega/Tathra (State of NSW and Office of Environment and Heritage, 2016). The proposed development will not result in the fragmentation of these habitat areas because of its proximity to the Bermagui township and other areas of and urban land use where koala records are scarce.

The proposal intends to retain areas within the Development Site (Myrtle gully) and patches of trees that could facilitate movement in and out of the Development Site. The patch of Myrtle Forest (PCT 875), to be retained within the drainage line has the potential to be a refuge for koalas during times of drought and or extreme fire weather however unlikely this may be. This is speculatory only, as the area will be retained the development will not affect areas of habitat important to the recovery of koala.

The site contains limited ecological values that are necessary to support the preservation and recovery of koalas within the local and regional landscape. Likely the most significant threat to koalas will be the increased potential for incidents involving dog attacks and vehicle strikes as a result of the development. These can be partially mitigated through management actions such as fencing.

3.1.2 Principle 2. Avoid intensifying land use in koala habitat areas through appropriate landscape planning and site selection

Criterion 3. Site selection for development considers koala habitat values.

No core koala habitat occurs within the Development Site as confirmed by this report. A large portion of the Development Site consists of previously cleared land, categorised by NGH as low condition derived grasslands with some isolated trees (Figure 2-1**Error! Reference source not found.**). These areas do not constitute core koala habitat and, if utilised at all, would predominantly serve as low quality foraging habitat, or potentially as movement corridors between patches of higher quality habitat. The development site contains a total of 5.83 hectares of low-quality suitable Koala habitat of which 96% will be directly impacted by the proposal through removal.

3.1.3 Principle 3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas

Criterion 4. Development avoids the direct loss of core koala habitat within the site area and avoids fragmentation

No core koala habitat as defined in Section 2.2.1 occurs within the Development Site. A patch (0.38 ha) of existing vegetation to the east of the Development Site is to be retained to maintain some treed connectivity between vegetation to the south of the development and Bermagui Golf Club.

Criterion 5. Core koala habitat is excluded from the development footprint

No core koala habitat as defined in Section 2.2.1 occurs within the development footprint. Although no ‘core’ habitat occurs within the development site some ‘suitable’ low quality koala habitat does occur. These are the mapped vegetation (PCTs 1220, 1336, 834) areas labelled as forest/woodland. The proposed development will result in the removal of most treed habitat that could be considered suitable koala habitat.

3.1.4 Principle 4. Minimise potential direct impacts to koalas through koala sensitive design

Criterion 6. Development avoids direct impacts to core koala habitat within the site area.

No core koala habitat as defined in Section 2.2.1 occurs within the development footprint or the Development Site. However, 1.56 ha of PCTs 1336 and 1220 is to be retained in the south east corner to preserve some suitable koala habitat which would not be defined as core koala habitat.

Criterion 7. Where some loss of core koala habitat cannot be avoided (and provided it is consistent with all other criteria), development is designed in a way that retains higher value areas across the site and avoids fragmentation of habitat within the site area and more broadly within the region.

No core koala habitat as defined in Section 2.2.1 occurs within the development footprint or the Development Site. A patch (0.38 ha) of existing vegetation in the centres east of the Development Site is to be retained to maintain some treed connectivity between vegetation to the south of the development and Bermagui Golf Club. This vegetation contains patches of PCTs 1336 and 1220 both of which contain koala feed trees and can be considered suitable koala habitat. Further the development will not result in the fragmentation of koala habitat in the broader area. The Development Site is located adjacent to existing developed areas including the Bermagui Golf

course an already fragmented and intensified land-use. As such the development will not result in the fragmentation of koala habitat in the broader area.

Criterion 8. Development is undertaken in a way that maintains the potential function of the core koala habitat.

No core koala habitat as defined in Section 2.2.1, occurs within the Development Site. The proposed development will result in the removal of most treed habitat that could be considered suitable koala habitat however suitable koala habitat will be retained as shown on Figure 2-3.

3.1.5 Principle 5. Implement best practice measures for the management of identified risks to koalas

Criterion 9. All relevant indirect impacts to koalas and koala habitat associated with the development are identified.

Threats to koalas identified in the Murrah ARKS are very high risk of vehicle strikes, high risk of threat dog attacks, moderate risk of threat from habitat fragmentation and wildfire, and a low risk of threat from disease, heat stress and climate change. The proposal will not impact directly or indirectly on core Koala habitat or result in the fragmentation of suitable Koala habitat locally and regionally. An assessment of significance (AoS) was compiled for koala to be submitted with EPBC referral. This outlined threats to koala because of the development being mostly in relation to the further increase in invasive species (domestic pets, namely dogs) and the threat to koalas' recovery through increased vehicle strikes. The AoS identified that a residential development involving the creation of 187 houses would likely result in an increase in the number of dog-koala interactions within the area. Additionally, the increased number of houses will likely result in an increase in koala related traffic incidents. These threats have been assessed in further detail in the Assessment of Significance for koala EPBC referral (refer Appendix B)

Criterion 10. Development uses best practice management measures to address the potential impacts considered likely to pose an increased risk to koalas or their habitat.

The *Far South Coast Koala Management Framework* report (Eco Logical Pty. Ltd., 2006), recommend five management concepts that support the recovery of koala populations in the South Coast KMA:

1. Secure habitat (quality and quantity)
2. Reduce threats (now and into the future)
3. Protect existing animals
4. Increase number of animals – in specific locations and across the region
5. Ensure links with other koala populations are made and/or maintained

Step 1 is less relevant to the development proposal as no core koala habitat occurs within the Development Site. The area of suitable koala habitat to be cleared (4.36 ha) does not represent a large quantity of koala habitat in relation to the reserve areas present in the local surroundings (>10,000 ha). Additionally, the proposal intends to retain 1.99 hectares of suitable koala habitat, although this habitat is in moderate condition it will be retained.

Step 2 is relevant to the proposal because it involves creating a residential housing estate adjacent to Koala habitat areas. This type of development will result in an increased traffic flow through the Development Site and likely result in an increased presence of domestic pets that pose a threat to koalas, namely dogs. These two threats have been identified in the Murrah ARKS as very high and high risk to koalas and were discussed in the AoS. Measure to mitigate these threats include:

- Erection of dog/cat proof fencing around development perimeter
- Constructed underpasses for koala passage if necessary
- requirement for properties within the development to have cat and dog containment
- Signage to inform residents of koala habitat/ecology and dog/cat exclusion areas

The proposed development is less relevant to Step 3 as the Development Site does not have historical records of occupation by koala, thus is unlikely to affect the protection of existing animals. Step 4 is also not relevant to the proposed development as it will not reduce the number of koalas directly or indirectly in the surrounding area. Step 5 irrelevant to the proposal as it size, and location will not result in the fragmentation of the existing landscape to such an extent that it will destroy links between koala populations or sub-populations in the local area as per

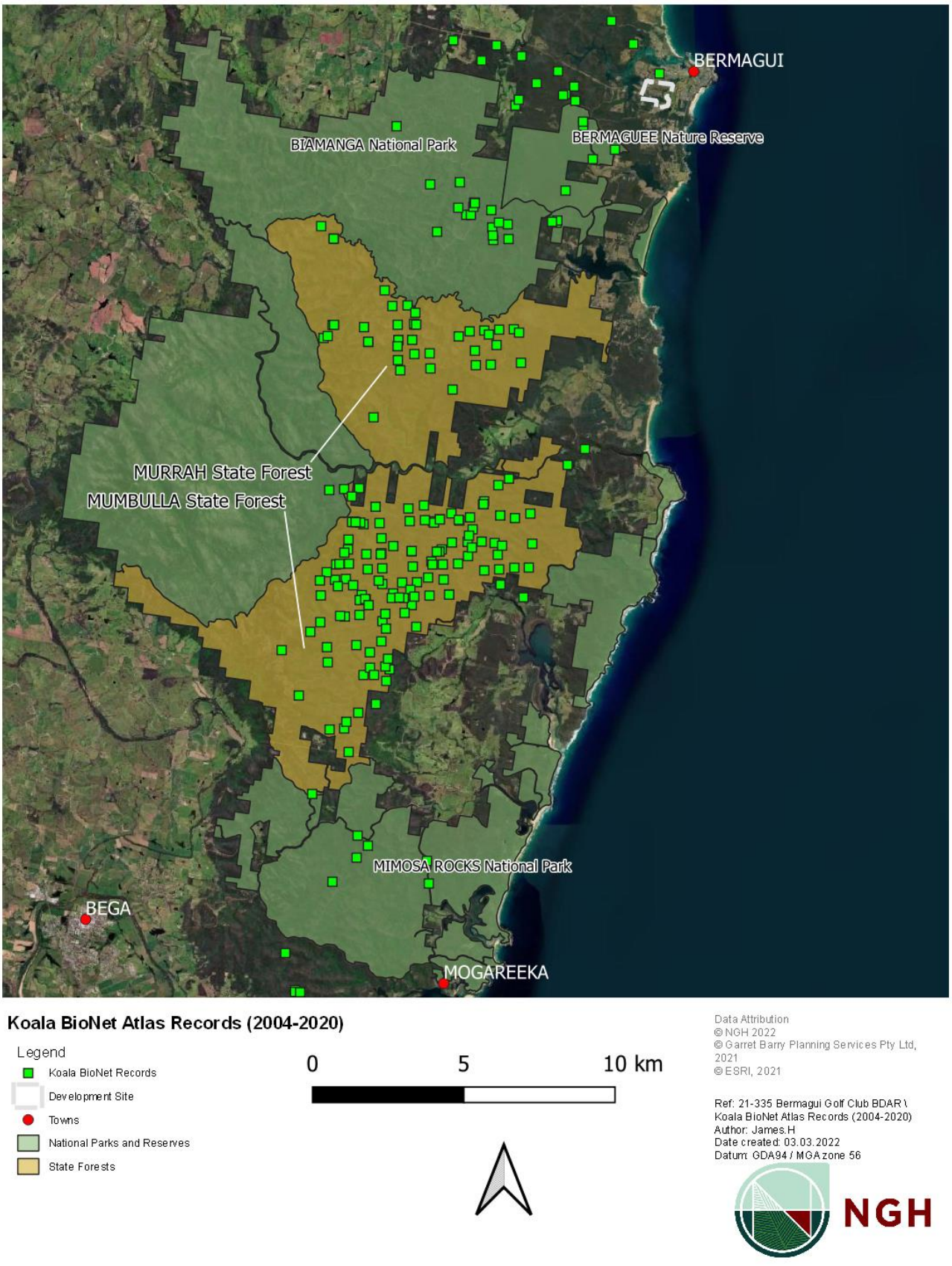

Figure 2-4 displaying connectivity between the proposal, forested habitat, and the local National Parks and State Forests.

3.1.6 Principle 6. Use compensatory measures only where they can be shown to better promote the aim of the SEPP

Criterion 11. Compensatory measures are only used once it has been demonstrated that options to avoid, minimise and manage impacts to core koala habitat have been exhausted.

No impacts to core koala habitat result from this development. Because the koala survey effort found no individuals or signs of koala occupation no species credit obligations were required to offset impacts to koala.

Criterion 12. Where there is any direct loss of habitat or compromise in the potential function of a koala habitat area (and provided it is consistent with all other criteria outlined here), suitable compensatory measures are provided.

The loss of 4.36 hectares of suitable koala habitat (not considered core habitat) is unlikely to pose a major threat to local koala populations of which high activity zones are located more than 10 km away and the closest activity zone is located approximately 3 km away in high quality habitat protected by National Parks and Reserves (State of NSW and Office of Environment and Heritage, 2016).

3.1.7 Principle 7. Use adaptive management strategies to monitor, evaluate and deliver appropriate planning outcomes for koalas

Criterion 13. The development application includes a monitoring, adaptive management and reporting component against the key outcomes.

No adaptive management plan is considered necessary at this stage. However, the following are recommendations for koala management as part of the development:

- Install protective fencing and fauna underpass in locations suitable for potential koala use.
- Require properties within the development to have cat and dog containment conditions.
- Install interpretive signage educating residents and visitors on koala ecology.

4. Conclusion

The proposal intends to develop 19.78 hectares of land, of which 16.76 ha will be occupied by 187 new dwellings, roads, footpaths, playlot park and sewer pumping station. The retained areas (3.02 ha) consist of patches of moderate condition forest vegetation and some low condition grassland to the south and east of the Development Site. No core koala habitat was identified within the Development Site as per the definitions in section 2.2.1. The development is expected to impact on 4.36 hectares of habitat potentially suited to koalas.

The Development Site is located within the Murrah ARKS (Figure 2-5) and has been assessed as having high resilience and security. Koalas in this ARKS are at very high risk of vehicle strikes, high risk of threat dog attacks, moderate risk of threat from habitat fragmentation and wildfire, and a low risk of threat from disease, heat stress and climate change. The AoS compiled by NGH is supported by the ARKS assessment, identifying that the incidence of vehicle strikes, and dog attacks, already a koala threat in the area, will potentially increase because of the proposal.

The impacts of the development of koala habitat are not considered to be significant for the following reasons:

- The site contains no core koala habitat with only potentially suitable koala habitat identified
- The suitable habitat within the Development Footprint is disturbed and at best in moderate condition
- The location of the proposal is not such that it will result in the fragmentation of suitable koala habitat locally or in the region and areas retained by the proposal are intended to maintain connectivity to existing patches of vegetation containing koala habitat.
- Suitable mitigation measures have been proposed in consideration for potential koala occupation on occasion.

Measures set out in the BDAR for managing impacts to suitable koala habitat include:

- the retention of several patches of vegetation that provide suitable koala habitat and connectivity between the site and the broader landscape
- Installation of protective fencing and fauna underpass in locations suitable for potential koala use
- A requirement for properties within the development to have cat and dog containment conditions
- Installation of interpretive signage educating residents and visitors on koala ecology and dog exclusion areas.

The report highlights that the proposal is unlikely to significantly impact on koala habitat in the area while confirming that the proposal may increase identified threats in the area such as dog attacks and vehicle strikes. The recommendation made by NGH is for the development consent to include mitigation measures suitable for protection of koala habitat and mitigation of impacts of this development on koala as listed above.

5. References

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State of NSW and Office of Environment and Heritage. (2016). *2012–14 Koala survey report in coastal forests of south-eastern NSW – Bermagui/Mumbulla area Corridors and core habitat for koalas.* Sydney, NSW: Office of Environment and Heritage.

The Office of Environment and Heritage. (2018). *A review of koala tree use across New South Wales.* Sydney: Office of Environment and Heritage.

Appendix A State Environmental Planning Policy (Koala Habitat Protection) 2021

Overleaf.

New South Wales

State Environmental Planning Policy (Koala Habitat Protection) 2021

under the

Environmental Planning and Assessment Act 1979

Her Excellency the Governor, with the advice of the Executive Council, has made the following State environmental planning policy under the *Environmental Planning and Assessment Act 1979*.

ROB STOKES, MP
Minister for Planning and Public Spaces

Published LW 17 March 2021 (2021 No 115)

Contents

State Environmental Planning Policy (Koala Habitat Protection) 2021

under the

Environmental Planning and Assessment Act 1979

Part 1 Preliminary

1 Name of Policy

This Policy is *State Environmental Planning Policy (Koala Habitat Protection) 2021*.

2 Commencement

This Policy commences on the day on which it is published on the NSW legislation website.

3 Aim of Policy

This Policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Editorial note. Guidelines are being made by the Planning Secretary with the agreement of the Secretary of Regional NSW for the purposes of Parts 2 and 3 of this Policy. When the Guidelines are made this Policy is to be amended to incorporate references to the Guidelines.

4 Definitions

(1) In this Policy—

approved koala plan of management, for land, means a koala plan of management for the land approved in accordance with clause 16.

core koala habitat means—

(a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

equivalent land use zone—see clause 5.

former Koala SEPP, in relation to land to which this Policy applies, means the following—

(a) *State Environmental Planning Policy No 44—Koala Habitat Protection*,

(b) *State Environmental Planning Policy (Koala Habitat Protection) 2019*,

(c) *State Environmental Planning Policy (Koala Habitat Protection) 2020*.

koala habitat means koala habitat however described in a plan of management under this Policy or a former Koala SEPP and includes core koala habitat.

Planning for Bush Fire Protection means the document referred to in clause 272 of the *Environmental Planning and Assessment Regulation 2000*.

suitably qualified and experienced person means a person who has—

(a) a tertiary qualification in ecology, environmental management, forestry or other equivalent qualifications, and

(b) experience in flora and fauna identification, survey and management, including experience in conducting koala surveys.

the Act means the *Environmental Planning and Assessment Act 1979*.

Note. The Act and the *Interpretation Act 1987* contain definitions and other provisions that affect the interpretation and application of this Policy.

(2) Notes included in this Policy do not form part of this Policy.

5 Equivalent land use zones

(1) A non-standard zone is an ***equivalent land use zone*** to 1 of the following land use zones (a ***standard zone***) if the land uses specified for the standard zone are permitted in the non-standard zone—

Land use zone	Permitted land uses
RU1 Primary Production	Primary production, including agriculture and a diverse range of primary industry enterprises
RU2 Rural Landscape	Compatible rural land uses, including extensive agriculture
RU3 Forestry	Forestry land uses and other development compatible with forestry land uses

(2) The Planning Secretary may declare, by order published in the Gazette, that a non-standard zone is equivalent to a standard zone.

(3) The order is conclusive that the non-standard zone is an equivalent land use zone to the standard zone.

(4) In this clause—

non-standard zone means a land use zone in a local environmental planning instrument that was not made in accordance with the relevant standard environmental planning instrument under section 3.20 of the Act.

6 Land to which Policy applies

(1) This Policy applies to each local government area listed in Schedule 1.

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

(a) in the koala management area specified in Schedule 1 opposite the local government area, or

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

(3) Despite subclause (1), this Policy does not apply to—

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

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

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

(d) land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 1—

(i) Zone RU1 Primary Production,

(ii) Zone RU2 Rural Landscape,

(iii) Zone RU3 Forestry.

7 Relationship with other environmental planning instruments

In the event of an inconsistency between this Policy and another environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency.

8 Exempt land

(1) The objective of this clause is to enable the clearing of koala use tree species to create an asset protection zone as part of the replacement of a lawfully erected dwelling house that has been damaged or destroyed by a bush fire.

(2) This Policy does not apply to land forming part of an asset protection zone cleared for a dwelling house if—

(a) the dwelling house is replacing a lawfully erected dwelling house damaged or destroyed by a bush fire, and

(b) the development application for the replacement dwelling house is made to the consent authority no later than 5 years after the day the bush fire caused the damage or destruction, and

(c) the asset protection zone is cleared in accordance with Planning for Bush Fire Protection.

9 Maps

(1) A reference in this Policy to a named map adopted by this Policy is a reference to a map by that name—

(a) approved by the Minister when the map is adopted, and

(b) as amended or replaced from time to time by maps declared by environmental planning instruments to amend or replace that map, and approved by the persons making the environmental planning instruments when the instruments are made.

(2) Any 2 or more named maps may be combined into a single map. In that case, a reference in this Policy to any such named map is a reference to the relevant part or aspect of the single map.

(3) Any such maps are to be kept and made available for public access in accordance with arrangements approved by the Minister.

(4) For the purposes of this Policy, a map may be in, and may be kept and made available in, electronic or paper form, or both.

Note. The maps adopted by this Policy are to be deposited in the head office of the Department of Planning, Industry and Environment and made available for public access.

Part 2 Development control of koala habitats

10 Development assessment process—approved koala plan of management for land

(1) This clause applies to land to which this Policy applies and to which an approved koala plan of management applies.

(2) The council's determination of the development application must be consistent with the approved koala plan of management that applies to the land.

11 Development assessment process—no approved koala plan of management for land

(1) This clause applies to land to which this Policy applies if the land—

(a) has an area of at least 1 hectare (including adjoining land within the same ownership), and

(b) does not have an approved koala plan of management applying to the land.

(2) Before a council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on koalas or koala habitat.

(3) If the council is satisfied that the development is likely to have low or no impact on koalas or koala habitat, the council may grant consent to the development application.

(4) If the council is satisfied that the development is likely to have a higher level of impact on koalas or koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a koala assessment report for the development.

(5) However, despite subclauses (3) and (4), the council may grant development consent if the applicant provides to the council—

(a) information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application—

(i) does not include any trees belonging to the koala use tree species listed in Schedule 2 for the relevant koala management area, or

(ii) is not core koala habitat, or

(b) information the council is satisfied demonstrates that the land subject of the development application—

(i) does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or

(ii) includes only horticultural or agricultural plantations.

(6) In this clause—

koala assessment report, for development, means a report prepared by a suitably qualified and experienced person about the likely and potential impacts of the development on koalas or koala habitat and the proposed management of those impacts.

12 Development assessment process—other land

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

(a) the land does not have an approved koala plan of management applying to the land, or

(b) the council is satisfied that the land is not core koala habitat.

Part 3 Koala plans of management

13 Preparation of koala plans of management

(1) A koala plan of management may be prepared for—

(a) the whole of a local government area listed in Schedule 1, or

(b) a part of a local government area listed in Schedule 1.

(2) A koala plan of management must be prepared—

(a) on behalf of a council by a suitably qualified and experienced person, and

(b) having regard to a survey of the land for core koala habitat conducted by a suitably qualified and experienced person.

(3) A koala plan of management may—

(a) be a separate document or be part of another document, and

(b) provide for additional matters, whether or not the matters are directly related to the assessment of a development application by the council.

(4) Land may be identified in a koala plan of management if—

(a) the land is identified on the Site Investigation Area for Koala Plans of Management Map as an area where this Policy applies, and

(b) the land is core koala habitat.

(5) In this clause—

Site Investigation Area for Koala Plans of Management Map means the State Environmental Planning Policy (Koala Habitat Protection) 2021—Site Investigation Area for Koala Plans of Management Map.

14 Consultation on koala plans of management

In preparing a koala plan of management, a council, on behalf of which the plan of management has been prepared, must consult the Chief Executive Officer of Local Land Services and a Public Service employee designated by the Minister for Energy and Environment.

15 Public exhibition of draft koala plans of management

Following the preparation of a draft koala plan of management, the council—

(a) must publicly exhibit the draft koala plan of management for a minimum period of 90 days, and

(b) must give public notice on the council's website and in a local newspaper of the places, dates and times for inspection of the draft koala plan of management, and

(c) must publicly exhibit a copy of the draft koala plan of management at the places, on the dates and during the times set out in the notice, and

(d) must serve notice of the places, dates and times for inspection of the draft koala plan of management on landholders whose land is identified under clause 12(4) in the draft koala plan of management—

(i) by post, or

(ii) by email to an email address specified by the landholder for the service of notices by the council, and

(e) must specify, in the notices referred to in paragraphs (b) and (d), the period during which submissions about the draft koala plan of management may be

made to the council (which must include the period during which the draft koala plan of management is being publicly exhibited).

16 Approval of koala plans of management

(1) A koala plan of management prepared in accordance with clause 13 has no effect unless it is approved by the Planning Secretary.

(2) The council on behalf of which the koala plan of management has been prepared must provide the following to the Planning Secretary—

(a) a report on submissions received as a result of the public consultation under clause 15,

(b) a report on the survey of the land made under clause 13(2)(b),

(c) any other documents that informed the preparation of the koala plan of management.

(3) Before approving a koala plan of management, the Planning Secretary must provide the following to the Chief Executive Officer of Local Land Services and a Public Service employee designated by the Minister for Energy and Environment for comment—

(a) a copy of the draft koala plan of management,

(b) a copy of the report on submissions,

(c) a copy of the report on the survey of the land made under clause 13(2)(b),

(d) any other documents that informed the preparation of the koala plan of management.

(4) Before approving a koala plan of management, the Planning Secretary must obtain the concurrence of the Secretary of Regional NSW.

(5) Before approving a koala plan of management submitted for approval under this clause, the Planning Secretary may—

(a) request that amendments be made to the koala plan of management, and

(b) approve the koala plan of management conditional on the making of those amendments.

(6) To avoid doubt, a koala plan of management conditionally approved under subclause (5)(b) is taken to be approved by the Planning Secretary on the making of those amendments.

(7) A koala plan of management takes effect on—

(a) the day it is approved by the Planning Secretary, or

(b) if a later day is specified in the plan of management—the later day.

17 Subsequent koala plans of management

(1) An approved koala plan of management may be amended or replaced by a subsequent koala plan of management prepared and approved in accordance with this Part.

(2) The subsequent koala plan of management must be exhibited in accordance with this Part if the council is directed to do so by the Planning Secretary.

Part 4 Savings and transitional provisions

18 Existing development applications

A development application made in relation to land, but not finally determined before this Policy applied to the land, must be determined as if this Policy had not commenced in its application to the land.

19 Documents taken to be koala plans of management

(1) A plan of management approved under a former Koala SEPP in relation to the whole of a local government area or a part of a local government area and in force immediately before this Policy is taken to be an approved koala plan of management.

(2) The following documents published on the NSW planning portal are taken to be approved koala plans of management and may be renamed accordingly—

(a) *Byron Shire Draft koala plan of management*,

(b) *Tweed Shire Draft koala plan of management*.

(3) An approved koala plan of management under this clause applies to the land specified in the koala plan of management and accordingly clause 10 extends to apply to that land.

20 Documents submitted as plans of management

(1) This clause applies to a document submitted to the Planning Secretary—

(a) for approval as a koala plan of management in relation to the whole of a local government area or a part of a local government area, and

(b) before this Policy applied to the local government area.

(2) Before approving a koala plan of management submitted for approval under this clause, the Planning Secretary may—

(a) request that amendments be made to the koala plan of management, and

(b) approve the koala plan of management conditional on the making of those amendments.

(3) To avoid doubt, a koala plan of management conditionally approved under subclause (2)(b) is taken to be approved by the Planning Secretary on the making of those amendments.

(4) Despite clauses 13–16, the Planning Secretary may approve the document as a koala plan of management for the local government area or part of the local government area.

(5) To avoid doubt, the Planning Secretary may approve the document as a koala plan of management despite the document not having been prepared in accordance with the provisions of a former Koala SEPP.

(6) On approval, the document is taken to be an approved koala plan of management.

Schedule 1 Local government areas

(Clauses 6(1), 13(1))

Local government area	Koala management area(s)
Armidale Regional	Northern Tablelands
Ballina	North Coast
Bathurst Regional	Central and Southern Tablelands
Bega Valley	South Coast
Bellingen	North Coast
Berrigan	Riverina
Blayney	Central and Southern Tablelands
City of Blue Mountains *	Central and Southern Tablelands Central Coast
Bourke	Darling Riverine Plains Far West
Brewarrina	Darling Riverine Plains Far West
Byron	North Coast
Cabonne	Central and Southern Tablelands
City of Campbelltown *	Central Coast
Central Coast *	Central Coast
Central Darling	Far West
City of Cessnock	Central Coast
Clarence Valley	North Coast
City of Coffs Harbour	North Coast
Coonamble	Darling Riverine Plains Northwest Slopes
Dungog	Central Coast
Edward River	Riverina
Eurobodalla	South Coast
Federation	Central and Southern Tablelands Far West Riverina
Forbes	Far West
Gilgandra	Northwest Slopes
Glen Innes Severn Shire	Northern Tablelands
Goulburn Mulwaree	Central and Southern Tablelands
Greater Hume Shire	Central and Southern Tablelands Far West Riverina

Local government area	Koala management area(s)
Gunnedah	Northwest Slopes
Gwydir	Northwest Slopes
City of Hawkesbury *	Central Coast
Hilltops	Central and Southern Tablelands Far West
Hornsby *	Central Coast
Inverell	Northern Tablelands Northwest Slopes
Kempsey	North Coast
Ku-ring-gai *	Central Coast
Kyogle	North Coast
City of Lake Macquarie	Central Coast
Leeton	Far West Riverina
City of Lismore	North Coast
City of Lithgow	Central and Southern Tablelands
City of Liverpool *	Central Coast
Liverpool Plains	Northwest Slopes
Lockhart	Central and Southern Tablelands Far West
City of Maitland	Central Coast
Mid-Coast	North Coast
Mid-Western Regional	Northwest Slopes
Moree Plains	Northwest Slopes
Murray River	Far West Riverina
Muswellbrook	Central Coast
Nambucca Valley	North Coast
Narrabri	Northwest Slopes
Narrandera	Far West Riverina
Narromine	Darling Riverine Plains Far West
City of Newcastle	Central Coast
Northern Beaches *	Central Coast
Oberon	Central and Southern Tablelands
Parkes	Far West
Port Macquarie-Hastings	North Coast
Port Stephens	Central Coast

Local government area	Koala management area(s)
Queanbeyan-Palerang Regional	Central and Southern Tablelands
Richmond Valley	North Coast
City of Shoalhaven	Central and Southern Tablelands South Coast
Singleton	Central Coast
Snowy Monaro Regional	Central and Southern Tablelands
Snowy Valleys	Central and Southern Tablelands
Tamworth Regional	Northern Tablelands
Tenterfield	Northern Tablelands
Tweed	North Coast
Upper Hunter Shire	Northwest Slopes
Upper Lachlan Shire	Central and Southern Tablelands
Uralla	Northern Tablelands
City of Wagga Wagga	Central and Southern Tablelands Far West
Walcha	Northern Tablelands
Walgett	Darling Riverine Plains Northwest Slopes
Warren	Darling Riverine Plains
Warrumbungle Shire	Northwest Slopes
Weddin	Central and Southern Tablelands Far West
Wentworth	Far West Riverina
Wingecarribee	Central and Southern Tablelands Central Coast
Wollondilly *	Central and Southern Tablelands Central Coast
City of Wollongong	South Coast
Yass Valley	Central and Southern Tablelands

Schedule 2 Koala use tree species

(Clause 11)

Central and Southern Tablelands koala management area

Scientific name	Common name(s)
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus albens	White Box
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus bridgesiana	Apple Box
Eucalyptus camaldulensis	River Red Gum
Eucalyptus conica	Fuzzy Box
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus dalrympleana	Mountain Gum
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus dives	Broad-leaved Peppermint
Eucalyptus elata	River Peppermint
Eucalyptus eugenioides	Narrow-leaved Stringybark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus globoidea	White Stringybark
Eucalyptus goniocalyx	Bundy
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus maidenii	Maiden's Blue Gum
Eucalyptus mannifera	Brittle Gum
Eucalyptus melliodora	Yellow Box
Eucalyptus microcarpa	Western Grey Box
Eucalyptus nortonii	Large-flowered Bundy
Eucalyptus obliqua	Messmate
Eucalyptus oblonga	Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pauciflora	White Sally, Snow Gum
Eucalyptus piperita	Sydney Peppermint
Eucalyptus polyanthemos	Red Box
Eucalyptus punctata	Grey Gum
Eucalyptus quadrangulata	White-topped Box
Eucalyptus radiata	Narrow leaved Peppermint
Eucalyptus rossii	Inland Scribbly Gum
Eucalyptus rubida	Candlebark

Scientific name	Common name(s)
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus sieberi	Silvertop Ash
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum

Central Coast koala management area

Scientific name	Common name(s)
Allocasuarina littoralis	Black She-oak
Allocasuarina torulosa	Forest Oak
Angophora bakeri	Narrow-leaved Apple
Angophora costata	Smooth-barked Apple
Angophora floribunda	Rough-barked Apple
Casuarina glauca	Swamp Oak
Corymbia eximia	Yellow Bloodwood
Corymbia gummifera	Red Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus acmenoides	White Mahogany
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus albens	White Box
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus beyeriana	Beyer’s Ironbark
Eucalyptus blakelyi	Blakely’s Red Gum
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus botryoides	Bangalay
Eucalyptus camaldulensis	River Red Gum
Eucalyptus camfieldii	Camfield’s Stringybark
Eucalyptus canaliculata	Large-fruited Grey Gum
Eucalyptus capitellata	Brown Stringybark
Eucalyptus carnea	Thick-leaved Mahogany
Eucalyptus consideniana	Yertchuk
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus deanei	Mountain Blue Gum
Eucalyptus eugenioides	Narrow-leaved Stringybark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus glaucina	Slaty Red Gum
Eucalyptus globoidea	White Stringybark

Scientific name	Common name(s)
Eucalyptus grandis	Flooded Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus imitans	Eucalyptus imitans
Eucalyptus largeana	Craven Grey Box
Eucalyptus longifolia	Woollybutt
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus michaeliana	Brittle Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Grey Box
Eucalyptus oblonga	Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus parramattensis	Parramatta Red Gum
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus propinqua	Small-fruited Grey Gum
Eucalyptus punctata	Grey Gum
Eucalyptus quadrangulata	White-topped Box
Eucalyptus racemosa	Narrow-leaved Scribbly Gum
Eucalyptus resinifera	Red Mahogany
Eucalyptus robusta	Swamp Mahogany
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus scias	Large-fruited Red Mahogany
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus siderophloia	Grey Ironbark
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus sieberi	Silvertop Ash
Eucalyptus signata	Scribbly Gum
Eucalyptus sparsifolia	Narrow-leaved Stringybark
Eucalyptus squamosa	Scaly Bark
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus umbra	Bastard White Mahogany
Eucalyptus viminalis	Ribbon Gum
Melaleuca quinquenervia	Broad-leaved Paperbark
Syncarpia glomulifera	Turpentine

Darling Riverine Plains koala management area

Scientific name	Common name(s)
Callitris glaucophylla	White Cypress Pine
Eucalyptus albens	White Box
Eucalyptus camaldulensis	River Red Gum
Eucalyptus chloroclada	Dirty Gum
Eucalyptus conica	Fuzzy Box
Eucalyptus coolabah	Coolibah
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus dwyeri	Dwyer's Red Gum
Eucalyptus largiflorens	Black Box
Eucalyptus melanophloia	Silver-leaved Ironbark
Eucalyptus melliodora	Yellow Box
Eucalyptus microcarpa	Western Grey Box
Eucalyptus pilligaensis	Narrow-leaved Grey Box
Eucalyptus populnea	Bimble Box, Poplar Box
Eucalyptus sideroxylon	Mugga Ironbark

Far West koala management area

Scientific name	Common name(s)
Angophora floribunda	Rough-barked Apple
Callitris glaucophylla	White Cypress Pine
Casuarina cristata	Belah
Eucalyptus albens	White Box
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus camaldulensis	River Red Gum
Eucalyptus chloroclada	Dirty Gum
Eucalyptus coolabah	Coolibah
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus intertexta	Gum Coolibah
Eucalyptus largiflorens	Black Box
Eucalyptus melanophloia	Silver-leaved Ironbark
Eucalyptus melliodora	Yellow Box
Eucalyptus microcarpa	Western Grey Box
Eucalyptus moluccana	Grey Box
Eucalyptus pilligaensis	Narrow-leaved Grey Box
Eucalyptus populnea	Bimble Box

Scientific name	Common name(s)
Eucalyptus sideroxylon	Mugga Ironbark
Geijera parviflora	Wilga

North Coast koala management area

Scientific name	Common name(s)
Allocasuarina torulosa	Forest Oak
Angophora floribunda	Rough-barked Apple
Corymbia gummifera	Red Bloodwood
Corymbia henryi	Large-leaved Spotted Gum
Corymbia intermedia	Pink Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus acmenoides	White Mahogany
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus bancroftii	Orange Gum
Eucalyptus biturbinata	Grey Gum
Eucalyptus campanulata	New England Blackbutt
Eucalyptus canaliculata	Large-fruited Grey Gum
Eucalyptus carnea	Thick-leaved Mahogany
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus eugenoides	Narrow-leaved stringybark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus glaucina	Slaty Red Gum
Eucalyptus globoidea	White Stringybark
Eucalyptus grandis	Flooded Gum
Eucalyptus laevopinea	Silver-top Stringybark
Eucalyptus largeana	Craven Grey Box
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Grey Box
Eucalyptus nobilis	Forest Ribbon Gum
Eucalyptus pilularis	Blackbutt
Eucalyptus placita	Grey Ironbark
Eucalyptus planchoniana	Bastard Tallowwood
Eucalyptus propinqua	Small-fruited Grey Gum
Eucalyptus psammitica	Bastard White Mahogany
Eucalyptus punctata	Grey Gum
Eucalyptus resinifera	Red Mahogany
Eucalyptus robusta	Swamp Mahogany
Eucalyptus rummeryi	Steel Box

Scientific name	Common name(s)
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus scias	Large-fruited Red Mahogany
Eucalyptus seeana	Narrow-leaved Red Gum
Eucalyptus siderophloia	Grey Ironbark
Eucalyptus signata/Eucalyptus racemosa	Scribbly Gum/Narrow-leaved Scribbly Gum
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus tindaliae	Stringybark
Eucalyptus umbra	Bastard White Mahogany
Melaleuca quinquenervia	Broad-leaved Paperbark

Northwest Slopes koala management area

Scientific name	Common name(s)
Angophora floribunda	Rough-barked Apple
Callitris glaucophylla	White Cypress Pine
Casuarina cristata	Belah
Eucalyptus albens	White Box
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus bridgesiana	Apple Box
Eucalyptus caleyi	Drooping Ironbark
Eucalyptus caliginosa	Broad-leaved Stringybark
Eucalyptus camaldulensis	River Red Gum
Eucalyptus canaliculata	Large-fruited Grey Gum
Eucalyptus chloroclada	Dirty Gum
Eucalyptus conica	Fuzzy Box
Eucalyptus coolabah	Coolibah
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus dalrympleana	Mountain Gum
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus dwyeri	Dwyer's Red Gum
Eucalyptus exserta	Peppermint
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus goniocalyx	Bundy
Eucalyptus laevopinea	Silver-top Stringybark
Eucalyptus largiflorens	Black Box
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus mannifera	Brittle Gum
Eucalyptus melanophloia	Silver-leaved Ironbark
Eucalyptus melliodora	Yellow Box

Scientific name	Common name(s)
Eucalyptus microcarpa	Western Grey Box
Eucalyptus moluccana	Grey Box
Eucalyptus nobilis	Forest Ribbon Gum
Eucalyptus parramattensis	Parramatta Red Gum
Eucalyptus pauciflora	White Sally, Snow Gum
Eucalyptus pilligaensis	Narrow-leaved Grey Box
Eucalyptus polyanthemos	Red Box
Eucalyptus populnea	Bimble Box/Poplar Box
Eucalyptus prava	Orange Gum
Eucalyptus punctata	Grey Gum
Eucalyptus quadrangulata	White-topped Box
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus viminalis	Ribbon Gum

Northern Tablelands koala management area

Scientific name	Common name(s)
Allocasuarina littoralis	Black She-oak
Angophora floribunda	Rough-barked Apple
Callitris glaucophylla	White Cypress Pine
Eucalyptus acaciiformis	Wattle-leaved Peppermint
Eucalyptus albens	White Box
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus biturbinata	Grey Gum
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus bridgesiana	Apple Box
Eucalyptus brunnea	Mountain Blue Gum
Eucalyptus caleyi	Drooping Ironbark
Eucalyptus caliginosa	Broad-leaved Stringybark
Eucalyptus camaldulensis	River Red Gum
Eucalyptus campanulata	New England Blackbutt
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus dalrympleana	Mountain Gum
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus eugenioides	Narrow-leaved Stringybark
Eucalyptus laevopinea	Silver-top Stringybark
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melanophloia	Silver-leaved Ironbark
Eucalyptus melliodora	Yellow Box

Scientific name	Common name(s)
Eucalyptus michaeliana	Brittle Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Grey Box
Eucalyptus nicholii	Narrow-leaved Black Peppermint
Eucalyptus nobilis	Forest Ribbon Gum
Eucalyptus nova-anglica	New England Peppermint
Eucalyptus obliqua	Messmate
Eucalyptus pauciflora	White Sally, Snow Gum
Eucalyptus prava	Orange Gum
Eucalyptus radiata	Narrow leaved Peppermint
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus stellulata	Black Sally
Eucalyptus subvelutina	Broad-leaved Apple
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum
Eucalyptus williamsiana	Eucalyptus williamsiana
Eucalyptus youmanii	Youman's Stringybark

Riverina koala management area

Scientific name	Common name(s)
Callitris glaucophylla	White Cypress Pine
Casuarina cristata	Belah
Eucalyptus albens	White Box
Eucalyptus camaldulensis	River Red Gum
Eucalyptus intertexta	Gum Coolibah
Eucalyptus largiflorens	Black Box
Eucalyptus melliodora	Yellow Box
Eucalyptus microcarpa	Western Grey Box
Eucalyptus populnea	Bimble Box

South Coast koala management area

Scientific name	Common name(s)
Allocasuarina littoralis	Black She-oak
Angophora floribunda	Rough-barked Apple
Corymbia gummifera	Red Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus agglomerata	Blue-leaved Stringybark

Scientific name	Common name(s)
Eucalyptus baueriana	Blue Box
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus consideniana	Yertchuk
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus elata	River Peppermint
Eucalyptus eugenioides	Narrow-leaved Stringybark
Eucalyptus fastigata	Brown Barrel
Eucalyptus globoidea	White Stringybark
Eucalyptus longifolia	Woollybutt
Eucalyptus maidenii	Maiden's Blue Gum
Eucalyptus muelleriana	Yellow Stringybark
Eucalyptus obliqua	Messmate
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus punctata	Grey Gum
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus sieberi	Silvertop Ash
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus tricarpa	Mugga (Red) Ironbark
Eucalyptus viminalis	Ribbon Gum

Schedule 3 Amendment of State Environmental Planning Policy (Koala Habitat Protection) 2020

[1] Clause 5

Omit the clause. Insert instead—

5 Land to which Policy applies

(1) This Policy applies to land in the following land use zones, or an equivalent land use zone, in a local government area specified in Schedule 1 of *State Environmental Planning Policy (Koala Habitat Protection) 2021*, but not if the local government area is marked with an * in that Schedule—

(a) Zone RU1 Primary Production,

(b) Zone RU2 Rural Landscape,

(c) Zone RU3 Forestry.

(2) In this clause—

equivalent land use zone has the same meaning as it has in *State Environmental Planning Policy (Koala Habitat Protection) 2021*.

[2] Clause 12 Preparation of plan of management

Omit clause 12(1). Insert instead—

(1) A plan of management may be prepared for—

(a) all land to which this Policy applies in a local government area,

(b) a part of that land, including an area of land that is the subject of a development application.

[3] Clause 13 Consultation

Omit the clause.

[4] Clause 16 Surveys, environment protection zones and development control plans

Omit "listed in Schedule 1" from clause 16(1).

Insert instead "in which there is land to which this Policy applies".

[5] Clause 16(1)(a)

Omit "within its area".

[6] Schedule 1 Local government areas

Omit the Schedule.

Appendix B Koala Habitat Assessment Tool

Table 5-1: Koala habitat assessment tool for coastal areas

Attribute	Score	Coastal	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 2 years.	
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.	
	0 (low)	None of the above.	✓ No records of species within 2 km within the last 5 years
Vegetation composition	+2 (high)	Has forest or woodland with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata	✓ All treed areas contain Koala feed tree species
	+1 (medium)	Has forest or woodland with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 500 ha	✓ Impacted vegetation is part of a patch of approximately 32 ha of unbroken habitat. Connectivity to broader habitat (>10,000ha) broken by 2-4 minor roads. Adjacent Bermagui Golf Course provides buffer to township and connectivity to broader landscape.
	+1 (medium)	Area is part of a contiguous landscape < 500 ha, but ≥ 300 ha	
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for	

Attribute	Score	Coastal	Applicable to the proposal?
		koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	✓ No koala mortality recorded, though development has potential to increase threat of vehicle strike or dog attack. Considered a high to very-high risk threat to koala populations in Murrah Area of Regional Koala Significance (ARKS) see Koala Assessment Report
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ No recent records of koala occurrence within proximity of the site. However, given the presence of koala use trees within the site, it is uncertain whether the habitat is important for koala.
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
Total	**6**	**Decision: Not habitat critical to the survival of the Koala—assessment of significance not required – however due to the up-listing of the koala to endangered and the impacts of the 2019-2020 bushfires there is some uncertainty and an AOS has been prepared**	

Appendix C Assessment of Significance Koala

EPBC ACT ASSESSMENT OF SIGNIFICANT IMPACT

Specific 'Significant Impact Criteria' are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for communities and species listed as endangered and vulnerable under the EPBC Act.

Koala - *Phascolarctos cinereus*

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

(a) lead to a long-term decrease in the size of a population

There are confirmed Koala populations within the South-Coast KMA located in the Murrah flora reserves between Tathra and Bermagui (OEH, 2018). These existing koala populations are approximately 15km south of the proposed Development Site and sparsely distributed within reserves between Bega/Tathra and Bermagui. The Murrah floral reserve (11,811 ha) comprises several smaller reserves; Mumbulla, Tanja, Murrah and Bermagui all of which form part of an extensive patch of forest adjoining with Biamanga National Park (NP) (13,617 ha) and Bermaguee nature reserve (818 ha). The total combined area of these reserves is approximately 25,000 hectares. The population that occurs within these reserves and NP's is considered **important** because of its geographic location within the wider koala distribution across eastern Australia, its' unique genetics, habitat use and history and the level of stakeholder commitment to its ongoing conservation (DPIE, 2021). The Development Site is located approximately 1.5km northeast of the northern boundary of Bermagui flora reserve with corridors of forest connecting the Development Site to these reserves. The connectivity of these areas is disrupted by 2-4 minor roads. The clearing area for this site is 16.76 ha in total with 4.88 ha consisting of moderate condition forested areas. The Development Site contains 5.83 ha of vegetation considered suitable Koala foraging habitat based on feed use trees set out by OEH (2018). During the 2019-20 summer bushfires extensive burning of varying severity occurred within the Bermagui-Cobargo region (see fig 1-1 below). A post fire Koala survey in 2020 spanned over the 25,000 ha of reserves and NP's previously mentioned revealed that approximately "70 percent of the study area, including most patches identified as sustaining higher levels of Koala activity, was not burned" (DPIE, 2020, p. 1). Because the clearing of forested areas on the subject site is small (<0.001%) to the area of unburned habitat available in the region, the proposed development is unlikely to have a long-term deleterious effect on the size of the Koala population in the area.

a) reduce the area of occupancy of the species

A known population of Koalas is within 15km's of the Development Site, with part of their known range extending within 1.5 km's south of the Development Site. The population has been identified as important by the NSW state government as stated above. Atlas of Living Australia (ALA) and BioNet illustrate 110 Koala sightings within 5 kilometres (46 from ALA and 64 from BioNet). There is one BioNet record of koala within 500m that was recorded in 2004. Based on the further analysis of However, it is important to note that the extent of any reduction is only very small and constitutes approximately 0.001% of available unburned habitat and less than 0.0003% of the 25,000 ha of contiguous forest where the important population is known to occur.

b) fragment an existing population into two or more populations

Within the South Coast KMA, Koalas occur in low densities, within isolated sub-population fragments (Department of the Environment, 2022). The known sub-populations in the area are already highly fragmented. The Development Site is positioned outside the northern most extent of a known koala

population within Murrah flora reserves and adjacent NP's. The development location does not infringe on any intact forest communities and will not result in the fragmentation of existing koala habitat. Further, it will not cause the fragmentation of already isolated populations in the area. Thus, it is highly unlikely that the development will further fragment the existing population into one or more populations.

c) adversely affect habitat critical to the survival of a species

The relevant portion of the impact area consists of a relatively small area of suitable treed habitat (5.83 ha), within the broader landscape of intact native vegetation (approximately 25,000 ha). The site contains some moderate condition koala habitat however this is not considered necessary for the breeding, dispersal and foraging of local koala populations. The site provides no known entities or features that are considered necessary for maintaining long-term survival of koala. The potential koala habitat impacted by the development will not be necessary to maintain genetic diversity of koalas in the region nor is it considered necessary for the recovery and reintroduction of populations. The native bushland contained in reserves close to Bermagui (within 8 km) was largely unaffected by the 2019-20 bushfires (see fig 1-1 below). As such, the proposed development is not considered likely to impact habitat critical to the survival of koala.

d) disrupt the breeding cycle of a population

Because the site represents such a small fraction of available habitat within the region and known populations are south of the development site, clearing for the development proposed is unlikely to impact on the breeding cycle of a population. If taking a very precautionary approach, it is recommended to remove trees outside of the Koala's breeding season being summer months (Nov-Feb) and gestation (March) for one month following (DoE, 2022).

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

The impact area contains low to moderate quality vegetation (PCTs) containing trees species which are considered Koala use trees (DPIE, 2021a). Koala's home range is variable depending largely on the fertility and moisture content of soils with characteristically "poorer" habitats consisting of larger home ranges (DoE, 2022). Home ranges can be as large as 100 ha or as little as 10-20 ha in coastal areas. Given the potential large home range of Koalas (10-20 ha), the relatively small tree clearing area (7.3 ha), and large contiguous patches of vegetation within the broader landscape (25,000ha) it is considered unlikely that the availability or quality of habitat will be reduced to the extent that Koala populations are likely to decline.

f) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat

The development is not expected to result in the introduction of any new invasive species which don't exist already in the surrounding residential areas. The proposal may however exacerbate existing impacts such as attack from domestic dogs. Because the proposal involves residential development there is potential for new homeowners to introduce additional domestic dogs to the area, of which attacks are a major threat to this species (DoE, 2022). This threat has been highlighted in the Murrah Areas of Regional Koala Significance assessment (DPIE, 2018) as being of high risk. These invasive species are likely already somewhat established in the area due to the proximity of the proposal to existing residential land.

g) introduce disease that may cause the species to decline, or

A well-known disease suffered by Koalas is Chlamydia and is thought to increase in response to environmental pressures which can cause poor nutrition and overcrowding (DoE, 2022). The recent 2019/2020 bushfires impacted about 30% of available habitat within a 10km radius, where vegetation was subjected to fire to the northwest and southwest of the development site when viewing the Fire Extent Severity Mapping on figure 1-1 below (DPIE, 2020). The majority of burnt habitat consisted of low intensity fire (green shading on map) that impacted the understory without burning the eucalypt canopy. On a larger scale, the fires were the result of intense drought and both drought then fire have impacted Koala populations throughout NSW, especially within medium and high burnt affected areas which have caused long-term impacts on habitat and food resources. Within fire impacted areas, it is expected that any surviving Koalas would locate themselves less burnt areas, especially into moist gullies where better quality food trees exist. It is expected that any sub-populations of koalas could become concentrated within these habitats and could aid in the spread the disease. The fires came within 8km of the Development Site.

In relation to the proposed development, the main gully head could be seen as a lower quality refuge habitat for Koalas during future droughts and fire events, however it is highly disturbed by edge effects onto cleared and managed land and residential development. The lower section of the main gully will be preserved (containing *Backhousia myrtifolia* and *Acacia mearnsii*) and connectivity to tree links to the east through the golf course will be preserved. This in turn will remain available for Koala interactions during times of malnourishment or when Chlamydiosis is most prevalent. With the scale of tree clearing proposed, the development is not expected to contribute to the introduction of diseases and cause the species to decline.

h) interfere with the recovery of the species.

The development is expected to impact on vegetation which may be suitable habitat for Koalas. The quality of suitable vegetation within the development footprint is considered to be poor and is not critical to the survival of koala in the region. The extent that will be cleared is negligible in relation to the existing contiguous habitat within nature reserves and National Parks and represents less than 0.0002 percent of available habitat amongst these protected areas. The direct impacts on vegetation proposed by the development are not expected to interfere with the recovery of koala populations in the area.

An increase in residential housing in the area will likely result in an increased traffic flow throughout and around the Development Site. This increase in vehicles is likely to increase the number koala related incidents potentially resulting in increased koala mortality. Vehicle strikes are a major threat to the species (DoE, 2022) and has been identified by the Murrah Areas of Regional Koala Significance assessment (DPIE, 2018) as being of very-high risk.

Conclusion

The Development Site has potential to provide limited habitat availability for Koalas in the region (<0.0002%). The availability of contiguous habitat in the region would suggest that the loss of 7.3 ha of habitat would not have a significant impact on the persistence of koalas in the local area. The development has potential to increase interactions between local koala individuals and dogs. There is potential for the development to increase the incidence of vehicle strikes to local koala individuals. Both impacts are considered major threats to the species and should require management.

There are known important koala populations in the Murrah flora reserves and adjacent NPs located within 1.5km southwest of the proposed development. Existing BioNet and ALA sightings within a 10km radius of the development site exceed 100 records. These records suggest that the local area

may be a corridor for movement of koalas in the region however evidence suggests that koala populations are sparse and isolate in their distribution in the South Coast KMA.

Review of available literature states that the 2019-20 bushfires effected 25 percent of available habitat within local reserves and imagery shows that little or no burning occurred within 8 km southwest of the Development Site. This suggests that koala populations and habitat may not have been severely impacted by the bushfires of 2019-20 although this is not confirmed.

In conclusion the direct impacts of the proposed development are unlikely to impact significantly on the survival of koalas in the local area. The indirect impacts may interfere with the recovery of koala based on the increased potential for vehicle strikes and dog attacks both considered nationally as threatening processes and high-very high risk threats on a regional level.

APPENDIX A FIGURES

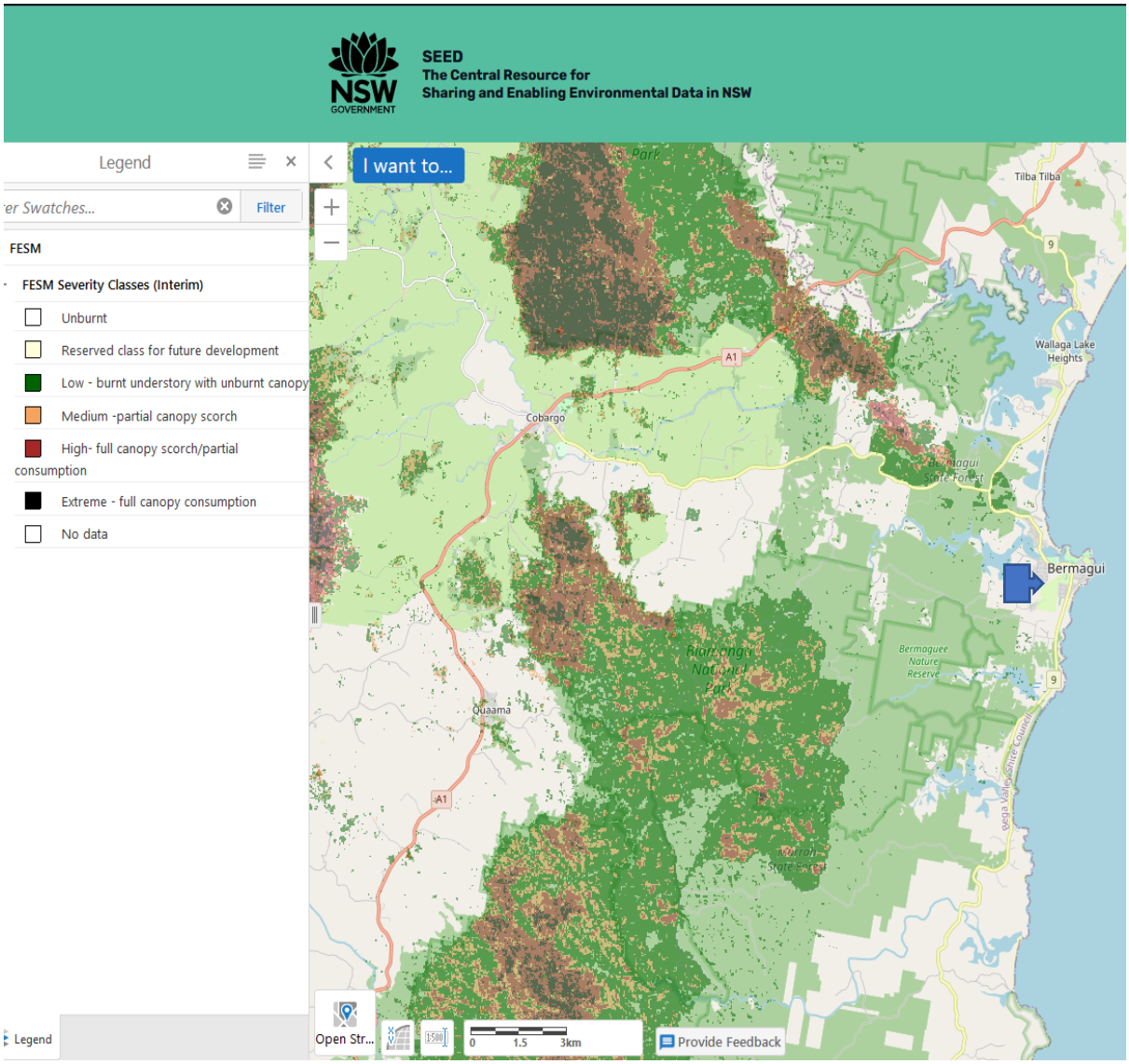

Figure 1-1 Image of fire affected areas and severity in proximity to development location at Bermagui. Source: NSW Govt. SEED portal.

APPENDIX B REFERENCES

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Appendix E EPBC Act protected matters search

Australian Government

Department of Agriculture, Water and the Environment

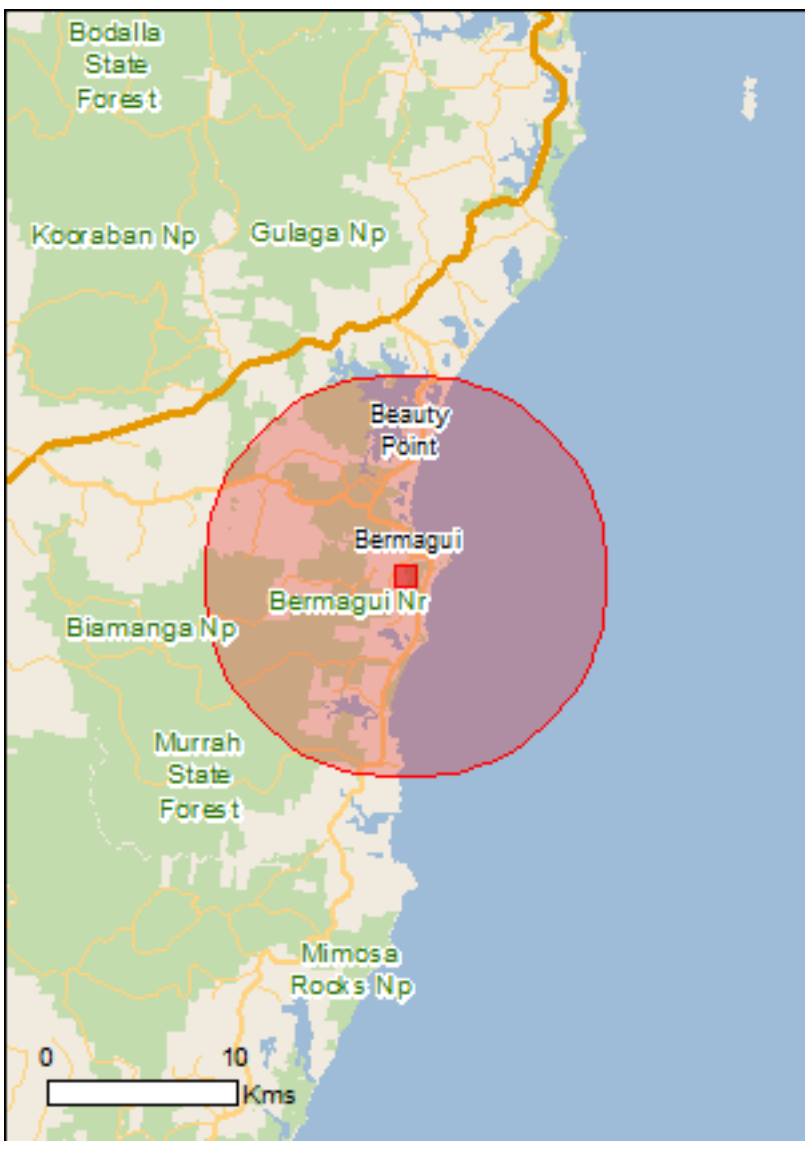
EPBC Act Protected Matters Report

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

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

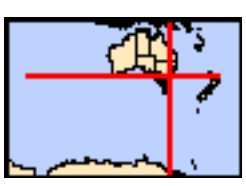
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/07/21 13:30:01



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	68
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	83
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	2
Invasive Species:	36
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
Temperate East

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community may occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Correa baeuerlenii Chef's Cap [17007]	Vulnerable	Species or species habitat known to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat known to occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Zieria tuberculata Warty Zieria [56736]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Gallinago megala		
Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura		
Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.	
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
[Kimblaeus bassensis](#) Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
[Leptoichthys fistularius](#) Brushtail Pipefish [66248]		Species or species habitat may occur within area
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area
[Mitotichthys semistriatus](#) Halfbanded Pipefish [66261]		Species or species habitat may occur within area
[Mitotichthys tuckeri](#) Tucker's Pipefish [66262]		Species or species habitat may occur within area
[Notiocampus ruber](#) Red Pipefish [66265]		Species or species habitat may occur within area
[Phyllopteryx taeniolatus](#) Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
[Solegnathus robustus](#) Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
[Solegnathus spinosissimus](#) Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
[Solenostomus cyanopterus](#) Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
[Stipecampus cristatus](#) Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
[Vanacampus phillipi](#) Port Phillip Pipefish [66284]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Vanacampus poecilolaemus		
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri		
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus		
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis		
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bermaguee	NSW
Bermagui	NSW
Biamanga	NSW
Gulaga	NSW
Murrah	NSW

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Eden RFA	New South Wales
Southern RFA	New South Wales

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat may occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Wallaga Lake	NSW

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Upwelling East of Eden	South-east

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-36.4297 150.0566,-36.4297 150.06788,-36.43871 150.06788,-36.43871 150.0566,-36.4297 150.0566

Acknowledgements

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

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

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

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

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Appendix F EPBC Act habitat assessment

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed in a 10km radius from the proposal area in the Atlas of NSW Wildlife[1] and those identified as potentially occurring in the area according to the Commonwealth EPBC Protected Matters Search Tool[2].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species

Yes: The proposal could impact this species or its habitats. An AOS has been applied to these entities.

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[1] The Atlas of NSW Wildlife is administered by the NSW Department of Environment& Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[2] This online tool is designed for the public to search for matters protected under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). It is managed by the Commonwealth Department of the Environment and Energy.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Flora				
Caladenia tessellata Thick Lip Spider Orchid, Daddy Long-legs BC-E EPBC-V PMST	Found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	Present. Grassy sclerophyll forests are present within the Development Site in the form of Lowland Grassy Woodland in the South East Corner Bioregion. However, this TEC and associated PCT are not associated with *C. tessellata*.	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Not associated with PCTs onsite and no records within 10 km of development site.
Correa baeuerlenii Chef's Cap Correa BC-V EPBC-V PMST	Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash (*Eucalyptus sieberi*), Yellow Stringybark (*E. muelleriana*), Blue-leafed Stringybark (*E. agglomerata*) and Spotted Gum (*Corymbia maculata*), or she-oak woodland. It may also be found in near-coastal rocky sites. Has been recorded between Nelligen (on Nelligen Creek and the Buckenbowra River) and Mimosa Rocks National Park.	Present. *C. baeuerlenii* is only associated with PCT 1336, which does not contain riparian habitat. Riparian habitat does occur in PCT 875 and PCT 834, however neither of these PCTs and	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Absence of suitable habitat in associated PCT.

[1] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.
BCD threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
		their associated species are associated with *C. baeuerlenii*.		
Cryptostylis hunteriana Leafless Tongue Orchid BC-? EPBC-V PMST	The species occurs mostly in coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest. It prefers open areas in the understorey of forested communities. The soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi),* Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	Present. Lowland forests present in the form of Lowland Grassy Woodland in the South East Corner Bioregion. However, this TEC and associated PCT are not associated with *C. hunteriana.*	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Not associated with PCTs onsite and no records within 10 km of development site.
Haloragis exalata subsp. *exalata* Square Raspwort, Wingless Raspwort *BC-V* *EPBC-V* *PMST*	Appears to require protected and shaded damp situations in riparian habitats. It is disjunct distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW.	Present. Riparian habitat occurs in PCT 875 and PCT 834, however neither of these PCTs are associated with *H. exalata subsp. excalata*.	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Not associated with PCTs onsite and no records within 10 km of development site.
Persicaria elatior Knotweed, Tall Knotweed *BC-V* *EPBC-V* *PMST*	**General habitat** Knotweed normally grows in damp places, including: • coastal with swampy areas (Quinn et al. 1995) • along watercourses, streams and lakes (NSW DECCW 2005ov) • swamp forest (NSW DECCW 2005ov) • disturbed areas (NSW DECCW 2005ov).	Absent. No associated PCT's in the Development Site.	Possible, BioNet record within 7km of the Development Site.	No. Not associated with PCTs onsite and no records within 10 km of development site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Associated species include *Melaleuca linearifolia*, *M. quinquenervia*, *Lophostemon suaveolens*, *Casuarina glauca*, *Corymbia maculata*, *Pseudognaphalium luteoalbum* and *Polygonum hydropiper* (NSW undated; Quinn et al. 1995). **Specific habitat** On South Stradbroke Island, Knotweed is found in waterholes under *Livistona australis* (Queensland Herbarium 1999). At Cornubia Wetland, where 12 specimens have been recorded, there are three different vegetation communities in the area (Leiper 2008). Leiper (2008) is not specific about whether a particular community is preferred. These vegetation communities are (Leiper 2008): • Regional Ecosystem 12.9.1; tall open forest on sedimentary derived soils with a mixture of gum species. Species include *Eucalyptus crebra*, *Angophora leiocarpa*, *Corymbia intermedia* and *L. confertus*. • Regional Ecosystem 12.3.8; swamps with *Cyperys* spp., *Schoenoplectus* spp. and *Eleocharis* spp. • Regional Ecosystem 12.3.5; *M. quinquenervia* open forest on coastal alluvium.			
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood *BC-CE* *EPBC-CE* *PMST*	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. • Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. • This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Present. Associated PCTs 875, 1336 and 1220 are present.	Unlikely. Outside of species known distribution.	No. Outside of species known distribution.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thesium australe Austral Toadflax *BC-V* *EPBC-V* *PMST*	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast, in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda triandra*).	Present. Associated PCTs 834.	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Presence excluded through targeted survey.
Zieria tuberculata Warty Zieria *BC-V* *EPBC-V* *PMST*	Grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland. Occurs in the Mt Dromedary and Tilba Tilba area.	Absent. No Associated PCT's Present	Unlikely. No Bionet records within the 10km buffer of the Development Site.	No. Not associated with PCTs onsite and no records within 10 km of development site.
Ecological Communities				
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological Community *BC - E* *EPBC: E*	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which Casuarina glauca (swamp oak) is the dominant species northwards from Bermagui. Other trees including Acmena smithii (lilly pilly), Glochidion spp. (cheese trees) and Melaleuca spp. (paperbarks) may be present as subordinate species and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and Melaleuca ericifolia is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, Parsonsia straminea, Geitonoplesium cymosum and Stephania japonica var. discolor, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.	Absent.	Unlikely. All PCTs and TEC identified within site.	No. Not identified within site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	The composition of the ground stratum varies depending on levels of salinity in the groundwater. Under less saline conditions prominent ground layer plants include forbs such Centella asiatica, Commelina cyanea, Persicaria decipiens and Viola banksii; graminoids such as Carex appressa, Gahnia clarkei, Lomandra longifolia, Oplismenus imbecillis; and the fern Hypolepis muelleri. On the fringes of coastal estuaries, where soils are more saline, the ground layer may include the threatened grass species, Alexfloydia repens, as well as Baumea juncea, Juncus kraussii, Phragmites australis, Selliera radicans and other saltmarsh species. For a comprehensive list of species that characterize the community open the Scientific Determination link in the top right box.			
Illawarra and south coast lowland forest and woodland ecological community *BC - E* *EPBC- 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. The understorey is not necessarily grassy as moist forest vegetation types are also included within this broad community. Common shrub species include Acacia mearnsii and Dodonaea viscosa subsp. angustifolia. Floodplain vegetation dominated by Casuarina species or rainforests on latite soils are not part of this community.	Absent.	Unlikely. All PCTs and TEC identified within site.	No. Not identified within site.
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia *BC - E*	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	Absent.	Unlikely. All PCTs and TEC identified within site.	No. Not identified within site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
EPBC-CE	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. There is considerable floristic variation between stands and in particular areas, localised variants may be recognised. The Sutherland Shire Littoral Rainforest Endangered Ecological Community which was listed previously as an endangered ecological community is included within this community. Characteristic species of this community are cited in the NSW Scientific Committee Final Determination on the DEC website.			
Lowland Grassy Woodland in the South East Corner Bioregion ***BC - E*** ***EPBC-CE***	**Lowland Grassy Woodland in the South East Corner bioregion is the name given to the ecological community associated with rainshadow areas of the south coast and hinterland of New South Wales. Typically, the community comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Undisturbed stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests.**	**Present. Associated PCT 834 present within site.**	**Likely. Associated PCT 834 present within site.**	**Yes. TEC identified within Development Footprint. Assessment of Significance completed.**
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria *BC - E* *EPBC-CE*	As the name suggests, this CEEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include Eucalyptus tereticornis (forest red gum), E. amplifolia (cabbage gum), Angophora floribunda (rough-barked apple) and A. subvelutina (broad-leaved apple). Eucalyptus baueriana (blue	Absent.	Unlikely. All PCTs and TEC identified within site.	No. Not identified within site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	box), E. botryoides (bangalay) and E. elata (river peppermint) may be common south from Sydney, E. ovata (swamp gum) occurs on the far south coast, E. saligna (Sydney blue gum) and E. grandis (flooded gum) may occur north of Sydney, while E. benthamii is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including Melaleuca decora, M. styphelioides (prickly-leaved teatree), Backhousia myrtifolia (grey myrtle), Melia azaderach (white cedar), Casuarina cunninghamiana (river oak) and C. glauca (swamp oak). Scattered shrubs include Bursaria spinosa, Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda and Phyllanthus gunnii. The groundcover is composed of abundant forbs, scramblers and grasses including Microlaena stipoides, Dichondra repens, Glycine clandestina, Oplismenus aemulus, Desmodium gunnii, Pratia purpurascens, Entolasia marginata, Oxalis perennans and Veronica plebeia . The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs. For a comprehensive list of species that characterize the community open the Scientific Determination - http://www.environment.nsw.gov.au/determinations/riverflat36a.htm. This community also has a listing advice provided by the Commonwealth following its gazettal to the EPBC (http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=154&status=Critically Endangered).			

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	The combination of features that distinguish River-Flat Eucalypt Forest on Coastal Floodplains from other endangered communities on the coastal floodplains include: its dominance by either a mixed eucalypt canopy or by a single species of eucalypt belonging to either the genus Angophora or the sections Exsertaria or Transversaria of the genus Eucalyptus; the relatively low abundance or sub-dominance of Casuarina and Melaleuca species; the relatively low abundance of Eucalyptus robusta; and the prominent groundcover of soft-leaved forbs and grasses. River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions includes and replaces Sydney Coastal River-Flat Forest Endangered Ecological Community.			
Subtropical and Temperate Coastal Saltmarsh *EPBC-V*	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include Baumea juncea, Sea Rush (Juncus krausii subsp. australiensis), Samphire (Sarcocornia quinqueflora subsp. quinqueflora), Marine Couch (Sporobolus virginicus), Streaked Arrowgrass (Triglochin striata), Knobby Club-rush (Ficinia nodosa), Creeping Brookweed (Samolus repens), Swamp Weed (Selliera radicans), Seablite (Suaeda australis) and Prickly Couch (Zoysia macrantha). Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans.	Absent.	Unlikely. All PCTs and TEC identified within site.	No. Not identified within site.
Birds				
Anthochaera phrygia Regent Honeyeater *BC-CE* *EPBC-CE*	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak, that inhabit woodlands that support a significantly high abundance and species richness of bird species, and have large numbers of	Yes. Associated PCT 834, 875, 1336, 1220	Possible But no nests detected, and no tall eucalypts	Yes. Potentially suitable habitat and 1 records within 10 km buffer.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
BioNet, PMST	mature trees, high canopy cover and abundance of mistletoes. 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. Recently recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. A generalist forager, although mainly feeds on the nectar from a relatively small number of eucalypts that produce high volumes of nectar e.g. Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important e.g. Lower Hunter Spotted Gum forests support regular breeding events. Flowering of associated species such as *Eucalyptus eugenioides* and other Stringybark species, and *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from *Amyema miquelii, A. pendula* and *A. cambagei* are also utilised. When nectar is scarce, lerp and honeydew can comprise a large proportion of the diet. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Nests in horizontal branches or forks in tall mature eucalypts, mistletoes and Sheoaks. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.		were detected on site. Not within 'important areas of map'. BioNet record within 10km buffer.	Assessment of Significance completed.
Botaurus poiciloptilus Australasian Bittern *EPBC-E* *PMST*	Favours permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. and *Eleocharis.* Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	Absent. No associated PCTs in the Development Site.	Unlikely. No Bionet records within the 10km buffer.	No. Not associated with PCTs onsite and no records within 10 km of development site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Calidris canutus Red Knot *EPBC – E,M* *BioNet, PMST*	A non-breeding migratory visitor from Arctic regions of Siberia. Birds arrive between September and October and leave between March and April, with a small number of individuals overwintering. In NSW, it is recorded in small numbers along some of the major river estuaries and sheltered embayment's of the coastline, in particular the Hunter River estuary. This environment is used as a staging area for birds to rest and replenish fat resources; large numbers arrive in September then most move south to Victoria by October. A rare visitor to wetlands away from the coast with a few records (mostly during southward migration) as far west as Lake Menindee and the Riverina. Mainly occurs in small numbers on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours and sandflats and sandy beaches of sheltered coasts. It is occasionally found on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms and is a rare visitor to terrestrial saline wetlands and freshwater swamps. Birds roost on sandy beaches, spits, islets and mudflats close to feeding grounds, usually in open areas. Rarely found on inland lakes or swamps.	Absent. No associated PCT's in the Development Site.	No records within the 10km buffer of BioNet search	No. Not associated with PCTs onsite and no records within 10 km of development site.
Calidris ferruginea Curlew Sandpiper *BC-CE* *EPBC-CE* *PMST*	Generally, occupies littoral and estuarine habitats, and in NSW is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Feeds on worms, molluscs, crustaceans, insects and some seeds. Distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration.	Absent. No associated PCT's in the Development Site.	Unlikely. No BioNet records within 10 km.	No. Not associated with PCTs onsite and no records within 10 km of development site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Dasyornis brachypterus Eastern Bristlebird *BC-E* *EPBC-E* *PMST*	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. Age of habitat since fires (fire-age) is of paramount importance to this species. The Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, habitat in northern NSW requires frequent fires to maintain habitat condition and suitability. The northern fire regimes are between 3-6 years and of variable intensity depending on the habitat condition.	Absent. No Associated PCT	No BioNet records within 10 km	No. No Associated PCT's or BioNet records.
Diomedea antipodensis Antipodean Albatross *BC-V* *EPBC-V* *PMST*	The majority of birds breed on Antipodes Island, with a small number of pairs breeding on Campbell Island. Breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish. Although representing a small proportion on its total foraging area, potential forage in NSW waters is nonetheless considered significant for the species. This species feeds pelagically on squid, fish and crustaceans. The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia.	Absent. No Associated PCT	No BioNet records within 10 km	No. No Associated PCT's or BioNet records.
Diomedea antipodensis gibsoni Gibson's Albatross *BC-V* *EPBC-V* *BioNet* *PMST*	Gibson's Albatross is marine, pelagic and aerial. In the Antarctic, it occurs in open water, and rarely enters the belt of icebergs region (Falla 1937a; Hicks 1973). In late summer, it may approach the edge of the pack-ice (Darby 1970).	Absent. No Associated PCTS.	BioNet records within 10 km.	No. No associate PCT's and is a marine species.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
(name change from: Diomedea gibsoni)	Gibson's Albatross flies within 15 m of the sea surface, using the updraft from wave fronts for lift. It circles over breeding islands to heights of at least 1500 m (Marchant & Higgins 1990). On breeding islands, the Gibson's Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground (Falla 1937a; Warham & Bell 1979). Nests of the Gibson's Albatross are sited on moss terraces, in dense tussocks, and often in loose aggregations on the west (windward) side of islands. It prefers open or patchy vegetation (tussocks, ferns or shrubs), and it requires nesting areas that are near exposed ridges or hillocks so that it can take off (Warham & Bell 1979).			
Diomedea epomophora Southern Royal Albatross *EPBC-V,M PMST*	Inhabits terrestrial and marine environments - grasslands and marine neritic and marine oceanic. Nests on tussock grassland slopes, ridges, and plateaus. Feeds primarily on squid and fish, supplemented by salps, crustacea and carrion.	Present. Some degraded native grassland.	Unlikely. No BioNet record in the 10km buffer	No. No record in area.
Diomedea exulans Wandering Albatross *EPBC-V Bionet, PMST*	Spend the majority of their time in flight, soaring over the southern oceans. Breed on a number of islands just north of the Antarctic Circle: South Georgia Island (belonging to the UK), Prince Edward and Marion Islands (South Africa), Crozet and Kerguelen Islands (French Southern Territories) and Macquarie Island (Australia). Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation, in small, loose colonies among grass tussocks, using a large mud nest. They feed in pelagic, offshore and inshore waters, often at night, taking fish and cephalopods such as squid, crustaceans and carrion, and will often follow ships feeding on the refuse they trail. Visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast.	Absent. No Associated PCTs	BioNet record about 1km away.	No, area is not a marine environment

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Diomedea sanfordi Northern Royal Albatross *EPBC-E* *PMST*	Primarily forages in inshore and offshore waters over the continental shelf to the shelf edge. It feeds mainly on cephalopods and fish, but also salps, crustacea and carrion. Ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia.	Absent. No Associated PCTs	Unlikely. No BioNet records within 10 km	No, area is not a marine environment
Hirundapus caudacutus White-throated Needletail *EPBC-V, M* *BioNet*	Arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. Are non-breeding migrants in Australia. Breeding takes place in northern Asia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground (Coventry 1989; Tarburton 1993; Watson 1955). Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (Higgins 1999). They also commonly occur over heathland (Cooper 1971; Learmonth 1951; McFarland 1988), but less often over treeless areas, such as grassland or swamps (Cooper 1971; Gosper 1981; Learmonth 1951). When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (Emison & Porter 1978; Friend 1982; Tarburton 1993). In coastal areas, they are sometimes seen flying over sandy beaches or mudflats (Cooper 1971; Crompton 1936; Davis 1965), and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (Cooper 1971; Dawson et al. 1991; Loyn 1980; Mitchell et al. 1996; Schulz & Kristensen 1994). They are sometimes recorded above islands well out to sea (Brandis et al. 1992; Cooper 1971; Warham 1957).	Present. The species has not PCT stated. But there is present in most habitats, often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland	Likely. Sightings were between 1.03 to 4.69km away. (records between 1979-1990).	Yes. Habitat is present and records within 10 km buffer. Assessment of Significance completed.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Falco hypoleucos Grey Falcon *BC-E* *EPBV-V* *PMST*	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, and near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. 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. Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Believed to be extinct in areas with more than 500mm rainfall in NSW.	Absent. No associated PCTs present.	Unlikely. No BioNet records within 10km buffer.	No. There is no associated PCTs or records of the species in the area.
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) *EPBC-V* *PMST*	The White-bellied Storm-Petrel occurs across sub-tropical and tropical waters in the Tasman Sea, Coral Sea and, possibly, the central Pacific Ocean (Harrison 1983; Hutton 1991; Marchant & Higgins 1990). In the non-breeding season, it reaches and forages over near-shore waters along the continental shelf of mainland Australia (Holmes 1977; Priddel 1996). It breeds, in Australian territory, on offshore islets and rocks in the Lord Howe Island group (Hutton 1991). It nests in crevices between large volcanic rocks (Fullagar et al. 1974; Hutton 1991), and in burrows excavated in banks (Hindwood 1940; McAllan et al. 2004). Breeding colonies are often situated along dykes (Fullagar 2002, pers. comm.). The White-bellied Storm-Petrel (Tasman Sea) does not occur in any of the ecological communities that are listed as threatened under the EPBC Act 1999. It is not known to associate with any other species or subspecies that is listed as threatened under the EPBC Act 1999.	Absent. No associated PCTs present as a Marine species.	Unlikely. No BioNet records within 10km buffer.	No. There is no associated PCTs or records of the species in the area.
Grantiella picta Painted Honeyeater *BC-V*	Nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW,	Absent. No Associated PCTs present.	Unlikely. No BioNet records	No. There is no associated PCTs or

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
EPBC-V *PMST*	Victoria and southern Queensland. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema.* Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.		within 10km buffer.	records of the species in the area.
Lathamus discolor **Swift Parrot** ***BC-E*** ***EPBC-CE*** ***BioNet, PMST***	**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. Migrates to the Australian south-east mainland between March and October. No breeding in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.**	**Present. Associated PCT's 834, 1336, 1220 present in project area.**	**Possible. Recorded within BioNet 10km Buffer**	**Yes. Associate PCT's present and records within BioNet 10km Buffer. Assessment of Significance completed.**
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit *EPBC-V* *BioNet,PMST*	Arrive in Australia each year in August from breeding grounds in the northern hemisphere. More numerous in northern Australia. Inhabit estuarine mudflats, beaches and mangroves. Common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders.	Absent. No PCT's present.	Possible. Recorded within BioNet 10km Buffer	No. Though recorded in 10km range no habitat present.
Limosa limosa Black-tailed Godwit *BC-V* *EPBC-M* *BioNet*	A coastal species, usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae,	Absent. No PCT's present.	Possible. Recorded within BioNet 10km Buffer	No. Though recorded in 10km range no habitat present.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars. Frequently recorded in mixed flocks with Bar-tailed Godwits.			
Macronectes giganteus Southern Giant Petrel *BC-E* *EPBC-E,M* *PMST*	Has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW. Over summer, it nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory. An opportunistic scavenger and predator and scavenges from fishing vessels and animal carcasses on land. Also, an active predator of cephalopods and euphausiids, as well as smaller birds (particularly penguins) both at land and at sea. Will desert their nests if disturbed at the breeding colony.	Absent. No Associated PCTs	Unlikely. No record within BioNet 10km Buffer.	No. No habitat or record or species present.
Macronectes halli Northern Giant-Petrel *BC-V* *EPBC-V,M* *BioNet, PMST*	Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the breeding colonies, while immature birds make long and poorly known circumpolar and trans-oceanic movements. Most birds recorded in NSW coastal waters are immature birds. Seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain. |Has a circumpolar pelagic distribution, usually between 40-64ºS in open ocean. Range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Absent. No Associated PCTs, Marine species habitat.	Possible. Recorded within BioNet 10km Buffer	No. Though recorded in 10km range no habitat present.
Neophema chrysogaster Orange-bellied Parrot *BC-CE* *EPBC-CE* *PMST*	Breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia, southern Victoria, and occasional reports from NSW. Winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. Forages in weedy areas associated with these	Absent. No Associated PCTs.	Unlikely. No record within BioNet 10km Buffer.	No. No habitat or record or species present.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses.			
Numenius madagascariensis Eastern Curlew *EPBC-CE, M BioNet, PMST*	In NSW, occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally, occupies coastal lakes, inlets, bays and estuarine habitats, and in NSW is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. Is carnivorous, mainly eating crustaceans.	Absent. No Associated PCTs.	Possible. Record within BioNet 10km Buffer.	No. Though recorded in 10km range no habitat present.
Pachyptila turtur subantarctica Fairy Prion (southern) *EPBC-V PMST*	Marine; found mostly in temperate and subantarctic seas. The species as a whole is abundant in south-east Australia, New Zealand and Indian Ocean waters but its oceanic distribution is poorly known. Sometimes forages over the continental shelves and continental slopes but can come close inshore during rough weather. Breeds on islands and rock stacks; burrowing in soil or using crevices and caves in cliffs or rock falls; can also nest in scrub, herbland, tussock or pasture.	Absent. No Associated PCTs Present	Unlikely. No BioNet record within 10km.	No. No Associated PCT's or record of occurrence found.
Phoebetria fusca Sooty Albatross *BC-V EPBC-V PMST*	The Sooty Albatross is marine and pelagic. In summer, the species occurs mainly south of 35° S in subtropical and subantarctic waters, but it is most abundant near the Subtropical Convergence (Falla 1937a; Tickell & Woods 1972; Weimerskirch et al. 1986). It ranges south of the Antarctic Convergence in the south-western Indian Ocean, but rarely elsewhere (Biermann &	Absent. No Associated PCTs Present	Unlikely. No BioNet record within 10km.	No. No Associated PCT's or record of occurrence found.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Voous 1950; Weimerskirch et al. 1986). In late autumn and winter, the Sooty Albatross occurs mainly in the Subtropical Zone (Rand 1963; Tickell & Woods 1972). Immature albatrosses are restricted to the Subtropical zone throughout the year (Stahl 1987). The Sooty Albatross tolerates a wide range of sea surface temperatures and salinities (Biermann & Voous 1950; Jouventin & Weimerskirch 1984). During both the breeding and non-breeding seasons, the species occurs widely over pelagic waters, exploiting dispersed sources of food (Weimerskirch et al. 1986). It forages over coastal kelp beds around Tristan da Cunha (Richardson 1984). The species breeds on subtropical and subantarctic islands in the Indian and Atlantic Oceans, on vegetated cliffs and steep slopes that are sheltered from prevailing winds, often amongst tussock grass (Weimerskirch et al. 1986). On Marion Island, Prince Edward Island, Iles Kerguelen and Crozet Island, breeding is confined to coastal sites. Nests are inland on Ile Amsterdam, Gough Island and the Tristan da Cunha Group, on ridges, cliffs, high slopes and plateaux (Hagen 1952; Segonzac 1972; Shaughnessy & Fairall 1976).			
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel *BC-V* *EPBC-E* *PMST*	Gould's Petrel is a pelagic marine species, spending much of its time foraging at sea and coming ashore only to breed. The Australian subspecies breeds and roosts on two islands off NSW, Cabbage Tree and Boondelbah Islands, and the at-sea distribution is poorly known (NSW 2006a; D'Ombrain 1970; Fullagar 1976; Hindwood & Serventy 1941; Hull 1911b; Priddel & Carlile 1995b, 1997; Priddel et al. 1995). The breeding colonies on Cabbage Tree Island and Boondelbah Island are in the transitional zone between the subtropical (with maximum summer rainfall) and temperate climatic zones (with	Absent. No Associated PCTs Present	Unlikely. No BioNet record within 10km.	No. No Associated PCT's or record of occurrence found.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	maximum winter rainfall) (NPWS 2003). On Cabbage Tree Island, Gould's Petrels mostly breed among rocky scree and beneath coarse woody debris in gullies dominated by dense rainforest, heavily vegetated with Cabbage Tree Palms (Livistonia australis), figs (Ficus) and Native Plums (Planchonella australis) (NSW 2006b; D'Ombrain 1970; Fullagar 1976; Hindwood & Serventy 1941; Hull 1911b; Priddel & Carlile 1995b, 1997; Priddel et al. 1995), but also occasionally among tussocks of mat-rush (Lomandra longifolia) (D'Ombrain 1970). Nests occur from just above sea level to elevations of 120 m (Fullagar 1976). Boondelbah Island is relatively treeless, except for a few wind-sheared trees, and is dominated by low vegetation. Here Gould's Petrels breed in artificial nest boxes, in piles of rocks and in the cavities between rocks (Priddel & Carlile 1995, 1997a). The at-sea habitat preferences of Gould's Petrel are poorly understood. It often occurs in the warm waters of the East Australian Current, where the sea-surface temperature ranges from 9.7–23.0 °C (Barton 1980; Blaber 1986; Hindwood & Serventy 1941; Reid et al. 2002); and off south-western Western Australia, where cold subantarctic waters intrude into warmer waters with a sea-surface temperature of about 15 °C (Surman et al. 1997). Of the 965 records of Gould's Petrels from south-eastern Australia, 58% were over the continental slope, 39% over open ocean and 3% over the continental shelf (Reid et al. 2002). The species also occasionally occurs over seamounts, where upwelling probably occurs, but these observations may refer to other subspecies (Barton 1980; Blaber 1986; Reid et al. 2002).			
Rostratula australis Australian Painted Snipe	A small freshwater wader restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical	Absent. No associated PCTs.	Unlikely. No record in BioNet 10km radius.	No. No Associated PCTs or records in area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
BC-E EPBC-E PMST	records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella and wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.			
Sternula nereis nereis — Australian Fairy Tern EPBC-V PMST	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayment's of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (Higgins & Davies 1996; Lindsey 1986a). The bird roosts on beaches at night (Higgins & Davies 1996). The subspecies may migrate within southern Western Australia and Tasmania, where are seen less frequently during the winter months. The bird is more sedentary in the north of Western Australia, South Australia and Victoria (Hill et al. 1988).	Absent. No associated PCTs.	Unlikely. No record in BioNet 10km radius.	No. No Associated PCTs or records in area.
Thalassarche bulleri — Buller's Albatross, Pacific Albatross *EPBC-, V,M* *PMST*	Buller's Albatross are marine and pelagic, inhabiting subtropical and subantarctic waters of the southern Pacific Ocean (Marchant & Higgins 1990). Specific habitat requirements are poorly known, but they have been observed in association with fishing boats close inshore and over waters 180–360 m deep in New Zealand (Robertson & Jenkins 1981; Secker 1969). This species does not appear to be as strongly associated with fishing boats as other albatrosses (Marchant & Higgins 1990).	Absent. No Associated PCTs.	Unlikely. No BioNet record in 10 km radius	No. No record of occurrence or PCT present.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	In Australia, Buller's Albatross are seen over inshore, offshore and pelagic waters. They appear to congregate over currents where water temperature exceeds 16 °C (Blaber 1986). Breeding habitat of Buller's Albatross occurs on subtropical and subantarctic islands and rock stacks in the New Zealand region. Nests are made in a range of inland habitats including: • bare substrate or fern and tussock covered cliffs, slopes or ridges • open grassy meadows • summit plateaus under Olearia forest (Marchant & Higgins 1990).			
Thalassarche cauta Shy Albatross *BC-V* *EPBC-E* *PMST, BioNet*	Inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. At sea, it soars on strong winds and when calm, individuals may rest on the ocean, in groups during the breeding season or as individuals at other times. Occasionally occurs in continental shelf waters, in bays and harbours. Feeds on fish, crustaceans, offal and squid and may forage in mixed-species flocks. Food may be caught by seizing prey from the water's surface and by scavenging behind fishing vessels. Known breeding locations include Albatross Island off Tasmania, Auckland Island, Bounty Island and The Snares, off New Zealand, where nesting colonies of 6-500 nests occur. Located on sheltered sides of islands, on cliffs and ledges, in crevices and slopes, nests are used annually and consist of a mound of mud, bones, plant matter and rocks. Breeding occurs September-December. Circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. Occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Commonly recorded off southeast NSW, particularly between July and November.	Absent. No Associated PCTs.	Possible. BioNet Record in 10km radius.	No. No Associated PCT will be impacted as Marine species.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche bulleri platei — Northern Buller's Albatross, Pacific Albatross *EPBC-V* *PMST*	The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean (Marchant & Higgins 1990). Habitat preferences are poorly known (Marchant & Higgins 1990). In New Zealand, the species has been observed in association with fishing boats close inshore and over waters of 180–360 m depth (Robertson & Jenkins 1981; Secker 1969) although it is not so strongly associated with fishing grounds as are other albatrosses (Bartle 1974). In Australia, the species occurs over inshore, offshore and pelagic waters (Blaber 1986; Carter 1977; Rogers 1969) and off the coast of south-east Tasmania. The Pacific Albatross prefers waters of the East Australia Current where sea surface-temperatures are greater than 16.5 °C (Blaber 1986). The birds fly in low or medium airspace using updraft off sea swell for lift (Marchant & Higgins 1990). The species takes food from the surface with shallow dives to depth of 1 m observed (Fenwick 1978). The birds breed on subtropical and subantarctic islands and rock stacks in the New Zealand region, on sparsely vegetated slopes, cliff tops and ledges on rocky islands or stacks (Dawson 1973; Robertson 1974; Wright 1984).	Present. There is streams present that may provide food (though they streams are fresh).	Unlikely. No BioNet Record in 10km radius.	No. No record in the area.
Thinornis cucullatus cucullatus Eastern Hooded Dotterel *BC-CE* *EPBC-V,M* *BioNet*	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-west Western Australia the Hooded Plover is not restricted to the coast and can also live and breed around inland salt lakes. The range of the Hooded Plover has declined in eastern Australia since European settlement. Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the 1920s. In the late 1920s and early 1930s the species	Absent. The sight though near the coast is inland with a freshwater stream this is not considered the type of habitat visited.	Possible. BioNet Record in 10km radius.	No. the project area is not considered habitat.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. • In south-eastern Australia Hooded Plovers 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. • Hooded Plovers forage in sand at all levels of the zone of wave-wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain. At night they favour the upper zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the season and water levels. • In eastern Australia, Hooded Plovers usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes. They often nest within 6 m of the fore-dune, mostly within 5 m of the high-water mark, but occasionally among or behind dunes. The nest is a scrape in the sand near debris, making it vulnerable to predators and beach disturbance. Both parents incubate 2-3 eggs for a period of 28 days and share the care of the young. Hooded			

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Plovers display high nest site fidelity and nest solitarily. On mainland Australia, nests may be 2-5 km apart.			
Thalassarche eremita Chatham Albatross *EPBC-E,M* *PMST*	The Chatham Albatross is a marine species. It occurs in subantarctic and subtropical waters reaching the tropics in the cool Humboldt Current off South America (Marchant & Higgins 1990). It has been noted in shelf-waters around breeding islands, over continental shelves during the non-breeding season, and occurs inshore and offshore (Cox 1976; Falla 1937; Marchant 1977). It enters harbours and bays (Jehl 1973) and is scarce in pelagic waters (Falla 1937; Jehl 1973). The Chatham Albatross preference for sea-surface temperatures is poorly known. In Chilean waters it has been observed over waters of 11.5 to 15°C (Jehl 1973). The species nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks. It is usually in broken terrain with little soil and vegetation (Brothers 1979a, b; Fleming 1939; Green 1974; Marchant & Higgins 1990; Miskelly 1984).	Absent. No Associated PCT's.	Unlikely. No BioNet record in 10 km radius	No. No record of Occurrence or associated PCTs.
Thalassarche impavida Campbell Albatross *EPBC-V,M* *PMST*	Nests only at Campbell Island and the adjacent Isle de Jeanette Marie south of New Zealand, with a total population estimated at 24,600 pairs. It ranges widely in Australasian seas. In NSW waters it is probably frequently overlooked due to the difficulties of separating it from the Black-browed Albatross. Appears to be a regular visitor occurring in most months of the year with peaks in winter during the non-breeding season. Forages on fish, squid, crustacea, carrion and gelatinous organisms.	Absent. No Associated PCT's.	Unlikely. No BioNet record in 10 km radius	No. No record of Occurrence or associated PCTs.
Thalassarche melanophris Black-browed Albatross *BC-V* *EPBC-V,M* *PMST*	Inhabits Antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents. Can tolerate water temperatures between 0-24ºC. Spends most of its time at sea, breeding on small isolated islands. At sea, individuals soar on strong winds and rest on the ocean, often in groups. Feeds on fish, crustaceans, offal and squid and often forages in flocks with other seabirds. Individuals seize prey from the surface while	Absent. No Associated PCT's.	Unlikely. No BioNet record in 10 km radius	No. No record of Occurrence or associated PCTs.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	swimming or landing, sometimes submerging their head and body to capture prey underwater, and they scavenge in large flocks behind fishing vessels. Nests annually on a mound of soil and vegetation, on the cliffs or steep slopes of vegetated Antarctic and subantarctic islands. Colonies of up to 100,000 nests are formed, occasionally containing Grey-headed Albatross, during which time the birds are territorial while nesting. Breeding September-December. Has a circumpolar range over the southern oceans, and are seen off the southern Australian coast mainly during winter. Migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. Has been recorded in Botany Bay National Park.			
Thalassarche salvini Salvin's Albatross *EPBC-V,M PMST*	Occasional individuals are encountered both in inshore and offshore over the continental shelf and in pelagic waters off the shelf break. Nests on the Bounty Islands, with small numbers on the Western Chain Islets in the Snares Islands and a few pairs nesting on Pyramid Rock and The Forty-Fours in the Chatham Islands of New Zealand. A small number of pairs also nest on Iles Crozet in the French Southern Territories. Total population is estimated between 350,000 and 380,000 individuals, with 99% nesting on the Bounty Islands. Ranges widely through the South Pacific Ocean, particularly in the Humboldt Current off western South America. In NSW waters it is an uncommon visitor principally occurring between June and October, with the majority of sightings from waters south of Sydney.	Absent. No Associated PCT's.	Unlikely. No BioNet record in 10 km radius	No. No record of Occurrence or associated PCTs.
Thalassarche steadi White Capped Albatross *EPBC-V,M PMST*	A marine species and occurs in subantarctic and subtropical waters. It reaches tropical areas associated with the cool Humboldt Current off South America. In the southern Indian Ocean, it has been observed in waters of 6.4–13.5 °C. Noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over	Absent. Species is marine and coastal.	Unlikely. No BioNet Record in 10km radius.	No. No record of species or habitat in project area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	continental shelves around continents. Occurs both inshore and offshore. and enters harbours and bays. Scarce in pelagic waters. Birds gather to scavenge at commercial fishing grounds. Nest on slopes vegetated with tussock and succulents on Auckland Island. Common off the coast of south-east Australia throughout the year.			
Thinornis cucullatus cucullatus — Hooded Plover (eastern), Eastern Hooded Plover *EPBC-V* *PMST*	Its natural habitats are freshwater lakes, freshwater marshes, coastal saline lagoons, and sandy beaches. Heavy populations are found on beaches with seaweed and dunes. It is threatened by habitat loss because of its small population and limited native range. It is a non-migratory inhabitant of coastal and subcoastal Western Australia, South Australia, New South Wales, Victoria and Tasmania, and is a vagrant in Queensland.	Absent. Only freshwater stream not considered habitat.	Unlikely. No BioNet Record in 10km radius.	No. No record of species or habitat in project area
Mammals				
Chalinolobus dwyeri Large-eared Pied Bat *BC-V* *EPBC-V* *PMST*	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. Females have been recorded raising young in maternity roosts from November to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months.	Absent. Species is geographically restricted to area north of Batemans Bay. Though associated PCTs 875 and 1336 are present	Unlikely. No BioNet record in the area.	No. Due to geographical restrictions and lack of records in the area.
***Dasyurus maculatus maculatus (SE mainland population)* — Spot-**	**The Spot-tailed Quoll has a preference for mature wet forest habitat (Belcher 2000b; Green & Scarborough 1990; Watt 1993), especially in areas with rainfall 600 mm/year (Edgar & Belcher 2008; Mansergh 1984). Unlogged forest or forest that has been less disturbed by timber harvesting is also**	**Present. Associated PCT 834, 875, 1336 and 1220 are in project area**	**Unlikely. No BioNet record in the area.**	**Yes. Habitat and associated PCTs potentially present. Assessment of Significance completed.**

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) ***BC- V*** ***EPBC-E*** ***PMST***	**preferable (Catling et al. 1998, 2000). This subspecies has been recorded from a wide range of habitats, including:** • **temperate and subtropical rainforests in mountain areas** • **wet schlerophyll forest** • **lowland forests** • **open and closed eucalypt woodlands** • **inland riparian and River Red Gum (*Eucalyptus camaldulensis*) forests** • **dry 'rainshadow' woodland** • **sub-alpine woodlands** • **coastal heathlands** • **occasional sightings from open country, grazing lands, rocky outcrops and other treeless areas (Edgar & Belcher 2008; Green & Scarborough 1990; Jones & Mansergh 1995a; Maxwell et al. 1996; NSW NPWS 1999; Reside 1997 cited in Dawson 2005; Rose 1996 cited in Dawson 2005).** **Belcher (2000b) observed that Spot-tailed Quolls at Suggan Buggan used escarpment and gully habitats. Possum, rat and antechinus scats were observed on the cliffs, rock ledges and outcrops along the escarpment suggesting that it was a prey-rich habitat. The gullies utilised by Spot-tailed Quolls featured an abundance of Rabbits (*Oryctolagus cuniculus*) and possums (Belcher 2000b).** **Habitat requirements** **The Spot-tailed Quoll is predominantly nocturnal and rests during the day in dens (Jones et al. 2001). Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves (NPWS 1999at). Individuals also require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage (NSW NPWS 1999at). This subspecies is moderately arboreal and**			

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	approximately 11% of travelling is done in trees (Jones 1995 cited in Jones et al. 2001).			
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern) *BC-E* *EPBC-E* *Bionet, PMST*	Found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular. Found in heath or open forest with a heathy understorey on sandy or friable soils. Feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Searches for food often create distinctive conical holes in the soil. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees *Xanthorrhoea* spp., blackberry bushes and other shrubs, or in rabbit burrows.	Present. Associated PCTs 1336 and 1220 are present in the Development Site.	Possible. BioNet Record within 1km or project area.	No, species has been ruled out through survey.
Petauroides volans Greater Glider *EPBC-V,M* *PMST*	Arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	Absent. No tall or hollow-bearing trees within the Development Site.	Possible. There is BioNet records within the area.	No, absence of hollow-bearing trees.
Petaurus norfolcensis Squirrel Glider	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstory.	Potentially present. Old-growth forest not present within the Development Site, however precautionary approach taken to assume forested areas provide suitable habitat.	Unlikely. No BioNet Records within the area.	No, species has been ruled out through survey.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Phascogale tapoatafa **Brush-tailed Phascogale**	**Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span.**	**Potentially present. Wet sclerophyll forests and woodlands have potential to provide suitable habitat.**	**Unlikely. No BioNet Records within 10 km area.**	**Yes. Potentially suitable habitat within the Development Site. Species has been assumed present.**
Phascolarctos cinereus **(combined populations of Qld, NSW and the ACT) Koala** ***BC-V*** ***EPBC-V*** ***BioNet, PMST***	**In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.**	**Present. Associated PCT's 834, 875, 1336 and 1220.**	**Possible. BioNet records less than 400m away**	**Potential. Koala Assessment Report completed.**
Potorous tridactylus Long-nosed Potoroo, Cobaki Lakes and Tweed Heads West population *BC-?* *EPBC-V* *BioNet*	Habitat is characterised by dense groundcover for shelter in proximity to small open areas for foraging. At Cobaki, appear to prefer Scribbly Gum Heathland, although they have been recorded in a variety of other vegetation communities, including Scribbly Gum/Swamp Mahogany Forest, Tree Broom Heath, Scribbly Gum Forest, Black She-oak Heath and Swamp Mahogany Forest. Breeding occurs throughout the year, although there is a peak from late winter to early summer. Fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet and they are considered to play an important role in fungi dispersal. Also eat roots, tubers, insects and their larvae and	Absent. Dense ground cover not present within the Development Site.	Unlikely. No BioNet Records within the area.	No. Absence of suitable habitat and no records within 10 km of Development Site.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	other soft-bodied animals in the soil. Leave characteristic diggings as a result of their foraging, and may improve the soil through turnover and aeration. Nocturnal and crepuscular and rarely seen. Spend the day in "squats" in dense vegetation and their regular movement through the vegetation creates characteristic runways.			
Pteropus poliocephalus **Grey-headed Flying-fox** ***BC-V*** ***EPBC-V*** ***BioNet, PMST***	**Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, giving birth and rearing young. Annual mating commences in January and single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia,* and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.**	**Present. Associated PCTs 834, 875, 1336 and 1220**	**Possible. BioNet Records within the area. But habitat constraints. Breeding camps absent from site**	**Yes. There is Associate PCT's in project area and species is known to the greater area. Assessment of Significance completed for this species.**
Frogs				
Litoria aurea Green and Golden Bell Frog *BC-E* *EPBC-V* *Bionet*	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp.*) or spikerushes (*Eleocharis* spp.), Optimum habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow *(Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	Present. Associated PCT 875.	Possible. BioNet Records within the area.	No. Species ruled out through survey.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Heleioporus australiacus Giant Burrowing Frog *BC-V* *EPBC-V* *Bionet* PMST	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. Home ranges are approximately 0.04 ha in size. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Present. Associated PCTs 834, 875, 1336 and 1220.	Possible. BioNet Records within the area.	No. Species ruled out through survey.
Mixophyes balbus — Stuttering Frog, Southern Barred Frog (in Victoria) *BC-V* *EPBC-V* PMST	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. Feed on insects and smaller frogs. Breed in streams during summer after heavy rain. Eggs are laid on rock shelves or shallow riffles in small, flowing streams. As the tadpoles grow, they move to deep permanent pools and take approximately 12 months to metamorphose. Occur along the east coast of Australia from southern Queensland to north-eastern Victoria.	Present. Associated PCT 875.	Unlikely. No BioNet Records within the area.	No. Species ruled out through survey.
Fish				
Prototroctes maraena — Australian Grayling BC-E EPBC-V PMST	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas (Miles et al. 2013). Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones (DEWHA 2008zzn) such as the Tambo River, which is also known to have granite outcrops (Berra 1982). The species has also been associated with clear, gravel-bottomed habitats in the Mitchell and Wonnangatta Rivers (Victoria) and in a muddy-bottomed, heavily silted habitat in the Tarwin River (Victoria) (Jackson 1980). The species has been	Present. There is a second order steam on site that flows to a wetland then harbour. Hence the stream may be considered as habitat.	Unlikely No BioNet record	No. No record of species in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	found over 100 km upstream from the sea (Jackson & Koehn 1988). During January–November 1979 in the Tambo River, Victoria, water temperatures ranged from 5–26 °C and the pH was approximately 8 (Berra 1982). Hall and Harrington (1989) located a population of adult Australian Grayling in consecutive years in an urban area of the lower reaches of the highly turbid Barwon River, with a salinity of approximately 1.5 parts per thousand (ppt).			
Migratory Marine Birds				
Apus pacificus **Fork-tailed Swift** ***EPBC-M*** ***BioNet,*** ***PMST***	**Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.**	**Present. There is a first order stream**	**BioNet record within 10km buffer.**	**Yes. Habitat potentially present and records within 10 km buffer of Development Site. Assessment of Significance completed.**
Ardenna carneipes Flesh-footed Shearwater *BC-V* *EPBC-M* *PMST*	Marine bird that nests on Lord Howe Island in forests on sandy soils from Ned's Beach to Clear Place, with smaller colonies below Transit Hill and at Old Settlement Beach. Eggs are laid at the end of a burrow 1 - 2 metres in length. Ranges throughout the Pacific and Indian Oceans. There are two main breeding areas in the world: one in the South West Pacific includes Lord Howe Island and New Zealand; the other along the coast of Western Australia.	Absent: No associated PCT's present as is a marine species.	Unlikely. No BioNet record in the 10km buffer	No. No habitat in the project area
Ardenna grisea Sooty Shearwater *EPBC-M*	Forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters, and may forage inshore occasionally, especially during rough weather. Migrates and forages in the	Absent. Though there is some degraded native	Unlikely. No BioNet record in the 10km buffer	No. No records or habitat in the project area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
PMST	North Pacific and Atlantic Oceans during the non-breeding season. Has been recorded in areas with sea surface-temperatures of 8.7-22.0° C (Reid et al. 2002). Breeds mainly on subtropical and sub-Antarctic islands, as well as on the mainland of New Zealand. Birds nest in burrows or rock crevices on coastal slopes, ridges and cliff tops, in herb fields, tussock grassland or forest. Areas with waterlogged or shallow soils and/or dense vegetation are avoided. At The Snares, they are excluded from areas occupied by Snares Penguins (*Eudyptes robustus*). Nesting Shearwaters are known to impact on the vegetation surrounding nesting sites, as they undermine trees, trample seedlings and remove leaf litter and ground vegetation for nest lining (Richdale 1963). Breeding birds roost solitarily at night, either in the burrow or on the ground near burrow entrance. Pre-breeders or failed breeders usually roost on the ground, but sometimes in burrows. Individuals often roost and 'loaf' offshore during the day, except when weather conditions are rough. Most birds leave the roost at dawn; although, some non-paired birds remain in burrows during day (Marchant & Higgins 1990).	grass land it is not tussock or herb filed.		
Ardenna pacifica Wedge-tailed shearwater *BC- EPBC- Bionet*	A pelagic, marine bird known from tropical and subtropical waters. Tolerates a range of surface-temperatures and salinities but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 %. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C	Absent: No associated PCT's present as is a marine species.	Possible. BioNet record in the 10km buffer.	No. No habitat in the project area
Ardenna tenuirostris Short-tailed Shearwater *BC- EPBC- Bionet*	Found in coastal waters. Feeds on krill, small fish and other small marine creatures. Food is caught mostly on the surface of water but sometimes dive. This species establishes massive breeding colonies off the southern and south eastern coasts of Australia each year. Off the coast of Tasmania, colonies can contain over 16 million adults and other colonies in Victoria and	Absent: No associated PCT's present as is a marine species.	Possible. BioNet record in the 10km buffer. Recorded less than 100m away from project site.	No. No habitat in the project area

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	NSW hold a further 2 million or more. the nest is a leaf lined chamber at the end of a burrow in the ground.			
Arenaria interpres Ruddy Turnstone *BC EPBC- Bionet*	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats. In north Australia it is known to occur in a wide variety of habitats and may prefer wide mudflats. In southern Australia, the Ruddy Turnstone prefers rockier coastlines and is less numerous on large embayment's with extensive mudflats. The Ruddy Turnstone mainly forages between lower supralittoral and lower littoral zones of foreshores, from strandline to wave-zone. They often forage among banks of stranded seaweed or other tide-wrack. They are also known to forage on exposed rocky platforms, coral reefs and mudflats Roosts on beaches above the tideline among rocks, shells, beach cast seaweed or other debris.	Absent: No associated PCT's present as is a marine species.	Possible. BioNet record in the 10km buffer.	No. No habitat in the project area
Calidris canutus Red Knot *BC EPBC- Bionet*	A non-breeding migratory visitor from Arctic regions of Siberia. Birds arrive between September and October and leave between March and April, with a small number of individuals overwintering. In NSW, it is recorded in small numbers along some of the major river estuaries and sheltered embayment's of the coastline, in particular the Hunter River estuary. This environment is used as a staging area for birds to rest and replenish fat resources; large numbers arrive in September then most move south to Victoria by October. A rare visitor to wetlands away from the coast with a few records (mostly during southward migration) as far west as Lake Menindee and the Riverina. Mainly occurs in small numbers on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours and sandflats and	Absent: No wetlands present.	Possible. BioNet record in the 10km buffer	No. No habitat in the project area

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	sandy beaches of sheltered coasts. It is occasionally found on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms and is a rare visitor to terrestrial saline wetlands and freshwater swamps. Birds roost on sandy beaches, spits, islets and mudflats close to feeding grounds, usually in open areas. Rarely found on inland lakes or swamps.			
Diomedea antipodensis Antipodean Albatross *BC-V* *EPBC-V,M* *PMST*	The majority of birds breed on Antipodes Island, with a small number of pairs breeding on Campbell Island. Breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish. Although representing a small proportion on its total foraging area, potential forage in NSW waters is nonetheless considered significant for the species. This species feeds pelagically on squid, fish and crustaceans. The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia.	Absent: No associated PCT's Present as is a marine species.	Unlikely. No BioNet record in the 10km buffer	No. No habitat in the project area or record.
Diomedea epomophora Southern Royal Albatross *EPBC-V,M* *PMST*	Inhabits terrestrial and marine environments - grasslands and marine neritic and marine oceanic. Nests on tussock grassland slopes, ridges, and plateaus. Feeds primarily on squid and fish, supplemented by salps, crustacea and carrion.	Present. Some degraded native grassland.	Unlikely. No BioNet record in the 10km buffer	No. No record in area.
Diomedea exulans Wandering Albatross BC-E *EPBC-V,M* *PMST*	Spend the majority of their time in flight, soaring over the southern oceans. Breed on a number of islands just north of the Antarctic Circle: South Georgia Island (belonging to the UK), Prince Edward and Marion Islands (South Africa), Crozet and Kerguelen Islands (French Southern Territories) and Macquarie Island (Australia). Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation, in small, loose colonies among grass tussocks, using a large mud nest. They feed in pelagic, offshore and inshore waters, often at night,	Absent: No associated PCT's Present as is a marine species.	Unlikely. No BioNet record in the 10km buffer	No. No habitat in the project area or record.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	taking fish and cephalopods such as squid, crustaceans and carrion, and will often follow ships feeding on the refuse they trail. Visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast.			
Diomedea sanfordi Northern Royal Albatross *EPBC-E,M PMST*	Primarily forages in inshore and offshore waters over the continental shelf to the shelf edge. It feeds mainly on cephalopods and fish, but also salps, crustacea and carrion. Ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia.	Absent: No associated PCT's Present as is a marine species.	Unlikely. No BioNet record in the 10km buffer	No. No habitat in the project area or record.
Hirundapus caudacutus* White-throated Needletail *BC EPBC-V,M BioNet	**In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes. They are sometimes recorded above islands well out to sea.**	**Present. There is open woodland and grassland.**	**Possible. BioNet record in the 10km buffer.**	**Yes. Records of species in the area. Assessment of Significance completed.**

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Hydroprogne caspia Caspian Tern *BC* *EPBC-* *BioNet*	This species is gregarious when breeding, though single nesting does occur. Outside of breeding, the Caspian Tern occurs mostly singly or in small groups. Occasional larger groups of 30 or more birds are seen, often at rich fishing areas or at nightly roost sites, where they may roost with other terns. The species may also aggregate into flocks on passage (migration) (Higgins & Davies 1996). Within Australia, the Caspian Tern has a widespread occurrence and can be found in both coastal and inland habitat The Caspian Tern is mostly found in sheltered coastal embayment's (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs (Higgins & Davis 1996).	Absent. No wetlands or lakes present within the Development Site.	Possible. BioNet record in the 10km buffer.	No. Absence of suitable habitat.
Limosa lapponica Bar-tailed Godwit *BC* *EPBC-* *BioNet* *(aka Limosa lapponica baueri)*	Arrive in Australia each year in August from breeding grounds in the northern hemisphere. More numerous in northern Australia. Inhabit estuarine mudflats, beaches and mangroves. Common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders.	Absent: No associated PCT's Present as is a marine species.	Possible. BioNet record about 500m from project area	No. No associated PCTs in the project area.
Limosa limosa Black-tailed Godwit *BC* *EPBC-* *BioNet*	A coastal species, usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell	Absent: No associated PCT's Present as is a marine species.	Possible. BioNet record about 1km from project area.	No. No associated PCTs in the project area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	bars. Frequently recorded in mixed flocks with Bar-tailed Godwits.			
Macronectes giganteus Southern Giant Petrel BC-E *EPBC-E,M* *PMST*	Has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW. Over summer, it nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory. An opportunistic scavenger and predator and scavenges from fishing vessels and animal carcasses on land. Also, an active predator of cephalopods and euphausiids, as well as smaller birds (particularly penguins) both at land and at sea. Will desert their nests if disturbed at the breeding colony.	Absent: No associated PCT's Present as is a marine species.	Unlikely. No BioNet record in the 10km buffer	No. No associated PCT's or record of species in the area.
Macronectes halli Northern Giant-Petrel BC-V *EPBC-V,M* *PMST*	Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the breeding colonies, while immature birds make long and poorly known circumpolar and trans-oceanic movements. Most birds recorded in NSW coastal waters are immature birds. Seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain. |Has a circumpolar pelagic distribution, usually between 40-64ºS in open ocean. Range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Absent: No associated PCT's Present as is a marine species.	Possible. There is a BioNet record within 10km buffer.	No. No associated PCT's in project area as species is marine.
Numenius madagascariensis Eastern Curlew *BC* *EPBC-CE,M* *BioNet*	In NSW, occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally, occupies coastal lakes, inlets, bays and estuarine habitats, and in NSW is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Forages in or at the	Absent. No associated PCT's in the project area.	Possible. There is a BioNet record within 10km buffer.	No. No. No associated PCT's in project area for species.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. Is carnivorous, mainly eating crustaceans.			
Numenius minutus Little Curlew *BC* *EPBC-* *BioNet*	Most often found feeding in short, dry grassland and sedgeland, including dry floodplains and black soil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used. Generally, foraging is in relatively short grass (around 20 cm tall) as the birds avoid dense tall grasses. When resting during the heat of day, they congregate around pools, riverbeds and water-filled tidal channels, and shallow water at edges of billabongs. Prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated	No. Absence of freshwater pools or areas which are seasonally inundated.	Possible. There is a BioNet record within 10km buffer.	No. absence of suitable habitat.
Numenius phaeopus Whimbrel *BC* *EPBC-*	Regular migrant to Australia and New Zealand, with a primarily coastal distribution. Found in all states, but more common in the north. Found on the intertidal mudflats of sheltered coasts, in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. Occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. Infrequently recorded using saline or brackish lakes near coastal areas. Also uses salt flats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and salt fields (Higgins & Davies 1996). Forages on intertidal mudflats, along the muddy banks of estuaries and in coastal lagoons,	Absent. The habitats are saline or brackish and the project area is salt.	Possible. There is a BioNet record within 10km buffer.	No. No suitable habitat in project area

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	either in open unvegetated areas or among mangroves, and sometimes forages on sandy beaches or among rocks. It has occasionally been sighted feeding on exposed coral or rocky reefs and rock platforms. It is known to probe holes and crevices among rubble and on reef flats, but not on reef crests. Regularly roosts in mangroves and other structures flooded at high tide.			
Phoebetria fusca Sooty Albatross *BC-V* *EPBC-V,M* *PMST*	This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea, and rarely occurs in continental shelf waters. While at sea, this agile species soars on strong winds and when calm, rests on the ocean. Generally solitary while at sea, although small groups of 2-3 birds have been recorded. Feeds on fish, crustaceans, offal and squid and although solitary, individuals may forage at night in mixed-species flocks. Species may follow fishing vessels for short periods. Nests in small breeding colonies of up to 100 nests, on subantarctic islands including Prince Edwards Island, Iles Crozet, Iles des Apotres and Iles Kerguelen. Nests are located amongst vegetation on steep cliffs and consist of a mound of mud and plant matter, lined with grass. Highly territorial and defends its nests with threat displays. Breeding occurs August-December. Occurs in the South Atlantic and southern Indian Oceans and has not been recorded in the Pacific Ocean between Australia and South America. In Australian waters, this species is generally recorded in winter off the south coast from Tasmania to Western Australia, while there are occasional sightings off the NSW coast, north of Grafton.	Absent. The area is dry sclerophyll forest and degraded native grassland.	Unlikely. No BioNet record within 10km buffer	No. No record within the area or habitat suitable.
Sternula albifrons Little Tern *BC-E* *EPBC-M* *PMST*	In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. It breeds in spring and summer along the entire east coast from Tasmania to northern Queensland, and is seen until May, with only occasional birds seen in winter months. Almost exclusively coastal, preferring sheltered environments; however,	Absent. No associated PCT's in the area.	Possible. BioNet record within 10km buffer	No. No associated PCTs.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	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. Nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles. Often seen feeding in flocks, foraging for small fish, crustaceans, insects, worms and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight.			
Sterna hirundo Common Tern *BC* *EPBC-* *Bionet*	Common Terns are marine, pelagic and coastal. In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores. However, off Wollongong, NSW, Common Terns were recorded in all marine zones but generally recorded in offshore and pelagic waters, 11–55 km from shore. Occasionally they are recorded in coastal and near-coastal wetlands, either saline or freshwater, including lagoons, rivers, lakes, swamps and saltworks. Sometimes they occur in mangroves or saltmarsh and, in bad weather, in coastal sand-dunes or coastal embayment's. Common Terns forage in marine environments, often close to the shore, including sheltered embayment's and in the surf-zone, but also well out to sea. They also forage in near-coastal terrestrial wetlands, including estuaries, rivers and swamps.	Absent. No marine habitat present.	Possible. BioNet record within 10km buffer.	No. No suitable habitat present.
Thalassarche bulleri Buller's Albatross *EPBC-V,M* *PMST*	Only nests on islands off New Zealand. The northern subspecies (*platei*) nests on islands off Chatham Island with an estimated population of around 18,200 breeding pairs. The southern subspecies (*bulleri*) breeds on the Snares and Solander islands with a total population of around 13,600 breeding pairs. After breeding both subspecies migrate to the seas off Peru and	Absent. No associated PCTs as is marine species	Unlikely. No BioNet record within 10km buffer	No. No Associated PCT's or record in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Chile. In NSW waters it is a relatively common visitor between March and October, with few sightings outside this period. Occurs in both inshore and offshore waters, including the continental shelf break and pelagic waters. Feeds mainly on squid, fish, tunicates, octopus and crustacea.			
Thalassarche cauta Shy Albatross *BC-V* *EPBC-E,M* *PMST*	Inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. At sea, it soars on strong winds and when calm, individuals may rest on the ocean, in groups during the breeding season or as individuals at other times. Occasionally occurs in continental shelf waters, in bays and harbours. Feeds on fish, crustaceans, offal and squid and may forage in mixed-species flocks. Food may be caught by seizing prey from the water's surface and by scavenging behind fishing vessels. Known breeding locations include Albatross Island off Tasmania, Auckland Island, Bounty Island and The Snares, off New Zealand, where nesting colonies of 6-500 nests occur. Located on sheltered sides of islands, on cliffs and ledges, in crevices and slopes, nests are used annually and consist of a mound of mud, bones, plant matter and rocks. Breeding occurs September-December. Circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. Occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Commonly recorded off southeast NSW, particularly between July and November.	Absent. No associated PCTs as is marine species	Unlikely. No BioNet record within 10km buffer.	No. No Habitat or records in the area.
Thalassarche eremita Chatham Albatross *EPBC-E,M* *PMST*	Occasional individuals are encountered both in inshore and offshore over the continental shelf and in pelagic waters off the shelf break. Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand.	Absent. The species as is marine.	Unlikely. No BioNet record within 10km buffer	No. No Habitat or records in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche impavida Campbell Albatross *EPBC-V,M* *PMST*	Nests only at Campbell Island and the adjacent Isle de Jeanette Marie south of New Zealand, with a total population estimated at 24,600 pairs. It ranges widely in Australasian seas. In NSW waters it is probably frequently overlooked due to the difficulties of separating it from the Black-browed Albatross. Appears to be a regular visitor occurring in most months of the year with peaks in winter during the non-breeding season. Forages on fish, squid, crustacea, carrion and gelatinous organisms.	Absent. No associated PCTs as is marine species	Unlikely. No BioNet record within 10km buffer.	No. No Habitat or records in the area.
Thalassarche melanophris Black-browed Albatross *BC-V* *EPBC-V* *PMST*	Inhabits Antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents. Can tolerate water temperatures between 0-24ºC. Spends most of its time at sea, breeding on small, isolated islands. At sea, individuals soar on strong winds and rest on the ocean, often in groups. Feeds on fish, crustaceans, offal and squid and often forages in flocks with other seabirds. Individuals seize prey from the surface while swimming or landing, sometimes submerging their head and body to capture prey underwater, and they scavenge in large flocks behind fishing vessels. Nests annually on a mound of soil and vegetation, on the cliffs or steep slopes of vegetated Antarctic and subantarctic islands. Colonies of up to 100,000 nests are formed, occasionally containing Grey-headed Albatross, during which time the birds are territorial while nesting. Breeding September-December. Has a circumpolar range over the southern oceans and are seen off the southern Australian coast mainly during winter. Migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. Has been recorded in Botany Bay National Park.	Absent. No associated PCTs as is marine species	Unlikely. No BioNet record within 10km buffer.	No. No Habitat or records in the area.
Thalassarche salvini Salvin's Albatross *EPBC- V,M* *PMST*	Occasional individuals are encountered both in inshore and offshore over the continental shelf and in pelagic waters off the shelf break. Nests on the Bounty Islands, with small numbers on the Western Chain Islets in the Snares Islands and a few pairs nesting on Pyramid Rock and The Forty-Fours in the Chatham	Absent. The species as is marine.	Unlikely. No BioNet record within 10km buffer.	No. No Habitat or records in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Islands of New Zealand. A small number of pairs also nest on Iles Crozet in the French Southern Territories. Total population is estimated between 350,000 and 380,000 individuals, with 99% nesting on the Bounty Islands. Ranges widely through the South Pacific Ocean, particularly in the Humboldt Current off western South America. In NSW waters it is an uncommon visitor principally occurring between June and October, with the majority of sightings from waters south of Sydney.			
Thalassarche steadi White Capped Albatross *EPBC- V,M* *PMST*	A marine species and occurs in subantarctic and subtropical waters. It reaches tropical areas associated with the cool Humboldt Current off South America. In the southern Indian Ocean it has been observed in waters of 6.4–13.5 °C. Noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over continental shelves around continents. Occurs both inshore and offshore. and enters harbours and bays. Scarce in pelagic waters. Birds gather to scavenge at commercial fishing grounds. Nest on slopes vegetated with tussock and succulents on Auckland Island. Common off the coast of south-east Australia throughout the year.	Absent. The species as is marine.	Unlikely. No BioNet record within 10km buffer.	No. No Habitat or records in the area.
Migratory Terrestrial Species				
Cuculus optatus — Oriental Cuckoo, Horsfield's Cuckoo *EPBC- M* *PMST*	The Black-faced Monarch is a wet forest specialist, occurring mainly in rainforests and riparian vegetation. In wet sclerophyll forest, the species mostly frequents sheltered gullies and slopes with a dense understorey of ferns and/or shrubs. They forage mainly gleaning from foliage or branches of trees and shrubs or by taking insect prey from the air (sallying). Breeding generally occurs from October to February. The species builds solitary, inverted conical or pear-shaped nests, with a cup-like cavity at the top, and the base tapering to a point. The Blackfaced Monarch is a known nest-host to the Brush Cuckoo Cacomantis variolosus. Has an extensive breeding range in south-eastern Australia from Cooktown to eastern Victoria.	Absent. The area is mostly degraded native grassland and Dry Sclerophyll Forest.	Unlikely. No BioNet record in the 10km buffer.	No. No associated habitat or records of species in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Hirundapus caudacutus **White-throated Needletail** ***EPBC- V,M*** ***PMST*** ***BioNet***	**In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground (Coventry 1989; Tarburton 1993; Watson 1955). Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (Higgins 1999). They also commonly occur over heathland (Cooper 1971; Learmonth 1951; McFarland 1988), but less often over treeless areas, such as grassland or swamps (Cooper 1971; Gosper 1981; Learmonth 1951). When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (Emison & Porter 1978; Friend 1982; Tarburton 1993). In coastal areas, they are sometimes seen flying over sandy beaches or mudflats (Cooper 1971; Crompton 1936; Davis 1965), and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (Cooper 1971; Dawson et al. 1991; Loyn 1980; Mitchell et al. 1996; Schulz & Kristensen 1994). They are sometimes recorded above islands well out to sea (Brandis et al. 1992; Cooper 1971; Warham 1957).** **Feeding habitat** **In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats (Learmonth 1951; McDonald 1938; Tarburton 1993; Templeton 1991), though they sometimes forage much closer to the ground in open habitats, once as low as about**	**Present. There is open woodland and grassland.**	**Possible. BioNet record in the 10km buffer.**	**Yes. Records of species in the area. Assessment of Significance completed.**

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	15 cm in a coastal saltworks (Watson 1955). They sometimes forage over recently disturbed areas, such as forest that has been recently cleared or burnt, or above paddocks as they are being ploughed or slashed (Blakers et al. 1984; Bravery 1971). They often forage in areas of updraughts, such as ridges, cliffs or sand-dunes (Legge 1927; Loyn 1985a; Mitchell et al. 1996), or in the smoke of bushfires (McCulloch 1966), or in whirlwinds (Le Souëf & Campbell 1902). They often forage along the edges of low-pressure systems, which both lift their food sources and assist with their flight, and it is said that they follow these systems across Australia (Boehm 1939). They seldom alight on the ground or vertical substrates to catch insects (Carlyle 1982; McCaskill 1943; Quested 1980). **Roosting habitat** **The species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows (Corben et al. 1982; Day 1993; Quested 1982; Tarburton 1993), though the number of references to Needletails roosting in trees possibly over-emphasizes such occurrences (Higgins 1999). It has been suggested that they also sometimes roost aerially (Currie 1928; Dove 1919; Schulz & Kristensen 1994), and it was formerly erroneously thought that the species did not alight while in Australia (Pescott 1983).** **Breeding habitat** **The species breeds in wooded lowlands and sparsely vegetated hills, as well as mountains covered with coniferous forests (Chantler 1999; Dement'ev & Gladkov 1951).** **White-throated Needletails may take refuge during extreme conditions. Many birds were seen perching on the trunks of trees during a bushfire (Currie 1916; Currie 1928); during**			

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	cold weather, one was found roosting during the day in the hollow branch of a eucalypt (Pettigrew & Wilson 1985) and some were seen sheltering in stunted scrub during bad weather on the high plains (Paterson 1930). They may also alight on the trunks or branches of trees during hot or inclement weather (Davies 1982; Littler 1910a; Loyn 1980; Whackett 1989; Wheeler 1959); and there is a record of Needletails resting on a lawn under sprinklers during hot weather (Davies 1982). **The species does not rely on a listed threatened ecological community.**			
Monarcha melanopsis Black-faced Monarch *EPBC- M* *PMST*	Found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. Builds a deep cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3-6 m above the ground. Only the female builds the nest, but both sexes incubate the eggs and feed the young.	There is open eucalyptus woodland in the form of Dry sclerophyll forest.	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.
Myiagra cyanoleuca Satin Flycatcher *EPBC- M* *PMST*	Found along the east coast of Australia in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. Nests in loose colonies of two to five pairs nesting at intervals of about 20-50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3-25 m above the ground.	Absent. The area is mostly Dry sclerophyll forest and grassland.	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.
Rhipidura rufifrons Rufous Fantail *EPBC-M* *PMST*	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.	Absent. The area is mostly Dry sclerophyll forest and grassland with a small stream.	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Migratory Wetland				
Actitis hypoleucos Common Sandpiper *EPBC-M* *PMST*	Found along all coastlines of Australia and in many areas inland. The population that migrates to Australia breeds in the Russian far east. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags the species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.	Absent. Though there is a stream that feed into a wetland (that is outside the project area) there is not much tree vegetation next to the stream or muddy margins.	Unlikely. No BioNet record in the 10km buffer.	No. No habitat or records of species in the area.
Calidris acuminata Sharp-tailed Sandpiper *EPBC-M* *PMST*	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beach cast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).	*Present. There is a wetland nearby that the stream, feeds into, and is near to the coast*	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Foraging They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. They also forage among inundated vegetation of saltmarsh, grass or sedges. They forage in sewage ponds, and often in hypersaline environments. After rain, they may forage in paddocks of short grass, well away from water. They may forage on coastal mudflats at low tide and move to freshwater wetlands near the coast to feed at high tide. Occasionally they forage on wet or dry mats of algae and among rotting beach cast seagrass or seaweed, and sometimes they are recorded foraging around the edges of stony wetlands or among rocks in water, and rarely on exposed reef (Higgins & Davies 1996). **Roosting** Roosting occurs at the edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse vegetation, such as grass or saltmarsh. Occasionally, they roost on sandy beaches, stony shores or on rocks in water (Higgins & Davies 1996). They have also been recorded roosting in mangroves (Minton & Whitelaw 2000).			
Calidris canutus, Red Knot *EPBC-E,M* *PMST*	A non-breeding migratory visitor from Arctic regions of Siberia. Birds arrive between September and October and leave between March and April, with a small number of individuals overwintering. In NSW, it is recorded in small numbers along some of the major river estuaries and sheltered embayment's of the coastline, in particular the Hunter River estuary. This environment is used as a staging area for birds to rest and replenish fat resources; large numbers arrive in September then most move south to Victoria by October. A rare visitor to wetlands away from the coast with a few records (mostly during southward migration) as far west as Lake Menindee and the Riverina. Mainly occurs in small numbers on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours and sandflats and sandy beaches of sheltered coasts. It is occasionally found on sandy ocean beaches or shallow pools on exposed wave-cut	Absent. No associated PCTs in the project area.	Possible. BioNet record in the 10km buffer.	No. No habitat in the project area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	rock platforms and is a rare visitor to terrestrial saline wetlands and freshwater swamps. Birds roost on sandy beaches, spits, islets and mudflats close to feeding grounds, usually in open areas. Rarely found on inland lakes or swamps.			
Calidris ferruginea Curlew Sandpiper *BC-CE* *EPBC-CE,M* *PMST*	Generally, occupies littoral and estuarine habitats, and in NSW is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Feeds on worms, molluscs, crustaceans, insects and some seeds. Distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration.	Absent. No associated PCTs in the project area.	Unlikely. No BioNet record in the 10km buffer.	No. No habitat or records of species in the area.
Calidris melanotos Pectoral Sandpiper *EPBC-M* *PMST*	In NSW, it is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum.	Potentially present. There is a small ephemeral second order stream, which may provide habitat.	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.
Gallinago hardwickii Latham's Snipe *EPBC-M*	Usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). Known to occur in the	Present. There is a wetland near by that the stream,	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
PMST	upland wetlands of the New England Tablelands and Monaro Plateau.	feeds into, and is near to the coast		
Gallinago megala Swinhoe's Snipe *EPBC-M* *PMST*	During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. Also known to occur in grasslands, drier cultivated areas (including crops of rapeseed and wheat) and market gardens. Habitat specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes.	Present. There is a wetland nearby that the stream, feeds into, and is near to the coast	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.
Gallinago stenura Pin-tailed Snipe *EPBC-M* *PMST*	During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands	Absent. Project area is no within a wetland.	Unlikely. No BioNet record in the 10km buffer.	No. No records of species in the area.
Limosa lapponica Bar-tailed Godwit *EPBC-M* *PMST*	Arrive in Australia each year in August from breeding grounds in the northern hemisphere. More numerous in northern Australia. Inhabit estuarine mudflats, beaches and mangroves. Common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders.	Unlikely. No associated PCTs.	Possible. BioNet record in the 10km buffer.	No. No records of species in the area.
Numenius madagascariensis Eastern Curlew *EPBC-CE,M* *PMST*	In NSW, occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally, occupies coastal lakes, inlets, bays and estuarine habitats, and in NSW is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Forages in or at the	Unlikely. No associated PCTs.	Possible**.** BioNet record in the 10km buffer.	No. No associated PCTs in the area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. Is carnivorous, mainly eating crustaceans.			
Numenius minutus Little Curlew *EPBC-M* *PMST*	Most often found feeding in short, dry grassland and sedgeland, including dry floodplains and black soil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used. Generally, foraging is in relatively short grass (around 20 cm tall) as the birds avoid dense tall grasses. When resting during the heat of day, they congregate around pools, riverbeds and water-filled tidal channels, and shallow water at edges of billabongs. Prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated	Unlikely. Some derived grassland, but no associated PCTs.	Unlikely. No BioNet record in the 10km buffer.	No. No records or associated PCTs within the area.
Pandion haliaetus Osprey *EPBC-M* *PMST*	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia (Johnstone & Storr 1998; Marchant & Higgins 1993; Olsen 1995). They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes (Czechura 1985; Domm 1977; Fleming 1987; Gosper 1983; Gosper & Holmes 2002; Johnstone & Storr 1998; Olsen 1995;	Absent. Water of stream in area is not brackish or saline.	Unlikely. No BioNet record in the 10km buffer.	No. No Habitat or records in area.

Species	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
	Roberts & Ingram 1976). They exhibit a preference for coastal cliffs and elevated islands in some parts of their range (Boekel 1976; Domm 1977), but may also occur on low sandy, muddy or rocky shores and over coral cays (Marchant & Higgins 1993). They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging sites (Czechura 1985; Hembrow 1988; Pruett-Jones & O'Donnell 2004; Roberts & Ingram 1976).			
Tringa nebularia Common Greenshank	Does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. In NSW, the species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions.	Yes. There is a stream within the project that feeds to a wetland outside and is near the coast.	Unlikely. No BioNet record in the 10km buffer	No. No records in the area.
	E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.* *V EPBC = listed as Vulnerable under the Commonwealth Environment Protection & Biodiversity Conservation Act 1999.* M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*	CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.* CAMBA = Chinese-Australia Migratory Bird Agreement JAMBA = Japan-Australia Migratory Bird Agreement ROKAMBA = Republic of Korea–Australia Migratory Bird Agreement		

Appendix G EPBC Act assessment of significant impact

EPBC ACT ASSESSMENT OF SIGNIFICANT IMPACT

Specific 'Significant Impact Criteria' are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for communities and species listed as endangered and vulnerable under the EPBC Act.

Koala - *Phascolarctos cinereus*

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

(a) lead to a long-term decrease in the size of a population

There are confirmed Koala populations within the South-Coast KMA located in the Murrah flora reserves between Tathra and Bermagui (OEH, 2018). These existing koala populations are approximately 15km south of the proposed Development Site and sparsely distributed within reserves between Bega/Tathra and Bermagui. The Murrah floral reserve (11,811 ha) comprises several smaller reserves; Mumbulla, Tanja, Murrah and Bermagui all of which form part of an extensive patch of forest adjoining with Biamanga National Park (NP) (13,617 ha) and Bermaguee nature reserve (818 ha). The total combined area of these reserves is approximately 25,000 hectares. The population that occurs within these reserves and NP's is considered **important** because of its geographic location within the wider koala distribution across eastern Australia, its' unique genetics, habitat use and history and the level of stakeholder commitment to its ongoing conservation (DPIE, 2021). The Development Site is located approximately 1.5km northeast of the northern boundary of Bermagui flora reserve with corridors of forest connecting the Development Site to these reserves. The connectivity of these areas is disrupted by 2-4 minor roads. The clearing area for this site is 16.76 ha in total with 4.88 ha consisting of moderate condition forested areas. The Development Site contains 5.83 ha of vegetation considered suitable Koala foraging habitat based on feed use trees set out by OEH (2018). During the 2019-20 summer bushfires extensive burning of varying severity occurred within the Bermagui-Cobargo region (see fig 1-1 below). A post fire Koala survey in 2020 spanned over the 25,000 ha of reserves and NP's previously mentioned revealed that approximately "70 percent of the study area, including most patches identified as sustaining higher levels of Koala activity, was not burned" (DPIE, 2020, p. 1). Because the clearing of forested areas on the subject site is small (<0.001%) to the area of unburned habitat available in the region, the proposed development is unlikely to have a long-term deleterious effect on the size of the Koala population in the area.

a) reduce the area of occupancy of the species

A known population of Koalas is within 15km's of the Development Site, with part of their known range extending within 1.5 km's south of the Development Site. The population has been identified as important by the NSW state government as stated above. Atlas of Living Australia (ALA) and BioNet illustrate 110 Koala sightings within 5 kilometres (46 from ALA and 64 from BioNet). There is one BioNet record of koala within 500m that was recorded in 2004. Based on the further analysis of However, it is important to note that the extent of any reduction is only very small and constitutes approximately 0.001% of available unburned habitat and less than 0.0003% of the 25,000 ha of contiguous forest where the important population is known to occur.

b) fragment an existing population into two or more populations

Within the South Coast KMA, Koalas occur in low densities, within isolated sub-population fragments (Department of the Environment, 2022). The known sub-populations in the area are already highly fragmented. The Development Site is positioned outside the northern most extent of a known koala

population within Murrah flora reserves and adjacent NP's. The development location does not infringe on any intact forest communities and will not result in the fragmentation of existing koala habitat. Further, it will not cause the fragmentation of already isolated populations in the area. Thus, it is highly unlikely that the development will further fragment the existing population into one or more populations.

c) adversely affect habitat critical to the survival of a species

The relevant portion of the impact area consists of a relatively small area of suitable treed habitat (5.83 ha), within the broader landscape of intact native vegetation (approximately 25,000 ha). The site contains some moderate condition koala habitat however this is not considered necessary for the breeding, dispersal and foraging of local koala populations. The site provides no known entities or features that are considered necessary for maintaining long-term survival of koala. The potential koala habitat impacted by the development will not be necessary to maintain genetic diversity of koalas in the region nor is it considered necessary for the recovery and reintroduction of populations. The native bushland contained in reserves close to Bermagui (within 8 km) was largely unaffected by the 2019-20 bushfires (see fig 1-1 below). As such, the proposed development is not considered likely to impact habitat critical to the survival of koala.

d) disrupt the breeding cycle of a population

Because the site represents such a small fraction of available habitat within the region and known populations are south of the development site, clearing for the development proposed is unlikely to impact on the breeding cycle of a population. If taking a very precautionary approach, it is recommended to remove trees outside of the Koala's breeding season being summer months (Nov-Feb) and gestation (March) for one month following (DoE, 2022).

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

The impact area contains low to moderate quality vegetation (PCTs) containing trees species which are considered Koala use trees (DPIE, 2021a). Koala's home range is variable depending largely on the fertility and moisture content of soils with characteristically "poorer" habitats consisting of larger home ranges (DoE, 2022). Home ranges can be as large as 100 ha or as little as 10-20 ha in coastal areas. Given the potential large home range of Koalas (10-20 ha), the relatively small tree clearing area (7.3 ha), and large contiguous patches of vegetation within the broader landscape (25,000ha) it is considered unlikely that the availability or quality of habitat will be reduced to the extent that Koala populations are likely to decline.

f) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat

The development is not expected to result in the introduction of any new invasive species which don't exist already in the surrounding residential areas. The proposal may however exacerbate existing impacts such as attack from domestic dogs. Because the proposal involves residential development there is potential for new homeowners to introduce additional domestic dogs to the area, of which attacks are a major threat to this species (DoE, 2022). This threat has been highlighted in the Murrah Areas of Regional Koala Significance assessment (DPIE, 2018) as being of high risk. These invasive species are likely already somewhat established in the area due to the proximity of the proposal to existing residential land.

g) introduce disease that may cause the species to decline, or

A well-known disease suffered by Koalas is Chlamydia and is thought to increase in response to environmental pressures which can cause poor nutrition and overcrowding (DoE, 2022). The recent 2019/2020 bushfires impacted about 30% of available habitat within a 10km radius, where vegetation was subjected to fire to the northwest and southwest of the development site when viewing the Fire Extent Severity Mapping on figure 1-1 below (DPIE, 2020). The majority of burnt habitat consisted of low intensity fire (green shading on map) that impacted the understory without burning the eucalypt canopy. On a larger scale, the fires were the result of intense drought and both drought then fire have impacted Koala populations throughout NSW, especially within medium and high burnt affected areas which have caused long-term impacts on habitat and food resources. Within fire impacted areas, it is expected that any surviving Koalas would locate themselves less burnt areas, especially into moist gullies where better quality food trees exist. It is expected that any sub-populations of koalas could become concentrated within these habitats and could aid in the spread the disease. The fires came within 8km of the Development Site.

In relation to the proposed development, the main gully head could be seen as a lower quality refuge habitat for Koalas during future droughts and fire events, however it is highly disturbed by edge effects onto cleared and managed land and residential development. The lower section of the main gully will be preserved (containing *Backhousia myrtifolia* and *Acacia mearnsii*) and connectivity to tree links to the east through the golf course will be preserved. This in turn will remain available for Koala interactions during times of malnourishment or when Chlamydiosis is most prevalent. With the scale of tree clearing proposed, the development is not expected to contribute to the introduction of diseases and cause the species to decline.

h) interfere with the recovery of the species.

The development is expected to impact on vegetation which may be suitable habitat for Koalas. The quality of suitable vegetation within the development footprint is considered to be poor and is not critical to the survival of koala in the region. The extent that will be cleared is negligible in relation to the existing contiguous habitat within nature reserves and National Parks and represents less than 0.0002 percent of available habitat amongst these protected areas. The direct impacts on vegetation proposed by the development are not expected to interfere with the recovery of koala populations in the area.

An increase in residential housing in the area will likely result in an increased traffic flow throughout and around the Development Site. This increase in vehicles is likely to increase the number koala related incidents potentially resulting in increased koala mortality. Vehicle strikes are a major threat to the species (DoE, 2022) and has been identified by the Murrah Areas of Regional Koala Significance assessment (DPIE, 2018) as being of very-high risk.

Conclusion

The Development Site has potential to provide limited habitat availability for Koalas in the region (<0.0002%). The availability of contiguous habitat in the region would suggest that the loss of 7.3 ha of habitat would not have a significant impact on the persistence of koalas in the local area. The development has potential to increase interactions between local koala individuals and dogs. There is potential for the development to increase the incidence of vehicle strikes to local koala individuals. Both impacts are considered major threats to the species and should require management.

There are known important koala populations in the Murrah flora reserves and adjacent NPs located within 1.5km southwest of the proposed development. Existing BioNet and ALA sightings within a 10km radius of the development site exceed 100 records. These records suggest that the local area

may be a corridor for movement of koalas in the region however evidence suggests that koala populations are sparse and isolate in their distribution in the South Coast KMA.

Review of available literature states that the 2019-20 bushfires effected 25 percent of available habitat within local reserves and imagery shows that little or no burning occurred within 8 km southwest of the Development Site. This suggests that koala populations and habitat may not have been severely impacted by the bushfires of 2019-20 although this is not confirmed.

In conclusion the direct impacts of the proposed development are unlikely to impact significantly on the survival of koalas in the local area. The indirect impacts may interfere with the recovery of koala based on the increased potential for vehicle strikes and dog attacks both considered nationally as threatening processes and high-very high risk threats on a regional level.

APPENDIX A FIGURES

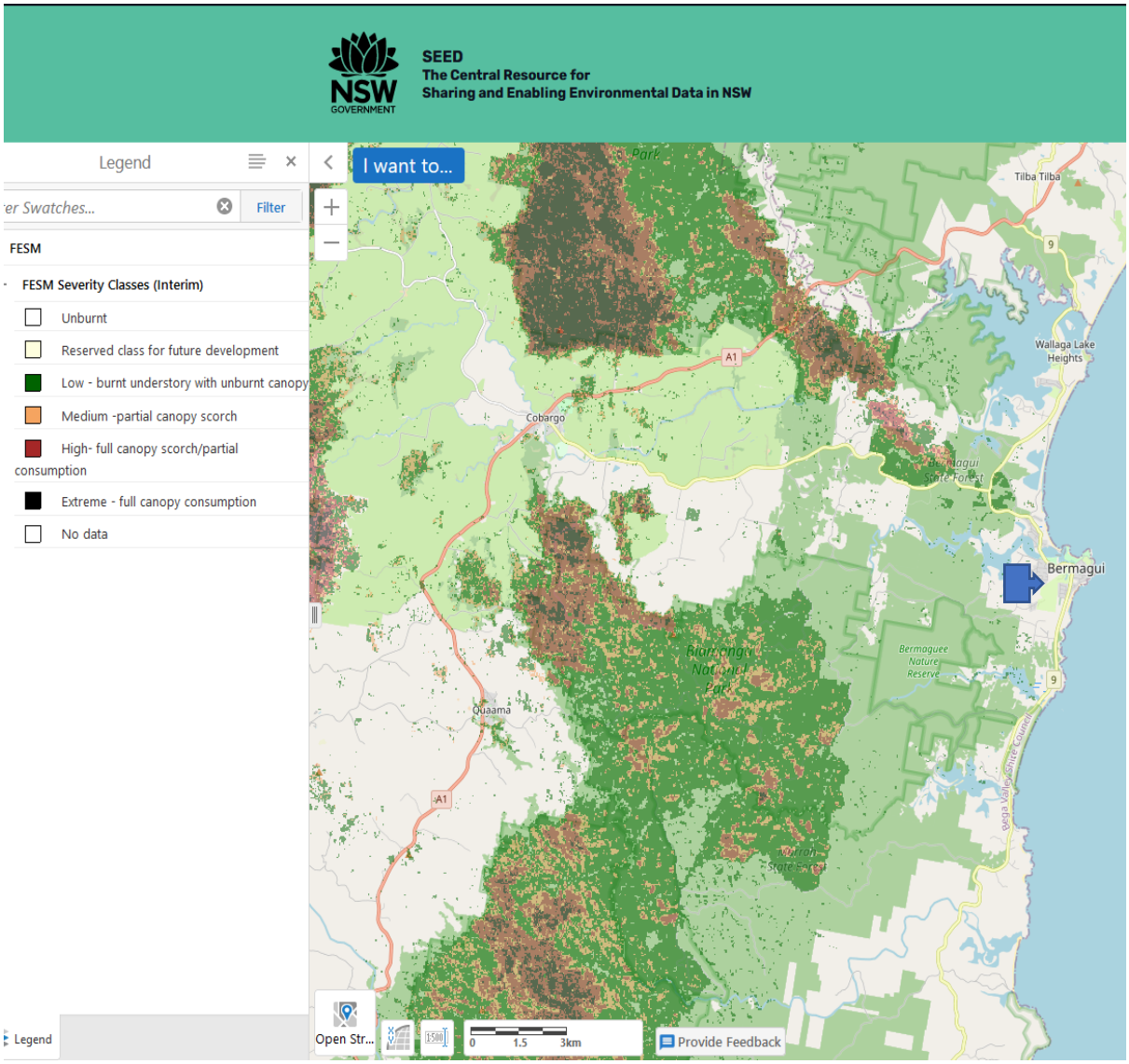

Figure 1-1 Image of fire affected areas and severity in proximity to development location at Bermagui. Source: NSW Govt. SEED portal.

APPENDIX B REFERENCES

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Appendix H Changes to the folio identifier

Lot

lganame	NULL
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(Actions)	
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hasstratum	1
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planlotareaunits	Meters
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enddate	3000-01-01T00:00:00.000
lastupdate	2022-07-13T13:56:54.000
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centroidid	NULL
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lotidstring	228//DP1284959
processstate	NULL
urbanity	R
Shape__Length	3044.37140768644476
Shape__Area	305555.69581705047
cadid	182960083
createdate	20220713135541
modifieddate	20220713135541
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vgcode	NULL
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Lot 22
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Lot 28
DP842925
Lot 23
DP786044
Lot 26
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Lot 1
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Lot D
DP391005
Lot 221
Nutleys Creek Rd
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Lot 226
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Lot 230
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Lot 104
DP1261513
Lot 242
DP1272130
Lot 102
DP1261513
Lot 243
DP1272130
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Lot 101
DP1261513
Lot 244
Lot 228
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Lot 50
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NSW lots merged 210810

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abscode	NULL
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vgcode	NULL
wbcode	NULL
layer	Lot_2


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DP1162287
Lot 60
DP1193819
Lot 50
Lot 101
DP1240330
Lot 8
DP25033
Lot 1
DP526487
Lot D
DP391005
Lot 21
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Lot 22
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Lot 23
DP786044
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Murrah St
Monarch St
Parbery Ave
Songlark St
Hart St
Dromedary Ct
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