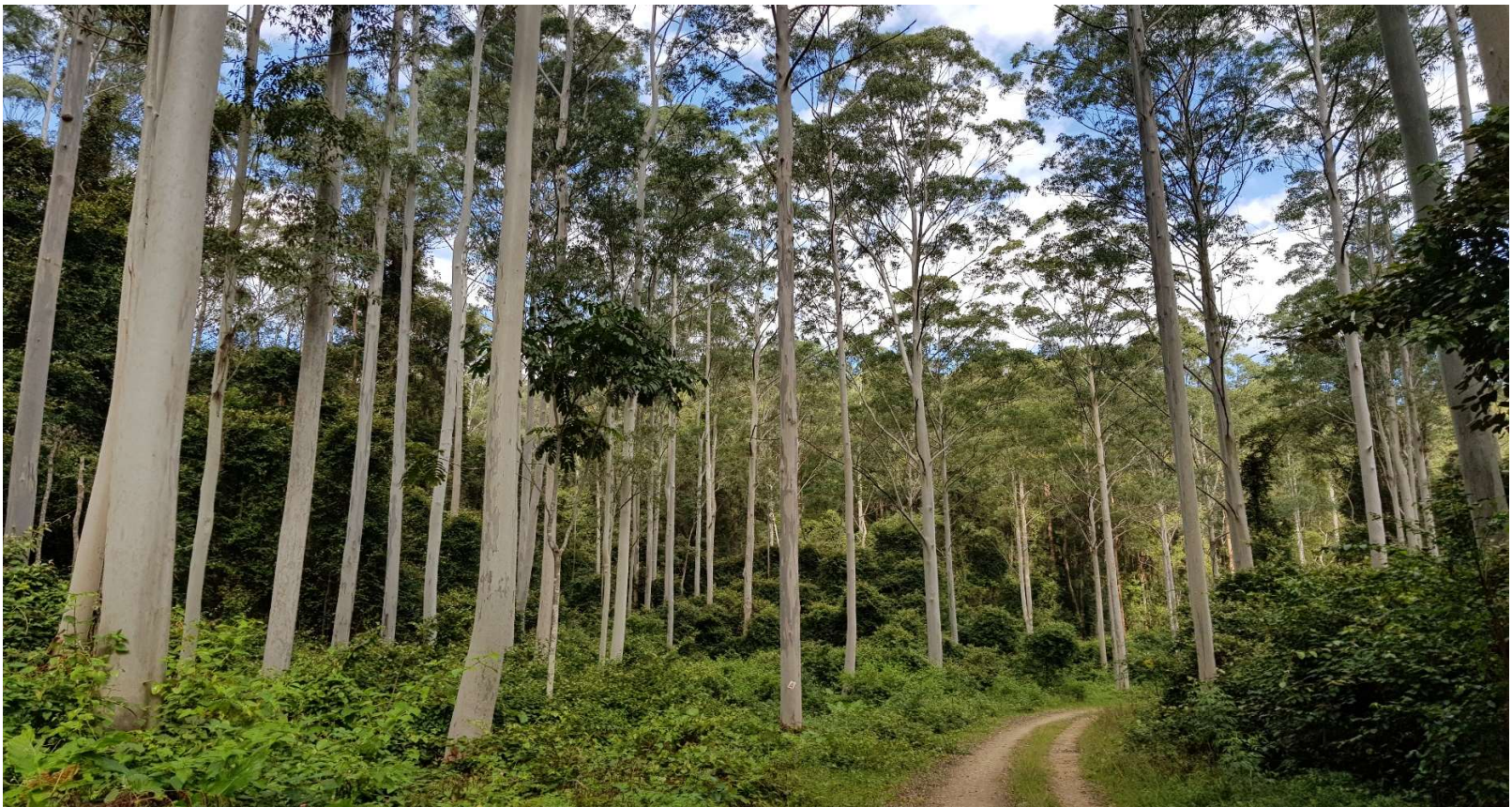
HABITAT
ENVIRONMENTAL SERVICES

Streamline Biodiversity Development Assessment Report

39, 39A and 41 Brockelsby Road, Medowie NSW 2318

28 April 2023



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39, 39A and 41 Brockelsby Road, Medowie NSW 2318

Document No: HBT0132_sBDAR_V2.0

28 April 2023

Prepared for

McCloy Project Management Pty Ltd

Prepared by

Habitat Environmental Services Pty Ltd

Declaration:

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016*.

Signature: Dr. Gilbert Whyte (Accredited Assessor No. BAAS18041)

Date: 28 April 2023

BAM Assessor Accreditation and Case File no: 00038719/BAAS18041/23/00038724

Document Control

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1.0	Draft Report	03 March 2023
2.0	Final Report	28 April 2023

Contents

1 Introduction

1.1 Background

Habitat Environmental Services Pty Ltd (Habitat) have been engaged by McCloy Project Management Pty Ltd (the proponent) to prepare a Streamline Biodiversity Development Assessment Report (sBDAR) to support the proposed rezoning and the future two stage residential subdivision of land located at 39 (Lot 301 DP 625002), 39A (Lot 300 DP 625002) and 41 (Lot 2 DP 508780), Brockelsby Road, Medowie NSW 2318 (refer to **Figure1**). The proposal will be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The following terms are used throughout this report:

- Study Area: Comprised of 39 (Lot 301 DP 625002), 39A (Lot 300 DP 625002) and 41 (Lot 2 DP 508780), Brockelsby Road, Medowie NSW 2318
- Development Site: Comprised of the entirety of the Study Area (Lots 301, 300 and Lot 2)
- Locality: Land within a five-kilometre (km) radius of the Study Area.

A Preliminary Ecological Assessment (PEA) was prepared for the Study Area (Habitat 2022b) to identify biodiversity constraints and help to inform the future development potential of the site. The PEA formed part of the Scoping Proposal submitted to Port Stephens Council (PSC) and relevant agencies in December 2022, as part of the pre-lodgment scoping stage assessment.

In response to the scoping proposal, the following key biodiversity issues and additional information required for lodgement were identified (PSC 2023) and have been addressed through this report:

- Consideration of impacts on the faunal corridor and opportunities to avoid and minimise this risk, such as:
    - Developing a corridor through the site
    - Retaining and improving existing habitat on site
    - Incorporating measures to manage faunal movements (fencing, signage, traffic calming devices).
- Demonstrating consistency with the Port Stephens Council Koala Plan of Management (CKPoM) and meet the performance criteria in Appendix 2
- Provide assessment in accordance with Stage 1 of the Biodiversity Assessment Method (BAM) (DPIE 2020a)
- Ensure the proposed subdivision design responds to and addresses environmental constraints.

1.2 Site Description

The Study Area is approximately 5.1 hectares (ha) in area and is located within the suburb of Medowie, approximately 30 km northeast of the city of Newcastle within the PSC Local Government Area (LGA). The Study Area is zoned RU2: Rural Landscape under the Port Stephens Local Environmental Plan 2013 (PSLEP) and is identified in the Medowie Planning Strategy (PSC 2016) as an area for potential future development (residential release areas).

The Study Area has been historically managed and is comprised of three rural-residential lots, all of which contain existing dwellings, sheds, and associated fencing (refer to **Figure 2**). The south of the

Study Area (Lot 301) is cleared and is currently used for small-scale farming (horses). Access to the Study Area is achieved via Brockelsby Road. Land use within the area is predominantly rural residential, however, over the last decade the area has experienced moderate residential growth and the subdivision of lands. The land-uses immediately surrounding the Study Area includes Wirreanda Public School to the north, low-density residential to the east, rural-residential to the south and future low-density residential to the west.

Land within the Study Area is relatively flat with the highest elevation occurring in the center, which gently slopes to the east and to the west. The vegetation within the Study Area is comprised of a mix of native forest, native forest regrowth, planted trees and shrubs and cleared land. The native vegetation is connected to larger areas of vegetation to the north and to the south. There is no connectivity to areas of vegetation to the east or west of the Study Area. Areas adjacent to the Study Area are identified as being suitable for residential development in the Medowie Planning Strategy (PSC 2016).

The extent of native vegetation within the Study Area is somewhat limited due to application of the *Rural Boundary Clearing Code for NSW* 2021. The objective of the Rural Boundary Clearing Code is to simplify vegetation management for owners or occupiers of land for the purpose of bush fire hazard mitigation by allowing them to clear vegetation on their property within 25 metres (m) of their property boundary. Native vegetation clearing was supervised by an ecologist on 19 January 2023.

Given the historical management of the Study Area and the application of the Rural Boundary Clearing Code, the native vegetation is largely confined to isolated patches. There are no mapped watercourses or streams within or adjacent to the Study Area. The nearest mapped wetland is identified as Moffats Swamp Nature Reserve, which occurs approximately 900 m to the south-east of the Study Area.

1.3 Proposed Development

The proponent is seeking approval to rezone the Study Area from RU2 Rural Landscape to R2 Low Density Residential. In addition to the rezoning, the proponent seeks to amend the minimum lot size of the three lots from two ha to 350 meters square (m^2), and for the Development Site to be identified on an Urban Release Area Map under PSLEP (2013).

Several future residential subdivision layout options have been considered (refer to **Section 6.1**). The preferred option for the Development Site would be comprised of Stage 1 (33 lots) and Stage 2 (29 lots) and would incorporate a 4.5 meter (m) wide vegetated road verge around subdivision boundaries and a 6.5 m road verge running north / south through the centre of the site (refer to **Figure 3**). The 6.5 m road verge will be developed and planted to facilitate fauna movement from patches of vegetation to north and the south through the Development Site.

Measures to manage faunal movements will be integrated into the residential design through the implementation of a post and wire fence along the northern and southern boundaries, signage, enforced speed limits and traffic slowing devices (refer to **Section 6.2**). A Section 88B restriction under the NSW *Conveyancing Act 1919,* requiring a lap and cap timber fence, would be implemented on title for future lot boundaries.

1.4 Scope

This sBDAR aims to quantify impacts of the proposed development upon biodiversity values based upon the methods described within the BAM 2020 (DPIE 2020a), including threatened biota listed under the NSW *Biodiversity Conservation Act 2016* (BC Act). The assessment includes:

- Stage 1 Biodiversity Assessment –Mapping of native vegetation communities (including Endangered Ecological Communities EECs) and an assessment of the potential occurrence of candidate threatened species, as returned by the BAM Calculator (BAM-C)
- Stage 2 Impact Assessment – An assessment of potential impacts of the proposed development on biodiversity values. Avoidance and mitigation measures are also presented. Biodiversity offset requirements are based upon residual impacts.

1.5 Information Sources

The following sources of information were used to inform the assessment:

- The NSW BioNet Atlas (DPE 2023a) for previous records of threatened species, populations, and ecological communities within a five km radius of the Study Area
- Regional Vegetation Mapping Projects:
    - State Vegetation Type Map (DPE 2023b)
- The NSW BioNet Vegetation Classification Database (DPE 2023c) for identification and allocation of Plant Community Types (PCTs) to vegetation zones on site
- The NSW BioNet Threatened Biodiversity Data Collection (DPE 2023d), Threatened Species Profiles (DPE 2023e) and Final Determinations (DPE 2023f) for information on threatened species, populations, and ecological communities.

Figure 1 - Locality

Legend

Study Area (Lot 2 DP 508780, Lots 300 & 301 DP 625002)

0 0.5 0.9 1.4 Kilometers

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Figure 2 - Study Area and Development Site

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Legend

- Study Area
- Development Site

0 0 0.1 0.1 Kilometers

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Figure 3 - Proposed Subdivision Layout

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Legend

- Subdivision Layout
- Road
- Drainage Basin
- Planted Road Verge (4 - 6.5m)
- Habitat Corridor (6.5m planted with Koala feed tree species)
- Stage Boundary

0 40 80 120 Meters

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2 Legislative Context

2.1 Summary

The assessment was undertaken in accordance and consideration of the following Acts and Policies:

Commonwealth:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

NSW:

- EP&A Act
- BC Act
- *Biodiversity Conservation Regulation 2017* (BC Regulation)
- *Biosecurity Act 2015*
- *Water Management Act 2000* (WM Act)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 4: Koala Habitat Protection 2021
- State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management.

Local:

- PSLEP 2013
- Port Stephens Development Control Plan 2014 (amended 2020)
- Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) (2002).

Information pertaining to the above list is presented in the following subsections.

2.1.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, an approval is required for actions that are likely to have a significant impact on MNES. An action includes a project, development, undertaking, activity or series of activities. When a person proposes to take an action, which they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Environment. The Act identifies the following nine MNES:

- World Heritage properties
- National heritage places
- Wetlands of international importance (Ramsar Convention)
- Listed threatened species and communities
- Migratory species listed under international agreements
- Great Barrier Reef Marine Park
- Commonwealth marine areas
- Nuclear actions
- Water resources in respect to CSG and large coal mines.

The proponent is required to address the EPBC Act as part of their development application to Council. Listed threatened species and communities are relevant to the proposed development. A summary of this assessment is presented in **Section 9.1**

2.1.2 Biodiversity Conservation Act 2016

The NSW BC Act together with the NSW BC Regulation outlines the framework for addressing impacts on biodiversity from development and clearing. The framework details a pathway to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offset Scheme (BOS).

Entry into the BOS is triggered by developments, projects and activities that meet criteria or certain thresholds for significant impacts on biodiversity in accordance with Section 6.3 of the BC Act.

Criteria to which the BOS applies include the following:

Local Development (assessed under Part 4 of the EP&A Act) that triggers the BOS Threshold or is "likely to significantly affect threatened species" (based on a test of significance pursuant to Section 7.3 of the BC Act). The BOS Threshold has two parts, and is triggered by the following:

- Clearing of vegetation that exceeds an area threshold (based on the minimum lot size), or
- Impacts are predicted to occur within an area mapped on the NSW Biodiversity Values Map (BV Map) (DPE 2023f).
- State Significant Development (SSD) and State Significant Infrastructure projects (SSI), unless "the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact"
- Biodiversity certification proposals.
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent.
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the Local Land Services Act 2013.
- Activities assessed and determined under Part 5 of the EP&A Act (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Conclusion

There are no areas within the Development Site mapped on the NSW BV Map. The proponent seeks to amend the minimum lot size from two ha to 350 m^2, reducing the vegetation clearing threshold from 0.5 ha to 0.25 ha. It is anticipated that the future development of the Development Site would impact approximately 0.43 ha of native vegetation along the northern boundary of Lot 2. This clearing will exceed the clearing threshold (0.25 ha) and trigger entry into the BOS.

In accordance with Appendix C and Table 12 of the BAM (DPIE 2020a), the maximum clearing limit for application of the small area development module is less than or equal to one ha. The extent of native vegetation within the Development Site equates to approximately 0.41 ha, therefore, the small area module is appropriate to support the proposal. A Streamline BDAR is the appropriate assessment to support the proposal.

2.1.3 Biosecurity Act 2015

Under the *Biosecurity Act 2015* all plants are regulated with a general biosecurity duty "to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable." Under the Act, a biosecurity impact "is

an adverse effect on the economy, environment, or the community that arises, or has the potential to arise, from a biosecurity matter." This legislation is addressed in **Section 9.2**.

2.1.4 Water Management Act 2000

Controlled activities carried out in, on or under waterfront land are regulated by the WM Act. 'Waterfront land' is defined as the bed of any river, lake or estuary, and the land within 40 m of the riverbanks, lake shore or estuary mean high water mark.

There are no mapped watercourses within or adjacent to the Development Site. The WM Act is not applicable to the proposal.

2.1.5 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 4 - Koala Habitat Protection (2021)

Chapter 4 of the SEPP contains provisions aimed to encourage the 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.

Where a Koala Plan of Management (KPoM) applies to the land, Clause 10 of the Koala SEPP applies to the proposal. The proposal must be consistent with the approved KPoM that applies to the land. The Port Stephens CKPoM (2002) applies to all development applications on land within the Port Stephens LGA (refer to **Section 2.1.9**).

2.1.6 State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 2 – Coastal Management

The aim of this Chapter is to promote an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016 (CM Act), including the management objectives for each coastal management area, by:

- Managing development in the coastal zone and protecting the environmental assets of the coast.
- Managing development in the coastal zone and protecting the environmental assets of the coast.
- Establishing a framework for land use planning to guide decision-making in the coastal zone.
- Mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the *Coastal Management Act 2016*.

The chapter defines the four coastal management areas in accordance with the CM Act, detailing mapping, and specific assessment criteria for each coastal management area. Councils and other consent authorities must apply these criteria when assessing proposals for development that fall within one or more of the mapped areas. The four coastal management areas are:

- Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26

- Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation
- Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands, marine and estuarine waters
- Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The Development Site does not contain areas mapped as a coastal management area; the CM Act does not apply.

2.1.7 Port Stephens Local Environmental Plan 2013

The Development Site is located within the Port Stephens LGA. The PSLEP 2013 controls development within the Development Site through zoning and development controls. These controls are described in greater detail by the supporting Port Stephens Development Control Plan 2021 (DCP).

2.1.8 Port Stephens Development Control Plan 2014

The Port Stephens Development Control Plan 2014 supports the LEP by providing additional detail and guidance on addressing biodiversity issues associated with development. Regarding biodiversity, the DCP contains provisions that relate to environmental effects, soil and erosion control and vegetation. These provisions have been considered during the preparation of this assessment.

2.1.9 Port Stephens Council Comprehensive Koala Plan of Management

The Port Stephens CKPoM aims to ensure the long-term sustainability of Koala populations within the Port Stephens LGA. Fulfilment of the requirements of the Port Stephens CKPoM satisfies the requirements of the Koala SEPP. Appendix 2 of the CKPoM details performance criteria for rezoning proposals, Appendix 4 details performance criteria which regulates proposed development on Koala habitat and Appendix 6 provides information for classifying Koala habitat within Port Stephens and the guidelines for Koala Habitat Assessments.

An assessment in accordance with the Appendices 2, 4 and 6 of the Port Stephens CKPoM is provided in **Section 5.1.3**.

3 Site Context

3.1 Landscape Features

The landscape features detailed in Section 3 of the BAM (DPIE 2020a), which are applicable to the Development Site are described in **Table 1**.

Table 1 Landscape Features

Landscape Features	Information
IBRA Region	NSW North Coast
IBRA Sub Region	Karuah Manning
Local Government Area (LGA)	Port Stephens Council Local Government Area
Mitchell Landscape	The extent of Mitchells Landscapes within the locality of the Study Area is mapped as Newcastle Coastal Ramp. A description of this landscape is provided below, and the mapping is shown on **Figure 4**. Newcastle Coastal Ramp – Undulating lowlands and low to steep hills on complex patterns of faulted and gently folded Carboniferous conglomerate, lithic sandstone, felspathic sandstone, and mudstone, with a general elevation of 50 to 275 m and a local relief of 40 to 150 m. Soila area stony red texture-contrast on steep slopes, yellow and brown texture-contrast on lower slopes and deep dark clay loams along streams.
Rivers, streams and estuaries	There are no mapped watercourses within or adjacent to the Development Site.
Wetlands	There are no Coastal wetlands mapped on the Coastal Wetlands and Littoral Rainforests Area Map (DPIE 2018) within or adjacent to the Development Site.
Connectivity of different areas of habitat	The Development Site has no connectivity to areas of vegetation to the east or to the west. The Development Site retains connectivity to the south, where patches of vegetation occur around the residence before becoming cleared land, and to the north with a small patch of intact vegetation adjacent to the western boundary of the public school. This area contains hollow bearing trees, and likely provides suitable habitat for fauna species.
Areas of geological significance and soil hazard features	The Development Site is not located with an area identified as having any particular geological significance. No mapping was identified that would indicate the site contains any soil hazard features.
Areas of outstanding biodiversity value	There are no areas of "outstanding biodiversity value" (in accordance with Section 3.1.3 of the BAM (DPIE 2020a) mapped within the Development Site.
Geology and Soils	The Development Site is described as containing geology of an unknown age with weak to moderately strong clay lenses. Soils are deep (>150 cm), well-drained red and yellow Structured Loams on deeply weathered clay deposits and moderately deep to deep (60–>200 cm), well-drained Red Podzolic Soils (Dr2.21) and deep (200–>300 cm) Yellow Podzolic Soils (DPIE 2017). The topography associated with the landscape includes gently undulating low hills on relict sediments in the Medowie Lowlands region.
Native Vegetation Cover	Native Vegetation was assessed as per Section 3.2 of the BAM 2020 (DPIE 2020a) as shown in **Figure 5**. Native vegetation constitutes 43% (372 ha) of the projected 1,500 m site buffer (857 ha) associated with the Development Site. Native Vegetation Cover was classed as >30-70%.

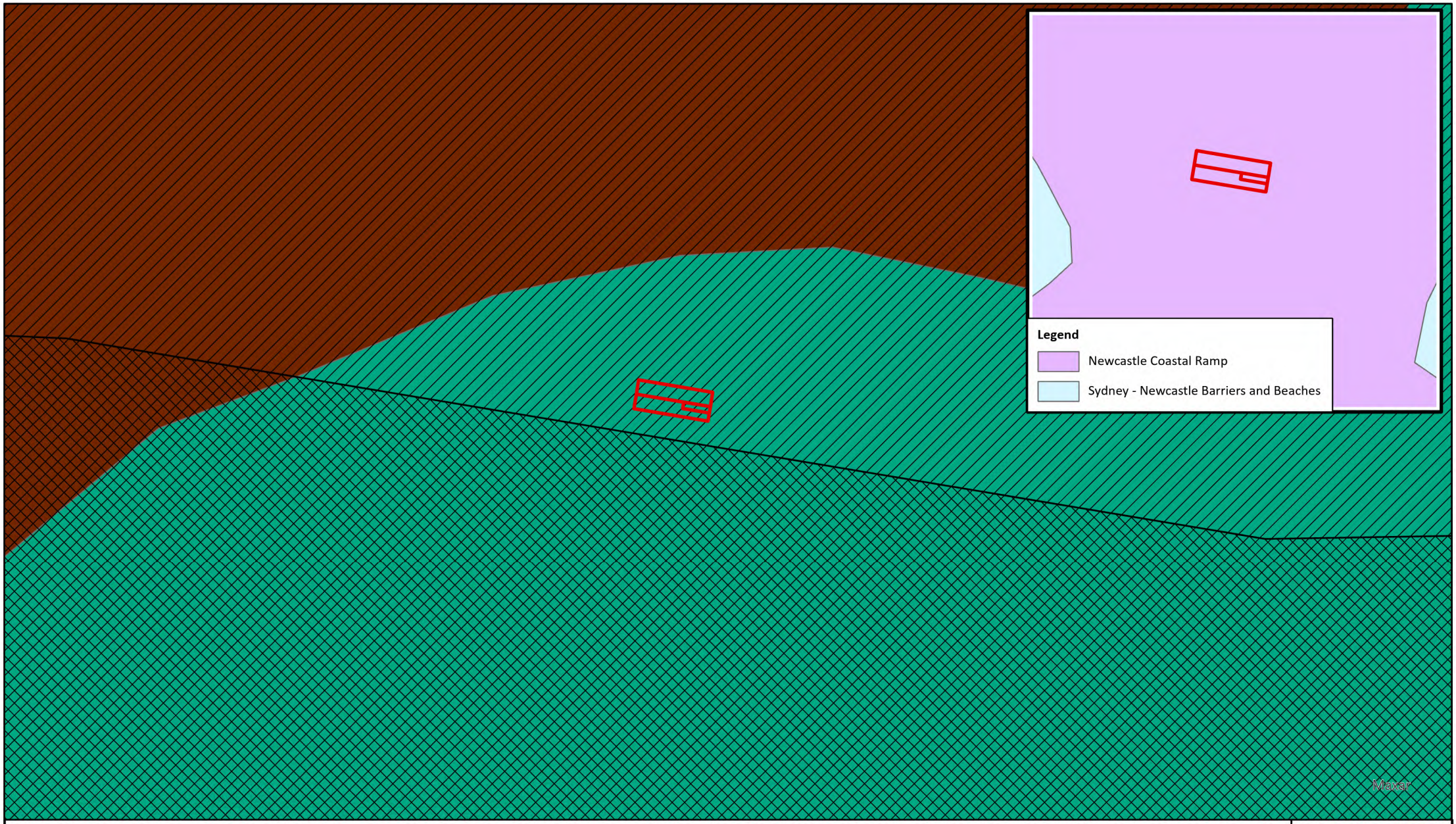

Figure 4 - Landscape Assessment (IBRA and Mitchells Landscape)

HABITAT ENVIRONMENTAL SERVICES

Legend

- Study Area
- NSW North Coast
- Sydney Basin
- Hunter
- Karuah Manning

0 0.5 0.9 1.4 Kilometers

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Figure 5 - Landscape Assessment (Native Vegetation Extent)

HABITAT ENVIRONMENTAL SERVICES

Legend

- Study Area
- 1500 meter buffer (857 ha)
- Native Vegetation Extent (372 ha or 43%)
- Mapped Waterways (SIXMaps)

0 0.5 0.9 1.4 Kilometers

Project ID: HBT0132_sBDAR_BrockelsbyRd

4 Native Vegetation

4.1 Data Review

Regional vegetation mapping projects for the area were reviewed to assist with the determination of Plant Community Types (PCTs) within the Development Site. A review of the of the NSW State Vegetation Type Map (DPE 2023b) indicated that two native vegetation communities are mapped within the Development Site:

- Lower North Spotted Gum – Ironbark – Mahogany Sheltered Forest (PCT 3244)
- Hunter Coast Foothills Apple Forest (PCT 3581).

No Threatened Ecological Communities (TECs) are associated with the above listed PCTs. Vegetation within the Development Site is further discussed in **Section 4.4**.

4.2 Vegetation Mapping Surveys

A vegetation assessment was undertaken within the Development Site on 19 September 2022 and 24 February 2023. The boundaries of PCTs were mapped using a combination of rapid data points (RDP) and walking transects. Polygons produced through aerial photo interpretation (API) were used to assist in targeting survey effort. RDPs involved collecting waypoints using a handheld GPS unit and recording dominant species, structure, and condition of the vegetation.

Walking transects involved verifying polygons where homogenous in floristic composition and condition, as well as walking vegetation ecotones and using the recorded tracks to define vegetation community boundaries. The RDPs and survey tracks were then overlaid on an aerial photograph and used to delineate and/or clarify vegetation boundaries.

An additional random meander assessment was undertaken on 18 April 2023 through the lot to the north (Lot 1 DP 508780) and to the south (lot 261 DP 525231) of the Development Site to assess the habitat suitability for threatened fauna and to determine whether the native vegetation aligned with the Koala Planning Map (KPM) for Medowie and Tilligerry (refer to **Section 5.1.3**).

4.3 Plant Community Type Identification

The PCTs were assigned to the closest equivalent PCT from those listed in the BioNet Vegetation Classification database (DPE 2023c). The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the plot / transect data collected from the Development Site.

In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the site were compared to the descriptions in the database. Threatened ecological communities (TECs) as defined in NSW and Commonwealth legislation were also identified if present.

4.3.1 Vegetation Zones

Vegetation zones were identified and delineated in accordance with Section 4.3 of the BAM (DPIE 2020a). A vegetation zone is defined in the BAM as “a relatively homogenous area that is the same vegetation type and broad condition”.

4.3.2 Vegetation Integrity

Following stratification of the Development Site into vegetation zones, a total of five BAM plot/transects were undertaken to collect site condition data for the composition, structure and function attributes listed in **Table 2**. The number of BAM plot/transects sampled meets the requirements for each vegetation zone as stipulated in Section 4.3.4, Table 3 of the BAM (DPIE 2020a).

Table 2 Components of Vegetation Integrity

Growth form groups	Function attributes
• Tree (TG) • Shrub (SG) • Grass and grass-like (GG) • Forb (FG) • Fern (EG) • Other (OG)	• Number of large trees • Tree regeneration (presence/absence) • Tree stem size class (presence/absence) • Total length of fallen logs • Litter cover • High threat exotic vegetation cover (HTE) • Hollow-bearing trees (HBT)

4.3.3 Floristic Identification and Nomenclature

Floristic identification and nomenclature were based on Harden (1992, 1993, 2000 and 2002) with subsequent revisions as published on PlantNet (http://plantnet.rbgsyd.nsw.gov.au).

4.4 Plant Community Type Determination

The vegetation within the Development Site was assigned to one PCT and four vegetation zones based on their broad condition state:

- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (Vegetation Zone (VZ) 01 – moderate)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ 02 – low)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ 03 – planted exotic)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ 04 – cleared grassland)

Detailed descriptions of each VZ are described within the following subsections. The extent of each VZ within the Study Area is displayed on **Figure 6**. BAM plot data is provided in **Appendix D**.

Table 3 Plant Community Type Information - PCT 1621 (VZ 01 - moderate and VZ 02 - low)

Criteria	PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Vegetation Formation and Class	Dry Sclerophyll Forests (Shrubby sub-formation) Sydney Coastal Dry Sclerophyll Forests
Floristic description	Vegetation within this community is characterized by a canopy dominated by *Eucalyptus pilularis* (Blackbutt), with *E. piperita* (Sydney Peppermint), *Angophora costata* (Smooth-bark Apple) and *Corymbia gummifera* (Red Bloodwood) occurring throughout. The mid stratum contains scattered *Pittosporum undulatum* (Sweet Pittosporum), *Acacia maidenii* (Maiden's Wattle) and *Cinnamomum camphora* (Camphor Laurel). Native shrubs are sparse, but include *Daviesia ulicifolia* (Gorse Bitter Pea), *Breynia oblongifolia* (Coffee Bush) and *Lomatia silaifolia* (Crinkle Bush). The ground stratum is frequently managed and contains a mix of native and exotic species. Dominant native species include *Dichondra repens* (Kidney Weed), *Hydrocotyle sibthorpioides, Oplismenus aemulus* (Basket Grass), *Imperata cylindrica* (Blady Grass) and *Microlaena stipoides* (Weeping Grass). Other common native species include *Carex inversa, Entolasia stricta* (Wiry Panic) and *Lobelia purpurascens* (Whiteroot). Exotic species are abundant within this community and comprise both weeds and planted species. Common species include *Monstera deliciosa* (Fruit Salad Plant), *Cinnamomum camphora* (Camphor Laurel), *Hedera sp.* (English Ivy), *Pinus elliotii* (Slash Pine), *Richardia humistrata* and *Phyllostachys aurea* (Bamboo).
Condition within Development Site	This vegetation community occurs in two different condition states: • **VZ 01** - Vegetation occurring in a ''moderate' condition contains an intact canopy, managed ground stratum and evidence of regrowth • **VZ 02** - Vegetation occurring in 'low' condition, contains a sparse open canopy (<10% cover) and exotic understory.
Status	**BC Act**: Not commensurate with a TEC listed under the BC Act.
	EPBC Act: Not commensurate with a TEC listed under the EPBC Act.
SAII	No
PCT % Cleared	30%

Plate 1 **PCT 1621 (VZ 01 - moderate condition) within the Development Site – Q01**

Plate 2 **PCT 1621 (VZ 02 - low condition) within the Development Site – Q04**

Table 4 Plant Community Type Information - PCT 1621 (VZ 03 – planted exotic)

Criteria	PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Vegetation Formation and Class	Dry Sclerophyll Forests (Shrubby sub-formation) Sydney Coastal Dry Sclerophyll Forests
Floristic description	Vegetation within this community is characterized by planted vegetation and ornamental gardens. A variety of planted native and non-native vegetation occurs throughout. Common species include varieties of *Citrus spp.*, *Pinus elliotii* (Slash Pine), *Monstera deliciosa* (Fruit Salad Plant), *Dendrobium speciosum*, *Hedera sp. Lavandula dentata* (Lavender), *Magnolia sp.*, *Musa sp., Macacdamia tetraphylla* (Rough Macadamia), *Phyllostachys aurea* (Bamboo), *Photinia sp., Yucca aloifolia* (Yucca), *Rhaphioloepis umbellate* (Yeddo Hawthorn) and *Prunus serrulata* (Cherry Blossom).
Condition within Development Site	This vegetation community has been largely cleared and is subject to ongoing management. The landscaped has been modified through the planting of exotic and woody vegetation and ornamental garden varieties.
Status	**BC Act**: Not commensurate with a TEC listed under the BC Act.
	EPBC Act: Not commensurate with a TEC listed under the EPBC Act.
SAII	No
PCT % Cleared	30%

Plate 3 PCT 1621 (VZ 03 – planted/exotic) within the Development Site – Q02

Table 5 Plant Community Type Information - PCT 1621 (VZ 04 – cleared grassland)

Criteria	PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Vegetation Formation and Class	Dry Sclerophyll Forests (Shrubby sub-formation) Sydney Coastal Dry Sclerophyll Forests
Floristic description	This community within the Development Site is characterized by a lack of canopy and midstorey. The ground layer typically contains a mix of native grasses and forbs and exotic species. Common species include *Cynodon dactylon* (Couch), *Sporobolus africanus* (Parramatta Grass), *Sida rhombifolia* (Paddy's Lucerne), *Hypochaeris radicata* (Catsear), *Plantago lanceolata* (Lamb's Tongue) and *Microlaena stipoides* (Weeping Grass).
Condition within Development Site	This vegetation community has been cleared. The vegetation along the boundary of Lot 2 was recently cleared (late 2022) for the purpose of reducing the potential for the spread of bushfires. The clearing was undertaken in accordance with the *Rural Boundary Clearing Code for NSW 2021* (Habitat 2022). Lot 401 has been historically managed and is currently used to graze horses.
Status	**BC Act**: Not commensurate with a TEC listed under the BC Act.
	EPBC Act: Not commensurate with a TEC listed under the EPBC Act.
SAII	No
PCT % Cleared	30%

Plate 4 PCT 1621 (VZ 04 – cleared grassland) within the Development Site – Q05

Plate 5 **PCT 1621 (VZ 04 – cleared grassland) within the Development Site – Q03**

4.4.1 Vegetation Zones and Vegetation Integrity Score

The current vegetation integrity score of each vegetation zone to be impacted by the proposal is outlined in **Table 6** and is further discussed in **Section 7.1.**

Table 6 **Vegetation Integrity**

VZ	PCT	Condition class	Area (ha)	Current VI Score
01	1621	Moderate	0.37	53.7
02	1621	Low	0.05	10.5
03	1621	Planted/exotic	1.04	16.6
04	1621	Cleared grassland	3.64	2.3

4.4.2 Floristic Diversity

A total of 83 flora species were identified within the Development Site during field surveys, 45 of these are exotic species, of which 12 are high threat weeds. No priority weeds listed under the NSW *Biosecurity Act 2015* for PSC were identified within the Development Site. A complete list of plant species recorded within the Development Site is presented in **Appendix A**.

4.4.3 Assessment of Patch Size

A patch is defined in the BAM as an area of intact native vegetation that occurs on the Development Site. The patch may extend onto adjoining land beyond the proposed footprint, and for woody

ecosystems, includes native vegetation separated by less than or equal to 100 m from the next area of intact native vegetation. The patch size for the native forest vegetation within the Development Site was assessed as >100 ha as this vegetation is connected to larger intact areas of native forest vegetation extending to the south (gaps in the connective vegetation across this area are less than 100 m).

4.4.4 Endangered Ecological Communities

The vegetation within the Development Site is not commensurate with any TECs listed under the BC Act or the EPBC Act.

Figure 6 - Vegetation Assessment

HABITAT ENVIRONMENTAL SERVICES

Legend

- Study Area
- BAM Plot
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ01 - moderate)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ02 - low)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ03 - planted/exotic)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ04 - cleared grassland)

5 Threatened Species

5.1 Habitat Assessment

To inform the assessment of suitable habitat for threatened species and populations within the Development Site, a database search of the NSW BioNet Atlas (DPE 2023a) was conducted. Results of the database search and 'likelihood of occurrence' assessment are provided in **Appendix B**.

5.1.1 Habitat Assessment – Threatened Flora

The Development Site is predominantly cleared of native vegetation and has been subject to historic and ongoing management. The native vegetation is fragmented and occurs in a moderate to low condition state. Planted vegetation includes sparse gardens and trees.

The managed native vegetation (PCT 1621) within the Development Site lacks structural integrity and habitat characteristics required for threatened flora species with the potential to occur. Several of the threatened flora known to occur in the locality are easily distinguishable shrubs or trees, such as *Angophora inopina* (Charmhaven Apple), *Eucalyptus parramattensis subsp. decadens,* and *Melaleuca biconvexa* (Biconvex Paperbark), none of which were not detected during the assessment.

All other threatened flora species returned by the NSW BioNet Atlas (DPE 2023a) were determined to have a low 'likelihood of occurrence' (refer to **Appendix B**).

5.1.2 Habitat Assessment – Threatened Fauna

Vegetation within the Development Site is frequently managed and currently exhibits an open canopy of mature trees and limited shrub layer. Small patches of planted shrubs and trees also occur within the site. Two hollow-bearing trees and one tree containing a hollow with a termite nest occupied by a Kookaburra were recorded during the site assessment (refer to **Figure 7**).

Of the hollow-bearing trees, one contained a large hollow (25 cm diameter and 10 m high) and showed evidence of use (discarded eggs at the base of the tree and feathers at the hollow entrance). Eggs were of similar size and shape to those of the Australian Wood Duck. All other hollows were recorded as small hollows (5 cm diameter). Although limited in numbers, the large hollow is considered suitable size and height for large forest owls and the small hollows are considered suitable for threatened arboreal fauna, such as Squirrel Gliders and Brush-tail Phascogale.

A list of fauna species identified during the habitat assessment is provided in **Appendix A.** Threatened fauna species returned by the NSW BioNet Atlas (DPE 2023a) were determined to have a low to moderate 'likelihood of occurrence' (refer to **Appendix B**).

5.1.3 Koala Habitat Assessment – Port Stephens Council

An assessment in accordance with Appendix 6 Guidelines for Koala Habitat Assessment (PSC CKPoM 2002) is provided in the subsections below.

Step 1 – Preliminary Assessment

Vegetation within the Development Site was assessed in accordance with Appendix 6 - Guidelines for Koala Habitat Assessments (PSC CKPoM 2002). Mapped Koala habitat, as detailed in the Koala

Planning Map (KPM) for Medowie and Tilligerry, maps the Development Site as '50 m Buffer over Cleared Land', '50 m Buffer over Marginal', '50 m Buffer over Other', 'Link over Other' and 'Mainly Cleared' (refer to **Plate 6**). Vegetation to the north of the site is mapped as '50 m Buffer over Cleared Land', '50 m Buffer over Marginal' and '50 m Buffer over Other'. Vegetation to the south of the site is mapped as 'Preferred Koala Habitat', '50 m Buffer over Cleared Land' and '50 m Buffer over Marginal'.

Field surveys identified one species of preferred Koala food tree, *Eucalyptus robusta* (Swamp Mahogany) within the Development Site. The species was recorded at a low density (three individuals) and was not recorded in the vegetation to the immediate north (Lot 1) or to the south (Lot 261) of the Development Site.

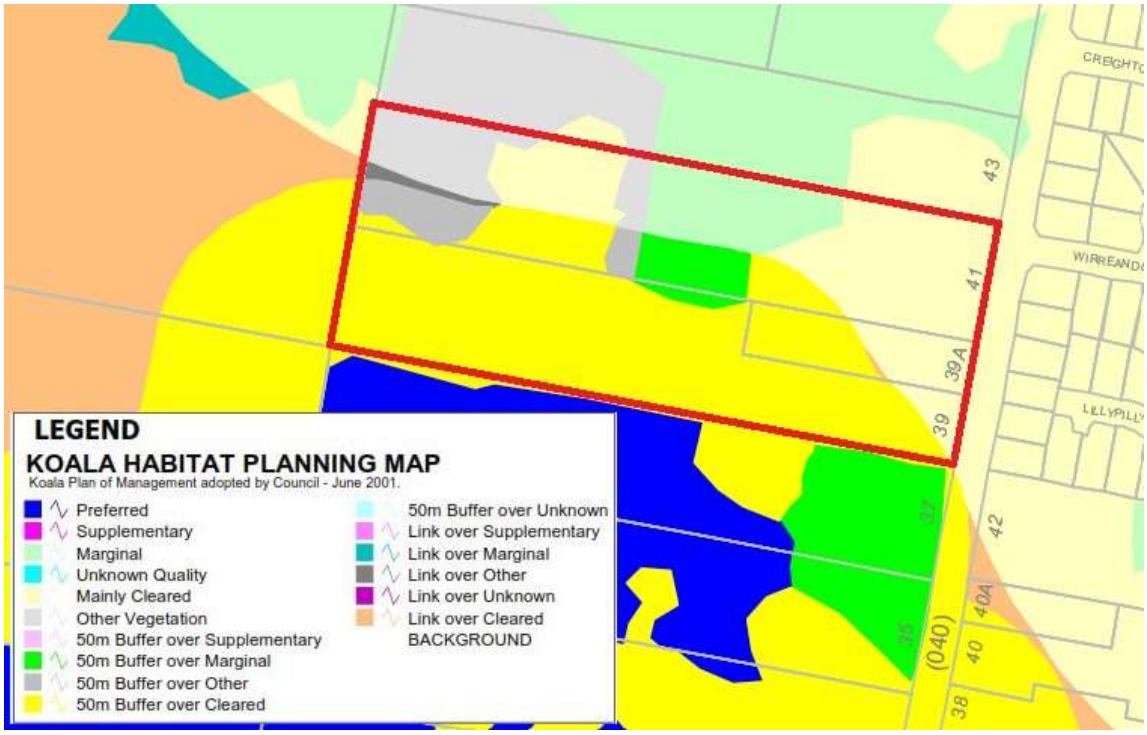

Plate 6 **KHP Mapping of the Development Site – Medowie & Tilligerry (KHP Map 2006)**

Step 2 – Vegetation Mapping

Native vegetation within the Development Site and to the immediate north (Lot 1) and south (Lot 261) is commensurate with Tall open Blackbutt and Sydney Red Gum Forest (Category C) community based on the composition of dominant canopy species, *Eucalyptus pilularis* (Blackbutt) and *Angophora costata* (Smooth-bark Apple/Sydney Red Gum) (Lunney et al. 1998) and limited Koala food trees (refer to **Appendix A**).

In accordance with the definitions provided in the CKPoM, the native forest vegetation best aligns with 'Supplementary Koala Habitat' and the north western portion of Lot 1 best aligns with 'Other Vegetation' (stand of exotic pine trees). Proposed Koala habitat mapping for the Development Site, Lot 1 and Lot 261 is shown on **Figure 7**.

Step 3b

Lot 261 to the south of the Development Site is mapped as 'Preferred Koala Habitat'. Random meander assessment (18 April 2023) concluded that this vegetation lacks preferred Koala food trees and is consistent with the native vegetation within the Development Site and Lot 1 to the north. The vegetation best aligns with 'Supplementary Koala Habitat' rather than 'Preferred Koala Habitat' (refer to **Figure 7**).

Step 4

An assessment of the proposal against the development standards and assessment criteria of Appendix 2 (Performance criteria for rezoning proposals) and Appendix 4 (Performance criteria for development applications) of the CKPoM are provided in **Table 7** and **Table 8** below.

Table 7 Appendix 2 CKPoM performance criteria

Performance criteria	Assessment
a) Not result in development within areas of Preferred Koala Habitat or defined Habitat Buffers.	The rezoning of the Study Area will not result in the future development of land defined as Preferred Koala Habitat or land defined as 50 m Buffer. Native vegetation within the Development Site better aligns with Supplementary Koala Habitat (0.42 ha) based on composition of species and lack of Koala feed tree species.
b) Allow for only low impact development within areas of Supplementary Koala Habitat and Habitat Linking Area.	The proposal will impact 0.42 ha of Supplementary Koala Habitat as classified in this assessment. The proposal will not impact on Koala Habitat Linking Areas.
a) Minimise the removal minimise the removal of any individuals of preferred koala food trees, where ever they occur on the site	The proposal will remove three *E. robusta* individuals. The three trees are within a patch of vegetation that is connected to intact Supplementary Koala Habitat (as classified in this assessment) to the north (Lot 1) and to the south (Lot 261). The removal of Koala feed trees will be offset through the planting of Koala feed trees in accordance with Port Stephens Council Tree Technical Specification (2014).
b) Not result in development which would sever koala movement across the site. This should include consideration of the need for maximising tree retention on the site generally and for minimising the likelihood of impediments to safe/unrestricted koala movement	The Development Site contains very little native vegetation. Large areas of the site contain exotic grassland, ornamental trees, fruit trees (citrus trees) and pine trees. The local Koala population is likely to be concentrated within Moffats Swamp Nature Reserve and Tilligerry State Conservation Area. Any local Koala detections are likely to be individuals dispersing between these two protected areas. The Development Site is not identified as a corridor within the Medowie Planning Strategy (PSC 2016), and there is no evidence which suggests that Koalas use the site, or areas to the immediate north (Lot 1), as a movement corridor between areas of higher quality habitat. The land in Lot 1 has been reserved for the construction of a high school and is likely to be cleared in the near future. Habitat compensatory measures will be implemented for removal of 0.42 ha of Supplementary Koala Habitat and three Koala food trees. To facilitate any potential movement of Koalas through the site, proposed internal roads of the subdivision will run north/south, with the central road having an increased road verge width (6.5 m) that will be planted with Koala food tree species (*E. robusta*) (refer to **Figure 3**). The development of the movement corridor will align with the objectives set out in the CKPoM and the replacement of preferred Koala food trees will be in accordance with Port Stephens Council Tree Technical Specification (2014). Given that the site currently does not provide a vegetated link between vegetation to the north (Lot 1) and south (Lot 261) of the Development

Performance criteria	Assessment
	Site, has not been identified as a 'Habitat Corridor' in the Medowie Planning Strategy (PSC 2016), the provision of a movement corridor and maintenance of connectivity is considered appropriate. Additional mitigation measures (such as Koala friendly fencing, reduced speed limits, traffic calming devices to slow vehicles and signage) will improve the safe movement of Koalas through the site. Compensatory and mitigation measures detailed in **Section 7.5** aims to maintain potential terrestrial movements of Koalas north/south through the Study Area.

Table 8 Appendix 4 CKPoM performance criteria

Performance criteria		Assessment
c)	Minimise the removal or degradation of native vegetation within Preferred Koala Habitat or Habitat Buffers.	The future development of the site will not remove or degrade Preferred Koala Habitat or Habitat Buffers as determined in this assessment and in accordance with Appendix 6 of the CKPoM.
d)	Maximize retention and minimise degradation of native vegetation within Supplementary Koala Habitat and Habitat Linking Areas.	The proposal will impact 0.42 ha of Supplementary Koala Habitat. The proposal will not impact on Koala Habitat Linking Areas, as determined in this assessment and in accordance with Appendix 6 of the CKPoM.
e)	Minimise the removal of any individuals of preferred koala food trees, wherever they occur on a development site. In the Port Stephens LGA these tree species are Swamp Mahogany (*Eucalyptus robusta*), Parramatta Red Gum (*Eucalyptus parramattensis*), and Forest Red Gum (*Eucalyptus tereticornis*), and hybrids of any of these species. An additional list of tree species that may be important to koalas based on anecdotal evidence is included in Appendix 8.	A small area of native vegetation bordering the northern boundary and a small area within the center of the Development Site have been classified as Supplementary Koala Habitat (0.42 ha) as part of this assessment. The Supplementary Koala Habitat contains three *E. robusta* individuals (northern portion of the site) which would require removal for future development.
f)	Make provision, where appropriate, for restoration or rehabilitation of areas identified as Koala Habitat including Habitat Buffers and Habitat Linking Areas over Mainly Cleared Land. In instances where Council approves the removal of koala habitat (in accordance with dot points 1-4 of the above waive clause), and where circumstances permit, this is to include measures which result in a "net gain" of koala habitat on the site and/or adjacent land.	The Development Site predominantly contains Mainly Cleared Land (contain exotic grassland, infrastructure, and exotic trees). A small area of native vegetation bordering the northern boundary and a small area within the center of the Development Site have been classified as Supplementary Koala Habitat (0.42 ha) as part of this assessment. The PSC Koala Habitat Planning Map for Medowie and Tilligerry, maps vegetation to the south (Lot 261) of the Development Site as Preferred Koala Habitat and the vegetation to the north (Lot 1) as Marginal Koala Habitat, Other Vegetation (exotic trees) and Mainly Cleared. An assessment undertaken on 18 April 2023 identified that the vegetation to the north (Lot 1) and the south (Lot 261) does not contain preferred Koala feed trees and based on composition of species better aligns with the Supplementary Koala Habitat classification. The land in Lot 1 has been reserved for the construction of a high school and is likely to be cleared in the near future. The Development Site is not identified as a corridor within the Medowie Planning Strategy (PSC 2016), and there is no evidence which suggests that Koalas use the site or areas to the north, as a movement corridor between areas of higher quality habitat. Additionally, no areas to the north of the site that are mapped as Habitat Linking Areas, which are typically designated to areas that have the potential to provide opportunities for effective movement of dispersing sub adult Koalas between breeding populations and vacant habitat areas. Habitat compensatory measures will be implemented for removal of 0.42 ha of Supplementary Koala Habitat and three Koala food trees. To facilitate any potential movement of Koalas through the site, proposed internal roads of the subdivision will run north/south, with the central

Performance criteria	Assessment
	road having an increased road verge width (6.5 m) that will be planted with Koala food tree species (*E. robusta*) (refer to **Figure 3**). The development of the movement corridor will align with the objectives set out in the CKPoM and the replacement of preferred Koala food trees will be in accordance with Port Stephens Council Tree Technical Specification (2014). Given that the site currently does not provide a vegetated link between vegetation to the north (Lot 1) and south (Lot 261) of the Development Site, has not been identified as a 'Habitat Corridor' in the Medowie Planning Strategy (PSC 2016), the provision of a movement corridor and maintenance of connectivity is considered appropriate. Additional mitigation measures (such as Koala friendly fencing, reduced speed limits, traffic calming devices to slow vehicles and signage) will improve the safe movement of Koalas through the site. Compensatory and mitigation measures detailed in **Section 7.5** aims to maintain potential terrestrial movements of Koalas north/south through the Study Area.
g) Make provision for long term management and protection of koala habitat including both existing and restored habitat.	Long-term management will be achieved through the maintenance of a movement corridor through the center of the site (increased road verge width to 6.5 m and planting of Koala feed trees), ensuring connectivity between areas to the north and south of the site. Given the lack of existing vegetation within the site and lack of evidence that Koalas use the site, there is little justification for restoring a vegetated corridor. An assessment was made against the criteria detailed in Section 7.2 of the CKPoM (Habitat Restoration Actions) which concluded that the site did not meet the criteria for a priority area for koala habitat restoration (see **Appendix E**).

Figure 7 - Habitat Features and Koala Habitat Mapping

HABITAT ENVIRONMENTAL SERVICES

Legend

- Study Area
- Mainly Cleared
- Other Vegetation (exotic pine)
- Supplementary Koala Habitat
- Hollow Bearing Tree
- Kookaburra nest (old termite nest)
- Koala Feed Tree (E. robusta)
- Cadastral Boundary

0 40 80 120 Meters

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5.1.4 Ecosystem Credit Species

The following assessment of habitat suitability for Ecosystem Credit Species was conducted in accordance with Section 6.2 of the BAM. Ecosystem credits represent threatened species that can be predicted to be present by the type and condition of the vegetation. Targeted surveys are not required for Ecosystem Credit Species.

Step 1: Identify threatened species for assessment

A list of predicted Ecosystem Credit Species for the Development Site was reviewed in the BAM calculator, according to PCTs present. The Predicted Species Report is provided within **Appendix C**.

Step 2: Assessment of the habitat constraints and vagrant species on the subject land

The potential for Ecosystem Credit Species to occur on the Development Site was assessed according to the sensitivity to gain (StG) derived from the ecosystem credit species, the associated PCT and species-specific habitat requirements, as detailed in **Table 9**. No Ecosystem Credit Species were removed from the assessment.

Table 9 Small Area Ecosystem Credit Species

Scientific name	Common name	StG	Confirmed Predicted Species	Justification
Chthonicola sagittata	Speckled Warbler	High	Yes	Suitable habitat present.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	High	Yes	Suitable habitat present.
Daphoenositta chrysoptera	Varied Sittela	Moderate	Yes	Suitable habitat present.
Dasyurus maculatus	Spotted-tailed Quoll	High	Yes	Suitable habitat present.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging	High	Yes	Suitable habitat present.
Hirundapus caudacutus	White-throated Needletail	High	Yes	Suitable habitat present.
Neophema pulchella	Turquoise Parrot	High	Yes	Suitable habitat present.
Ninox connivens	Barking Owl	High	Yes	Suitable habitat present.

5.1.5 Species Credit Species

Step 1: Identify threatened species for assessment

A preliminary list of predicted Species Credit Species for the Development Site was reviewed in the BAM Calculator (BAM-C). Species credits pertain to threatened species that cannot be predicted by the vegetation present. A Candidate Species Report is provided within **Appendix C**.

Step 2: Assessment of the habitat constraints and vagrant species on the subject land

The potential for identified Species Credit Species to occur on the Development Site was assessed according to species specific habitat requirements.

Step 3: Identify Candidate Species Credit Species for further assessment

The BAM-C did not generate any Candidate Species Credit Species for the Development Site. There are no areas of suitable habitat for Species Credit Species within the Development Site. No further assessment was required.

5.2 Threatened Species Surveys

Step 4: Determine presence or absence of Candidate Species Credit Species.

5.2.1 Flora Surveys

No preliminary Candidate threatened flora species were returned by the BAM-C, and no threatened flora species were determined to be Candidate Species for further assessment. Conversely, targeted flora surveys were undertaken on 14 June 2022, 19 September 2022 and 23 February 2023 (refer to **Figure 8**).

One threatened flora species, *Macadamia tetraphylla* (Rough Macadamia), was recorded in Lot 2 during the assessment. This species is planted and is widely cultivated, occurring outside of its natural distribution (northern NSW) within the Development Site. No other threatened flora species were detected during the assessment.

5.2.2 Fauna Surveys

No preliminary Candidate threatened fauna species were returned by the BAM-C and no threatened fauna species were determined to be Candidate Species for further assessment. To ensure that a comprehensive threatened species assessment was prepared, the following surveys were undertaken:

- One Koala scat survey (Spot Assessment Technique – SAT)
- A nocturnal fauna survey (spotlighting and call playback) was undertaken in VZ01 near the three *E. robusta* (a Koala feed tree species for the locality) (refer to **Figure 9**).

No threatened fauna species were detected during the assessment.

Figure 8 - Threatened Flora Survey Effort

Legend

- Study Area
- Threatened Flora Survey Track (14/06/2022)
- Threatened Flora Survey Track (19/09/2022)
- Threatened Flora Survey Track (23/02/2023)

0 0 0.1 0.1 Kilometers

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Figure 9 - Threatened Fauna Survey Effort

Legend

- Study Area
- Koala Call Playback (23/02/2023)
- Koala SAT Test (24/03/2023)
- Habitat Assessment Survey Track (14/06/2022)
- Nocturnal Survey Track (23/02/2023)

0 0 0.1 0.1 Kilometers

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6 Avoiding and Minimising Impacts

Avoidance and minimisation measures considered by the proponent for the proposed rezoning and future two stage residential subdivision development are outlined in the following sub sections.

6.1 Development Options

The proposed rezoning and indicative two stage subdivision layout was designed following the review of the PEA (Habitat 2022), the pre-lodgment scoping stage assessment and with consideration of the key biodiversity issues and additional information raised by PSC and relevant agencies (2023).

The Development Site was considered by the proponent to be suitable for rezoning and future development based on the following:

- The Development Site was initially selected based on the absence of biodiversity values as the land supports very few areas of native vegetation, contains no EECs, and does not provide high quality habitat for habitat for any threatened species known to occur within the locality
- The Development Site is zoned RU2 and is identified in the Medowie Planning Strategy (PSC 2016) as an area for potential future development (residential release areas)
- Existing use is rural-residential, and each lot contains infrastructure and have been subject to varying levels of historic and current management
- The Development Site is comprised of 4.68 ha (92 per cent) of exotic/ planted and cleared grassland vegetation
- Impacts on native vegetation and threatened species habitat would be limited to 0.42 ha (eight per cent) of low to moderate condition native vegetation.

While the Development Site currently lacks vegetation necessary to facilitate fauna connectivity, several design options have been considered by the proponent to ensure that the future subdivision design implements a north / south movement corridor for Koalas and other fauna species through the site. Options considered include:

- A movement corridor along the western boundary of the Development Site:
    - This option would connect to a stand of exotic pine trees located in Lot 1 (north) and would require reconfiguration of the existing layout
    - The reconfiguration would result in a loss of residential lots beyond the target set for this precinct under the Medowie Planning Strategy (PSC 2016).
- A movement corridor through the center of the Development Site:
    - This option would provide better connectivity to native vegetation in Lot 1 (north) and in Lot 261 (south)
    - While the existing layout would require reconfiguration, it would not reduce residential lots beyond the targets set for this precinct under the strategy.

The preferred option is comprised of Stage 1 (33 lots) and Stage 2 (29 lots) and would incorporate a 4.5 m wide vegetated road verge around subdivision boundaries and a 6.5 m road verge running north / south through the centre of the site (refer to **Figure 3**). The 6.5 m road verge will be developed and planted to facilitate fauna movement and maintain terrestrial connectivity to north and the

south. While street trees are proposed, these will only provide temporary refuge (once matured) and are unlikely to provide dense canopy linkage. Long-term management will be achieved through the maintenance of a movement corridor.

The preferred option is considered appropriate as an offset due to the following:

- The site currently does not provide a vegetated link between vegetation in Lot 1 or Lot 261
- There is no evidence that Koalas use the site or vegetation to the north
- The Development Site has not been identified as a 'Habitat Corridor' under the Medowie Planning Strategy (PSC 2016)
- Land in Lot 1 is reserved for a High School. The vegetation is likely to be removed for construction and to achieve setbacks in accordance with NSW Planning for Bushfire Protection (NSW RFS 2019)
- Measures to manage faunal movements will be integrated into the residential design (refer to **Section 6.2** and **Section 7.5.**)

An assessment in accordance with Section 7.2 of the CKPoM (Habitat Restoration Actions) was under taken (refer to **Appendix E**). The assessment determined the Development Site does not meet the criteria for a priority area for Koala habitat restoration.

6.2 Minimisation and Mitigation

Several mitigation measures and safeguards have been incorporated into the construction and operation of the proposal in an effort to avoid and minimise impacts on biodiversity values. The primary mitigation measures proposed include:

- The replacement of hollow-bearing trees with constructed nest boxes at a ratio of 1:1
- The incorporation of a 4.5 m wide vegetated road verge around subdivision boundaries, signage and traffic calming and slowing devices
- The incorporation of a 6.5 m road verge (eastern side of Road 4) which runs north/south through the centre of the site to allow for potential Koala movements (refer to **Figure 3**).

Road verges will be planted with street trees including preferred Koala feed tree species (*Eucalyptus robusta)*. This species has a dense canopy and large leaves making it suitable as a shade tree and is a listed preferred Koala food tree. The 6.5 m road verge will be planted more densely with tree species listed in the PSC Tree Technical Specification (2014) to facilitate fauna movement from patches of vegetation to north (Lot 1) and the south (Lot 261) through the Development Site.

Measures to manage faunal movements will be integrated into the residential design through the implementation of a post and wire fence along the northern and southern boundaries, lap and cap timber fencing between future lot boundaries, signage, enforced speed limits and traffic calming devices to slow vehicles. A Section 88B restriction under the NSW *Conveyancing Act 1919,* requiring a lap and cap timber fence, would be implemented on title for future lot boundaries. Additional mitigation measures are further detailed in **Section 7.5.**

7 Assessment of Impacts

7.1 Removal of Native Vegetation

The proposal will impact approximately 0.37 ha of moderate condition vegetation, 0.05 ha of low condition vegetation, 1.04 ha of planted vegetation and 3.64 ha of cleared grassland. Each vegetation zone equates to one management zone, and the future value of each attribute (composition, structure, and function) and the vegetation integrity score for VZ 01 to VZ 04 will be zero (refer to **Table 10**).

Table 10 Impacts on native vegetation

VZ	PCT	Condition class	Impacted (ha)	Current VI Score	Future VI Score	Retained
01	1621	Moderate	0.37	53.7	53.7	0
02	1621	Low	0.05	10.5	10.5	0
03	1621	Planted/exotic	1.04	16.6	16.6	0
04	1621	Cleared grassland	3.64	2.3	2.3	0

7.2 Removal of Habitat Features

A summary of habitat removal proposed is as follows:

- Removal of small areas of native vegetation, which occur in a fragmented state and do not represent important habitat for locally occurring flora and fauna species
- Removal of three hollow bearing trees, one of which contained a vacant termite nest occupied by a Kookaburra, and three Koala feed tree species (*E. robusta*).

No other direct impacts to fauna habitat are proposed.

7.3 Indirect Impacts

7.3.1 Edge Effects

The proposal has minor potential to cause a change in abiotic conditions. Edge effects may cause adverse changes to the structure and function of areas of retained vegetation from factors such as increased light intensity and duration, increased exposure to wind, dust and weed invasion in edge habitats and adjoining vegetation.

The majority of the Development Site is already affected by edge affects, therefore, the conditions following the clearing of native vegetation are unlikely to substantial change or modify the abiotic conditions of retained adjacent vegetation. Indirect impacts to retained adjacent vegetation and habitats can be minimised and avoided through the implementation of the mitigation measures detailed in **Section 7.5**.

7.3.2 Loss of hollows

Hollows represent important microhabitat features and provide potential nesting and breeding sites for arboreal fauna and bird species. Although no nesting or birding sites for threatened fauna were

identified during the assessment, pre-clearance surveys for fauna and the erection of nest boxes should be undertaken prior to any clearing activity (refer to **Section 7.5**).

7.3.3 Transport of weeds and pathogens

The activities associated with clearing vegetation and increased human presence during construction and operation have potential to introduce waste and weeds into adjacent vegetation outside the proposal as well as increase the risk of introducing plant and animal diseases carried on machinery. A consolidated list of plant species from the flora survey identified a high number of weed species (45 species), of these several (12 species) are considered high threat weeds. If not managed, weed incursion and the introduction of waste and disease during construction activities can reduce the viability and vegetation integrity of adjacent habitats.

7.3.4 Noise and Vibration

Anthropogenic noise can alter the behavior of animals or interfere with their normal functioning. During construction of the proposal there will likely be increased noise and vibration levels in the Development Site due to vegetation clearing, ground disturbance, machinery and vehicle movements, and general human presence. Noise impacts during operation are expected to be minimal.

7.3.5 Contamination

During the construction phase localised release of contaminants (hydraulic fluids, oils, drilling fluids, etc.) into the surrounding environment may accidentally occur. Accidental release of contaminants is considered low risk, and if it did occur would likely to be localised and able to be contained. Control measures will include ensuring that accidental spills are immediately reported and remediated. Provided that appropriate mitigation measures (**Section 7.5**) and management plans are enforced, indirect impacts are likely to be mitigated.

7.4 Prescribed Biodiversity Impacts

The following are prescribed impacts which need to be considered as per Section 8.3 of the BAM (DPIE 2020a).

Impacts of the development on the habitat of threatened species or ecological communities associated with significant geological features, human made structure or non-native vegetation.

The habitat within the Development Site for threatened species and ecological communities is not associated with significant geological features or human made structure. The clearing of non-native vegetation is unlikely to impact threatened fauna movements as connectivity will be maintained north/south through the site via internal roads with increased verge widths and supplementary planting of preferred Koala feed tree species. Mitigation measures to minimise any indirect impacts to biodiversity values within the Development Site are detailed in **Section 7.5**.

Impacts of the development on the connectivity of different habitat which facilitates movement of threatened species.

The Development Site is predominantly cleared and highly fragmented. Quality movement corridors for fauna species occur further to the north and the south of the site. Habitat connectivity in these

areas will be unaffected by the proposal. The maintenance of a north/south movement corridor through the center of the Development Site will ensure connectivity is achieved for threatened species including the Koala.

Impact of the development on movement of threatened species that maintains their life cycle.

As discussed above, the proposal would have limited impacts on the movement of threatened species in the locality. While a small area of native vegetation is proposed to be removed, movement corridors within the local area would be maintained further to the north and the south of the Development Site, while the maintenance of a north/south movement corridor through the center of the Development Site will ensure connectivity is achieved for threatened species including the Koala.

Impacts of the development on water quality, bodies and hydrological processes that sustain threatened species or ecological communities.

No threatened ecological communities are reliant on hydrological processes or waterbodies that occur within the Development Site. Overland flow (surface water flow following rainfall events) may be impacted to a minor extent due to increased hardstand areas, however, this is not likely to be significant.

Impact of wind turbine strikes on protected animals.

Not applicable to the current application.

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

Given the nature of the proposal (future construction of a subdivision) it is likely that there will be an increase in vehicle movement within proximity to the Development Site. To minimise potential impacts from increased movement of vehicles during the construction phase appropriate mitigation measures, such as speed limits will be enforced, as outlined below in **Section 7.5**.

7.5 Mitigation Measures

The measures outlined in **Table 11** are proposed to minimise and avoid potential impacts associated with the proposed development.

Table 11 Mitigation Measures

Impact	Action and Outcome	Responsibility	Timing
Direct impact / prescribed impact			
Clearing of native vegetation	• Avoid and minimise clearing impacts to native vegetation where possible. • Clearly delineate the boundaries of the project footprint to prevent any unnecessary clearing beyond its extent. This includes the installation of appropriate fencing along the extent of the Development Site. • Fencing should prohibit entry into the retained vegetation area and minimise indirect impacts during construction such as the movement of dust and rubbish into the forest. • Ensure vehicle and equipment parking areas and stockpile areas are identified and positioned to avoid areas containing ecological value, i.e., no stockpiling or parking in retained forest. Stockpiling must not occur within, or in close proximity (5m) to, areas of native vegetation in adjacent habitat. • Suitable areas for stockpiling may be exotic areas of vegetation and current cleared areas or infrastructure. • Appropriate signage such as 'no-go zone' or 'environmental protection area' should be installed around the boundaries of the Development Site. • Clearly identify and communicate the location of any 'no-go zones' in site inductions. • Tree protection measures should be implemented where appropriate to protect retained trees surrounding the Development Site. • Tree protection measures should consider allowances for Tree Protection Zones in accordance with AS4970 (Standards Australia, 2009).	Construction site manager	Prior to and during vegetation clearing
Removal of hollow-bearing trees / habitat trees, resulting in fauna injury and mortality	• Limit removal of trees to that required within the project footprint where possible.	Construction site manager	Prior to and during vegetation clearing

Impact	Action and Outcome	Responsibility	Timing
	• Pre-clearance surveys will be undertaken to determine if any inhabiting fauna, or habitat features (nests or hollows) are present 24 hours prior to clearing. • A staged habitat removal process is required for removal of habitat (hollow-bearing trees and nests). Staged habitat removal minimises direct impacts on fauna by providing them with an opportunity to vacate hollows and relocate naturally. The process includes: ○ If possible, avoid clearing during breeding seasons for hollow-dependent fauna and non-hollow dependent fauna, specifically nesting birds. ○ Contact vets and wildlife carers before construction activities commence. ○ Ensure a licensed wildlife carer and/or ecologist is present during vegetation clearing/habitat removal. ○ Adopt a two staged habitat removal strategy, for example clearing non-habitat trees first (shrubs, regrowth, ground cover) followed by habitat trees. Allow at least 24 hours for fauna to vacate habitat before removing habitat trees. ○ Fell habitat trees carefully using equipment that allows habitat trees to be lowered to the ground with minimal impact (claw extension). Do not fell trees towards exclusion zones. ○ Ensure a wildlife carer and/or ecologist inspects trees before and after felling. Capture and relocate non-injured fauna that are found in any felled trees to pre-determined habitat identified for fauna release to be undertaken by a licensed ecologist or wildlife carer.		
Compensatory Habitat	• Prior to clearing activities nest boxes will be installed in adjacent vegetation at a ratio of 1:1 and will correspond to the size of each hollow removed. • Rehabilitation and landscape planting within road verges will include Koala feed tree species as listed in Port Stephens Council Tree Technical Specification (2014), such as *E. robusta*.		

Impact	Action and Outcome	Responsibility	Timing
	• The development of a north / south corridor within the 6.5 m road verge densely planted with tree species listed in the Port Stephens Council Tree Technical Specification (2014) to facilitate fauna movement from patches of vegetation to north and the south through the Development Site. • The implementation of a post and wire fence along the northern and southern boundaries, signage and enforced speed limits and traffic slowing devices. • A Section 88B restriction that requires a lap and cap timber fence for future lot boundaries.		
Impacts to surface and groundwater quality and quantity due to sediment run-off and/or contaminant runoff into adjacent watercourses	• Source controls such as sediment fences, mulching and jute matting should be utilised where appropriate. • Site-based vehicles should carry spill kits. • Erosion and sediment control will be required for the development in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004) prior to commencement of construction. • Limit the use of pesticides in the project footprint where possible to avoid contamination off site.	Construction site manager	During vegetation clearing, construction and operation
Vehicle collision with fauna	• Speed limits within the Development Site should be limited to 20 km/hr. This limit should be clearly signed at all entry points to site. Vehicle calming devices will also be installed to slow vehicles. • The Development Site should be separated from vegetated areas throughout the construction and operational phases of the development. This separation should be achieved through physical barriers including fencing and appropriate signage.	Construction site manager	During construction and operation
Indirect Impact			
Transfer of weeds and pathogens to and from site	• The fungal pathogens *Phytophora cinnamomi* and Myrtle Rust (*Puccinia psidii*) are known to occur in the region, however, it is unknown if they occur within the Development Site. These pathogens can have devastating impacts on native plant communities and inhabiting fauna if not properly managed. • Vehicles and equipment should arrive clean and leave clean.	Construction site manager	During vegetation clearing, construction, and operation

Impact	Action and Outcome	Responsibility	Timing
	• Vehicles should follow formed tracks / driveways where appropriate. • High-threat weeds occur within the Development Site. Topsoil is to be disposed of appropriately and not stored within retained vegetation. Any stored topsoil piles should be covered or threatened regularly for emerging weeds.		
Noise, vibration, lighting, waste and air pollution impacts to adjacent sensitive habitat areas	• Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat. • Measures to mitigate impacts on flora and fauna from noise, vibration, waste, light and air pollution such as: ○ Enforce 'carry-in, carry-out' policy regarding rubbish and waste materials generated on-site during construction to avoid waste materials entering adjacent vegetation. ○ Restriction of public access and associated impacts from domestic pets, waste dumping and damage to adjoining vegetation must be enforced pre, during and post construction. ○ Fence sensitive areas to delineate 'no-go' zones. ○ Levels of lighting within the site should be reduced to a minimal level to reduce any adverse effects upon the essential behavioral patterns of light-sensitive fauna. ○ Lighting should comply with Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting. ○ Noise minimisation practices in accordance with DPE recommendations ○ Dust control measures should involve covering loads where required; stopping operations under excessive wind conditions including ceasing operations if required; use of water tankers as required to control dust; truck wheel washes or other dust removal measures.	Construction site manager	During construction and operation

8 Impact Summary

8.1 Serious and Irreversible Impacts

No species at risk of Serious and Irreversible Impacts (SAIIs) will be impacted as a result of the proposal. No SAIIs assessments have been completed.

8.2 Impacts Requiring Offset

The determination of impacts on the development site which requires an offset was undertaken in accordance with Section 10.1 of the BAM.

8.2.1 Impacts on Native Vegetation

In accordance with Section 9.2.1 of the BAM assessors must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that have a VI Score of:

- ≥15, where the PCT is representative of an EEC or a CEEC
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a Threatened Ecological Community (TEC)
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

The proposal will result in the clearing of 5.1 ha of vegetation ranging in condition (moderate to cleared), however, only VZ 01V (0.37 ha) has a current VI score of greater than 20 (53.7). An ecosystem credit obligation is incurred for impacts to this zone (**Table 12**). The Biodiversity Credit Report is provided in **Appendix C**. Impacts requiring offset and areas not requiring offset are detailed in **Figure 10**.

Table 12 Direct Impact to PCT Requiring Offset

VZ	PCT	Impact Area (ha)	Current VI score	Future VI score	Ecosystem Credits required
01	1621	0.37	53.7	0	7

Figure 10 - Impact Requiring Offset and Areas Not Requiring Offset

HABITAT ENVIRONMENTAL SERVICES

Legend

- Study Area
- Vegetation Requing Offset
- Vegetation Not Requiring Offset
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ01 - moderate)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ02 - low)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ03 - planted/exotic)
- PCT 1621 Smooth-barked Apple open forest on coastal lowlands of the Central Coast (VZ04 - cleared grassland)

9 Legislative Review

9.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act requires that developments or undertakings that are likely to have a significant impact on Matters of National Environmental Significance (MNES) be referred for a determination as to whether they are a controlled action that requires approval under the EPBC Act. The current proposal will not impact on EPBC Act listed MNES.

9.2 Biosecurity Act

No listed priority weed species for the Port Stephens Council LGA were detected within the Development Site.

9.3 Port Stephens Council Comprehensive Koala Plan of Management

An assessment in accordance with Appendix 2, 4 and 6 of the PSC CKPoM determined that the proposal and future development of the Development Site will be consistent with the objectives and performance criteria of the CKPoM. The implementation of compensatory and mitigation measures detailed in **Section 7.5** will achieve a net gain of potential terrestrial movement of Koalas north/south through the Development Site.

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Appendix A – Flora and Fauna List

Flora Species List

Form	Name	Q01	Q02	Q03	Q04	Q05	Lot 1 /Lot 261
Exotic	*Cirsium vulgare*			0.5			
Exotic	*Citrus sp.*		3				
Exotic	*Commelina benghalensis*					0.1	
Exotic	*Facelis retusa*	0.1					
Exotic	*Fumaria muralis*		0.3				
Exotic	*Gamochaeta calviceps*		0.2				
Exotic	*Gamochaeta purpurea*				0.3		
Exotic	*Hypochaeris radicata*	0.1	0.1				
Exotic	*Lysimachia arvensis*		0.5			0.1	
Exotic	*Malva parviflora*				0.2		
Exotic	*Modiola caroliniana*		5				
Exotic	*Nephrolepis cordifolia*		0.3				
Exotic	*Nerium oleander*			0.1			
Exotic	*Oxalis corniculata*			0.2			
Exotic	*Paronychia brasiliana*		0.1		0.1		
Exotic	*Paspalum sp.*					25	
Exotic	*Pelargonium sp.*		1				
Exotic	*Plantago lanceolata*		0.5				
Exotic	*Plantago major*		0.2				
Exotic	*Poa annua*		5				
Exotic	*Polygala virgata*	0.1					
Exotic	*Richardia humistrata*	2	0.2	0.5	1		
Exotic	*Setaria parviflora*			0.1			
Exotic	*Sida rhombifolia*		0.2	1	0.2	0.2	
Exotic	*Sisyrinchium rosulatum*			0.3			
Exotic	*Soliva sessilis*		0.2				
Exotic	*Sonchus oleraceus*		0.2				
Exotic	*Sporobolus africanus*		1				
Exotic	*Stellaria media*		0.2				
Exotic	*Stenotaphrum secundatum*		0.5				
Exotic	*Trifolium repens*		0.3				
Exotic	*Trifolium sp.*			0.1			
Exotic	*Verbena bonariensis*			0.1			
Fern	*Cheilanthes sieberi*	0.1					
Forb	*Brunoniella australis*	0.1					
Forb	*Dianella caerulea*	0.1					
Forb	*Dichondra repens*	5					x
Forb	*Hydrocotyle sibthorpioides*	0.5					
Forb	*Hypericum gramineum*				0.1		
Forb	*Lobelia purpurascens*	0.2					x
Forb	*Oxalis perennans*	0.1	0.5				

Form	Name	Q01	Q02	Q03	Q04	Q05	Lot 1 /Lot 261
Forb	*Rumex brownii*		0.1				
Forb	*Viola betonicifolia*	0.1					
Grass (Grass-like)	*Carex inversa*	0.1					
Grass (Grass-like)	*Cynodon dactylon*		50	95	50		
Grass (Grass-like)	*Entolasia marginata*	0.1					
Grass (Grass-like)	*Entolasia stricta*	1					
Grass (Grass-like)	*Imperata cylindrica*	5					x
Grass (Grass-like)	*Juncus krausii*			0.2	2		
Grass (Grass-like)	*Lepidosperma laterale*	0.1					x
Grass (Grass-like)	*Lomandra confertifolia*	0.2					
Grass (Grass-like)	*Lomandra longifolia*	0.2					x
Grass (Grass-like)	*Microlaena stipoides var. stipoides*	2					
Grass (Grass-like)	*Oplismenus aemula*	20	0.5				
Grass (Grass-like)	*Schoenus apogon*		1				
HTW	*Axonopus fissifolius*			0.5	0.5		
HTW	*Bidens pilosa*		0.1				
HTW	*Cenchrus clandestinus*		0.5	1	5		
HTW	*Cinnamomum camphora*	5				0.1	x
HTW	*Erharta erecta*		2				
HTW	*Lantana camara*	0.1		0.2			x
HTW	*Ligustrum sinense*	0.5	0.1	0.5		0.1	x
HTW	*Olea europaea subsp. cuspidata*	0.1					
HTW	*Pinus elliotii*	1					x
HTW	*Rumex acetosella*					0.1	
HTW	*Senecio madagascariensis*			0.1			
HTW	*Senna pendula*		0.2				
Other	*Billardiera scandens*	0.1					
Other	*Glycine tabacina*	0.2					
Other	*Maekawaea rhytidophylla*	0.1					
Other	*Parsonsia straminea*	0.1					x
Shrub	*Acacia ulicifolia*						x
Shrub	*Breynia oblongifolia*	0.1				0.2	x
Shrub	*Callistemon viminalis*		1				
Shrub	*Daviesia ulicifolia*	0.1					
Shrub	*Lomatia silaifolia*	0.1					x
Shrub	*Pittosporum undulatum*	2					x
Tree	*Acacia maidenii*	0.2					
Tree	*Angophora costata*	5					x
Tree	*Corymbia gummifera*	2					x
Tree	*Eucalyptus pilularis*	30					x
Tree	*Eucalyptus piperita*	5	10		10		x
Tree	*Eucalyptus robusta*	0.5					

Form	Name	Q01	Q02	Q03	Q04	Q05	Lot 1 /Lot 261
Tree	*Glochidion ferdinandi*	0.1					x
Tree	*Melaleuca quinquenervia*						x

Fauna Species List

Scientific Name	Common Name	Observation Type
Aviceda subcristata	Pacific Baza	VO
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	H
Cracticus tibicen	Australian Magpie	VO, H
Cracticus torquatus	Grey Butcherbird	VO, H
Grallina cyanoleuca	Magpie-lark	VO
Manorina melanocephala	Noisy Miner	H
Pardalotus punctatus	Spotted Pardalote	H
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet	H
Trichoglossus haematodus	Rainbow Lorikeet	VO, H
Trichosurus vulpecula	Common Brushtail Possum	VO
Vanellus miles	Masked Lapwing	VO

Observation Type: VO (Visual Observation), H (Heard whilst on site), ^ Denotes introduced species.

Appendix B – Threatened Species Database Search

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained from the DPE BioNet Atlas: (http://www.bionet.nsw.gov.au/).

The table below summarises the likelihood of threatened species occurring within the Development Site based on the habitat requirements of each species.

Definition of the likelihood of occurrence criteria are as follows:

- Known – species identified within the site during surveys;
- High – species known from the area (DPE BioNet Atlas records), suitable habitat (such as roosting and foraging habitat) present within the site;
- Moderate – species may be known from the area, potential habitat is present within the site;
- Low – species not known from the area and/or marginal habitat is present within the site; and
- Nil – habitat requirements not met for this species within the site

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Angophora inopina Charmhaven Apple	V	V	8	This species is endemic to the central coast region of NSW and is known to occur in four main vegetation communities: *Eucalyptus haemastoma / Corymbia gummifera / Angophora inopina* woodland / forest; *Hakea teretifolia / Banksia oblongifolia* wet heath; *Eucalyptus resinifera / Melaleuca sieberi / Angophora inopina* sedge / woodland; and *Eucalyptus capitellata / Corymbia gummifera / Angophora inopina* woodland / forest. Flowering generally poor and sporadic.	Low	Habitat is too degraded. Not recorded during site assessment.
Callistemon linearifolius Netted Bottle Brush	V,3	-	6	This shrub grows up to 3-4 m tall, with red flowers that are clustered into the typical "bottlebrushes". The species grows in dry sclerophyll forest on the coast and adjacent ranges.	Low	Habitat is too degraded. Not recorded during site assessment.
Commersonia prostrata Dwarf Kerrawang	E1	E	5	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E. haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago.	Low	Habitat is too degraded. Not recorded during site assessment.
Maundia triglochinoides	V, P	-	3	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Associated with wetland species e.g. *Triglochin procerum*.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Corybas dowlingii Red Helmet Orchid	E1, P	-	4	*Corybas dowlingii* is restricted to the central coast and Hunter regions of New South Wales where it is currently known from the Port Stephens, Bulahdelah, Lake Macquarie and Freemans Waterhole areas. It is known from the local government areas of Cessnock, Great Lakes, Lake Macquarie and Port Stephens.This species prefers sheltered areas such as gullies and southerly slopes in tall open forest on well-drained gravelly soil at elevations of 10-200 m.	Low	Habitat is too degraded. Not recorded during site assessment.
Diuris arenaria Sand Doubletail	E1,P,2		15	Sand Doubletail is known from the Tomaree Peninsula near Newcastle. This species occurs in coastal heath and dry grassy eucalypt forest on sandy flats. Grows in gently undulating country in eucalypt forest with a grassy understorey on clay soil.	Low	Habitat is too degraded. Not recorded during site assessment.
Eucalyptus camfieldii	V	V	3	Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West	Low	Habitat is too degraded.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Camfield's Stringybark				Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone.		Not recorded during site assessment.
Eucalyptus parramattensis subsp. decadens	V	V	633	Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant.	Low	Habitat is too degraded. Not recorded during site assessment.
Grevillea parviflora subsp. parviflora Small-flower Grevillea	V	V	3	The species distribution is between Moss Vale/Bargo and the lower Hunter Valley, with most occurrences in Appin, Wedderburn, Picton and Bargo. The habitat for the species is broad including heath, shrubby woodland and open forest on light clay or sandy soils, and often in disturbed areas such as on the fringes of tracks.	Low	Habitat is too degraded. Not recorded during site assessment.
Melaleuca biconvexa Biconvex Paperbark	V	V	1	Scattered, disjunct populations in coastal areas from Jervis Bay to Port Macquarie, with most populations in the Gosford-Wyong areas. Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low	No suitable habitat within the Development Site. Not recorded during site assessment.
Syzygium paniculatum Magenta Lilly Pilly	E1	V	3	The species occurs in a narrow coastal strip from Bulahdelah to Conjola State Forest. Rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas, often in remnant littoral or gallery rainforests Plants produce white flower-clusters at the end of each branch is the preferred habitat for this species. The petals are small accompanied by prominent long stamens.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Anthochaera phrygia Regent Honeyeater	E4A,P	CE	2	In NSW the species is confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks are seen occasionally in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests. Habitat for the species includes dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.	Low	Foraging habitat only. Not mapped as important habitat. Few records within the locality. Not recorded during site assessment.
Artamus cyanopterus cyanopterus	V,P	-	1	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias	Low	Foraging habitat only.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Dusky Woodswallow				and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.		Not recorded during site assessment.
Calidris ferruginea Curlew Sandpiper	E1,P	CE,C,J,K	1	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Calyptorhynchus lathami Glossy Black-Cockatoo	V,P,2	V	8	Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of Allocasuarina species. Prefers woodland and open forests, rarely away from Allocasuarina. Roost in leafy canopy trees, preferably eucalypts, usually <1 km from feeding site. Nests in large (approx. 20 cm) hollows in trees, stumps or limbs, usually in Eucalypts.	Low	Foraging habitat only. No hollow-bearing trees suitable for breeding. Not recorded during site assessment.
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V,P	-	1	Small grey-brown bird with black streaking on the lower breast/belly and black bars on the undertail. Inhabits Box-Gum woodlands and dry open forest of inland slopes and plains. Preferred woodlands dominant by stringybarks or other rough-barked eucalypts. Forages in trees and on the ground. Endemic to eastern Australia, occurring from the coast to inland plains and western slopes of the great dividing range. Nests in tree or stump hollows greater than 6cm.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Daphoenositta chrysoptera Varied Sittella	V,P	-	5	Sedentary, occurs across NSW from the coast to the far west. Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Sensitive to habitat isolation and loss of structural complexity, and adversely affected by dominance of Noisy Miners. Cleared agricultural land is potentially a barrier to movement. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	Low	Broadly suitable habitat within the Development Site. Not recorded during site assessment.
Ephippiorhynchus asiaticus Black-necked Stork	E1,P	-	1	Primarily inhabits permanent freshwater wetlands and surrounding vegetation including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters. Will also forage in inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water. This species breeds during summer, nesting in or near a freshwater swamp.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Dromaius novaehollandiae Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	E2,P	-	5	On the NSW north coast, Emus occur in a range of predominantly open lowland habitats, including grasslands, heathland, shrubland, open and shrubby woodlands, forest, and swamp and sedgeland communities, as well as the ecotones between these habitats. They also occur in plantations of tea-tree and open farmland, and occasionally in littoral rainforest. The population of Emus in the NSW North Coast Bioregion and Port Stephens LGA is of significant conservation value as the last known population in northern coastal NSW, and for the role that birds play in dispersing large seeds of native plant species, and over long distances.	Low	No suitable habitat within the Development Site. Not recorded during site assessment.
Gallinago hardwickii Latham's Snipe	P	J,K	8	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Glossopsitta pusilla Little Lorikeet	V,P	-	34	The species occurs from the coast to western slopes of the Great Dividing Range and inhabits dry, open eucalypt forests and woodlands. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely-flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands *Eucalyptus albens and E. melliodora* are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts, especially *Eucalyptus viminalis*, *E. blakelyi* and *E. dealbata*. Most breeding records are from the western slopes.	Moderate	Broadly suitable habitat within the Development Site. Not recorded during site assessment.
Haematopus fuliginosus Sooty Oystercatcher	E1,P	-	2	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Nil	No suitable habitat within the Development Site Not recorded during site assessment.
Haematopus longirostris Pied Oystercatcher	E1,P	-	2	Scattered along NSW coast. Favours intertidal flats of inlets and bays, open beaches, and sandbanks. Forages on exposed sand, mud and rock at low tide.	Nil	No suitable habitat within the Development Site

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
				Nests mostly on coastal or estuarine beaches; occasionally saltmarsh or grassy areas.		Not recorded during site assessment.
Haliaeetus leucogaster White-bellied Sea-Eagle	V,P	-	43	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the seashore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion. Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.	Low	Foraging habitat only. No suitable nesting habitat within the Development Site. Not recorded during site assessment.
Hieraaetus morphnoides Little Eagle	V,P	-	1	Occurs throughout NSW except most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	Low	Foraging habitat only. No suitable nesting habitat within the Development Site. Not recorded during site assessment.
Hirundapus caudacutus White-throated Needletail	P	V,C,J,K	9	Widespread in eastern and south-eastern Australia. 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.	Low	Suitable aerial foraging habitat within the Development Site. Not recorded during site assessment.
Lathamus discolor Swift Parrot	E1,P,3	CE	5	A migratory species that travels to the mainland from March to October, the species breeds in Tasmania from September to January. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. *Eucalyptus robusta, Corymbia maculata* and *C. gummifera* dominated coastal forests are also important habitat.	Moderate	Foraging habitat only. Few records within the locality. Not recorded during site assessment.
Limosa lapponica baueri Bar-tailed Godwit (baueri)	P	V	3	It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.

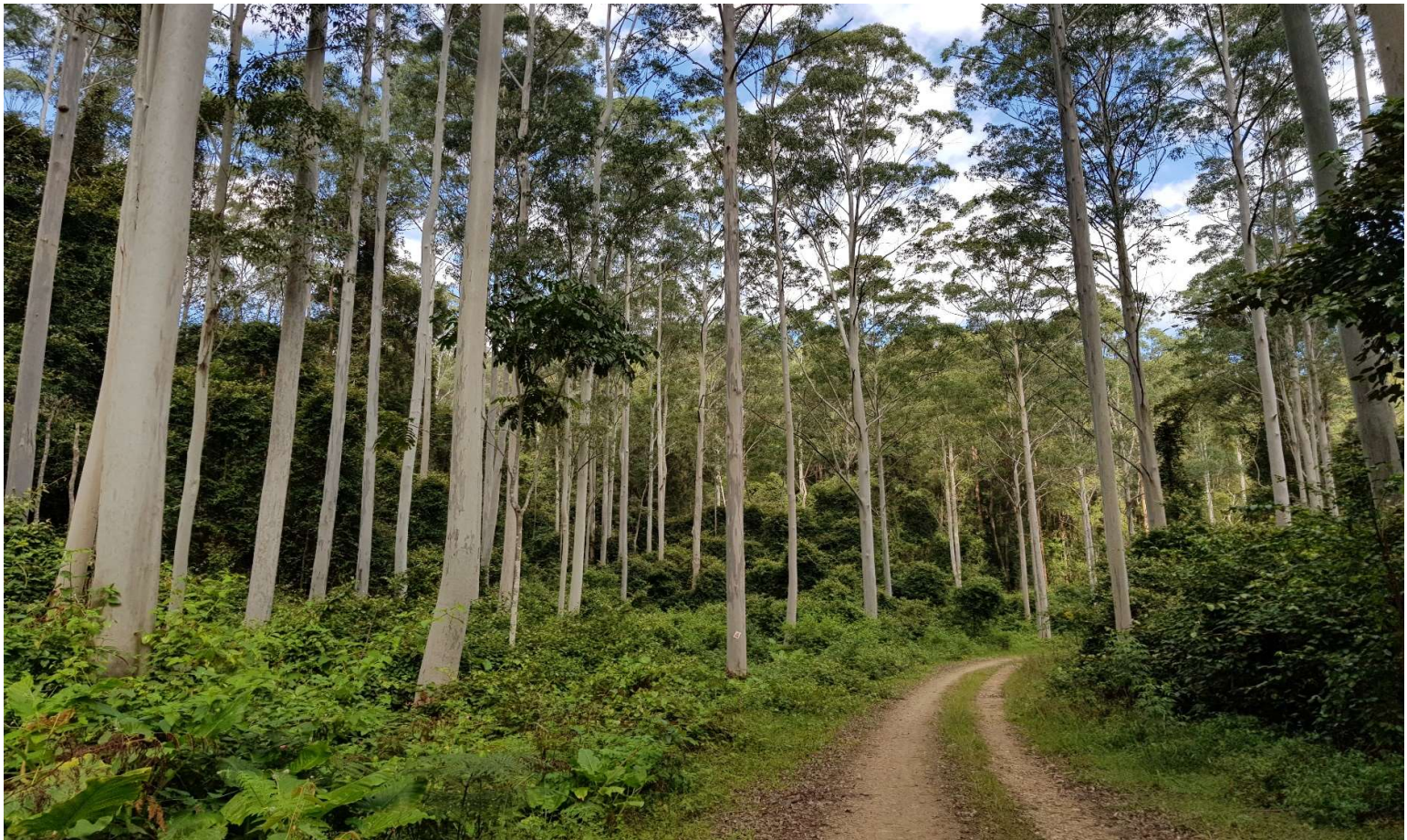
Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Lophoictinia isura Square-tailed Kite	V,P,3	-	2	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Ninox strenua Powerful Owl	V,P,3	-	9	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	Low	Broadly suitable foraging habitat within the Development Site. No suitable nesting Habitat within the Development Site. Not recorded during site assessment.
Pandion cristatus Eastern Osprey	V,P,3	-	2	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Nil	No suitable nesting habitat within the Development Site. Not recorded during site assessment.
Stictonetta naevosa Freckled Duck	V,P		1	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Tyto novaehollandiae	V,P,3	-	4	Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40cm) hollows and sometime caves in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. Home range between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.	Low	Broadly suitable foraging habitat within the Development Site.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Masked Owl						Not recorded during site assessment.
Dasyurus maculatus Spotted-tailed Quoll	V,P	E	12	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania the species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline	Nil	Unsuitable habitat, highly degraded. Not recorded during site assessment.
Falsistrellus tasmaniensis Eastern False Pipistrelle	V,P	-	2	The species occurs on southeast coast and ranges. Prefers tall (>20m) and wet forest with dense understorey. Absent from small remnants, preferring continuous forest but can move through cleared landscapes and may forage in open areas. Roosts include hollow trunks of Eucalypts, underneath bark or in buildings. Forages in gaps and spaces within forest, with large foraging range (12km foraging movements recorded).	Low	Foraging habitat only. No breeding habitat. Not recorded during site assessment.
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	V,P	-	8	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost maily in tree hollows but will also roost under bark or in man-made structures.	Low	Foraging habitat only. No breeding habitat. Not recorded during site assessment.
Miniopterus australis Little Bent-winged Bat	V,P	-	28	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Low	Foraging habitat only. No breeding habitat. Not recorded during site assessment.
Miniopterus orianae oceanensis Large Bent-winged Bat	V,P	-	13	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Low	Foraging habitat only. No breeding habitat. Not recorded during site assessment.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Petaurus norfolcensis Squirrel Glider	V,P	-	27	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. 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 midstorey.	Low	Broadly suitable habitat within the Development Site. Not recorded during site assessment.
Phascogale tapoatafa Brush-tailed Phascogale	V,P		3	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater.	Low to Moderate	Limited suitable habitat available within the Development Site. Not recorded during site assessment.
Phascolarctos cinereus Koala	E2,P	E	1309	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. 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 feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Moderate	Marginally suitable habitat within the Development Site. Not recorded during site assessment.
Pseudomys novaehollandiae New Holland Mouse	P	V	3	The species occurs in disjunct, coastal populations from Tasmania to Queensland. In NSW it inhabits a variety of coastal habitats including heathland, woodland, dry sclerophyll forest with a dense shrub layer and vegetated sand dunes. Species presence is strongly correlated with understorey vegetation density, and high floristic diversity in regenerating heath.	Low	Broadly suitable habitat within the Development Site. Not recorded during site assessment.
Pteropus poliocephalus Grey-headed Flying-fox	V,P	V	40	Generally this species is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Inhabit 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 are commonly found in gullies, close to water, in vegetation with a dense canopy.	Moderate	Broadly suitable foraging habitat within the Development Site. No roosts present. Not recorded during site assessment.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V,P	-	1	Migrates from tropics to SE Aus in summer. Forages across a range of habitats including those with and without trees, from wet and dry sclerophyll forest, open woodland, Acacia shrubland, mallee, grasslands and desert. Seasonal movements are unknown.	Low	Foraging habitat only. No breeding habitat. Only one record within the locality. Not recorded during site assessment.

Species	BC Act	EPBC Act	BioNet	Habitat	LoO	Summary
Scoteanax rueppellii Greater Broad-nosed Bat	V,P	-	12	The species is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Inhabits a variety of habitats from woodland to wet and dry sclerophyll forests and rainforest, also remnant paddock trees and timber-lined creeks.	Low	Foraging habitat only. No breeding habitat. Not recorded during site assessment.
Crinia tinnula Wallum Froglet	V,P	-	8	Found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands under leaf litter, vegetation and other debris. In NSW the species extends from north of the Queensland border south to Kurnell. Breeding occurs in colder months.	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.
Uperoleia mahonyi Mahony's Toadlet	E1,P	E	13	Mahony's Toadlet is endemic to the mid-north coast of NSW and to date has been found between Kangy Angy and Seal Rocks.Current observations indicate Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Commonly associated with acid paperbark swamps, Mahony's Toadlet also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Recent studies suggest intact vegetation adjacent to and within water bodies is an important habitat feature for this species. Associated with shallow ephemeral/semi-permanent water bodies with limited flow of water. Aquatic vegetation at breeding sites includes sedges (Shoenoplectus spp., Baumea spp. and Lepironia articulata) and Broadleaf Cumbungi (Typha orientalis).	Nil	No suitable habitat within the Development Site. Not recorded during site assessment.

Appendix C – Predicted and Candidate Species Reports



BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00038719/BAAS18041/23/00038724

Proposal Name

BAM data last updated *

01/02/2023

Assessor Name

Gilbert Whyte

Assessor Number

BAAS18041

BAM Data version *

57

Proponent Name(s)

Report Created

27/02/2023

BAM Case Status

Open

Assessment Revision

0

Assessment Type

Part 4 Developments (Small Area)

Date Finalised

To be finalised

BOS entry trigger

BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038719/BAAS18041/23/00038724

Proposal Name

BAM data last updated *
01/02/2023

Assessor Name
Gilbert Whyte

Assessor Number
BAAS18041

BAM Data version *
57

Proponent Names

Report Created
27/02/2023

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Not a TEC	5.1	7	0	7

1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Cleared	No	0	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Low	No	0	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Mod	Yes	7	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Planted	No	0	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Credit Summary Report

Proposal Details

Assessment Id 00038719/BAAS18041/23/00038724	Proposal Name	BAM data last updated * 01/02/2023
Assessor Name Gilbert Whyte	Report Created 27/02/2023	BAM Data version * 57
Assessor Number BAAS18041	BAM Case Status Open	Date Finalised To be finalised
Assessment Revision 0	Assessment Type Part 4 Developments (Small Area)	BOS entry trigger BOS Threshold: Area clearing threshold

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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Smooth-barked Apple open forest on coastal lowlands of the Central Coast												
1	1621_Cleared	Not a TEC	2.3	2.3	3.6	PCT Cleared - 30%	High Sensitivity to Gain			1.50		0

2	1621_Low	Not a TEC	10.5	10.5	0.05	PCT Cleared - 30%	High Sensitivity to Gain			1.50		0
3	1621_Mod	Not a TEC	53.7	53.7	0.36	PCT Cleared - 30%	High Sensitivity to Gain			1.50		7
4	1621_Planted	Not a TEC	16.6	16.6	1	PCT Cleared - 30%	High Sensitivity to Gain			1.50		0
											Subtotal	**7**
											Total	**7**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

BAM Predicted Species Report

Proposal Details

Assessment Id 00038719/BAAS18041/23/00038724	Proposal Name	BAM data last updated * 01/02/2023
Assessor Name Gilbert Whyte	Report Created 27/02/2023	BAM Data version * 57
Assessor Number BAAS18041	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Open
Assessment Revision 0	BOS entry trigger BOS Threshold: Area clearing threshold	Date Finalised To be finalised

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Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Speckled Warbler	Chthonicola sagittata	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Spotted-tailed Quoll	Dasyurus maculatus	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Turquoise Parrot	Neophema pulchella	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
Varied Sittella	Daphoenositta chrysoptera	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
White-bellied Sea-Eagle	Haliaeetus leucogaster	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast
White-throated Needletail	Hirundapus caudacutus	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast

Threatened species Manually Added

None added

BAM Predicted Species Report

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00038719/BAAS18041/23/00038724		01/02/2023
Assessor Name	**Report Created**	**BAM Data version ***
Gilbert Whyte	27/02/2023	57
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18041	Part 4 Developments (Small Area)	Open
Assessment Revision	**Date Finalised**	**BOS entry trigger**
0	To be finalised	BOS Threshold: Area clearing threshold

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1621_Cleared	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Cleared	3.64	2	

2	1621_Low	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Low	0.05	1	
3	1621_Mod	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Mod	0.36	1	
4	1621_Planted	1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Planted	1.04	1	

BAM Candidate Species Report

Proposal Details

Assessment Id 00038719/BAAS18041/23/00038724	Proposal Name	BAM data last updated * 01/02/2023
Assessor Name Gilbert Whyte	Report Created 27/02/2023	BAM Data version * 57
Assessor Number BAAS18041	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Open
Assessment Revision 0	Date Finalised To be finalised	BOS entry trigger BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months

Threatened species Manually Added

None added

BAM Biodiversity Credit Report (Variations)

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast	Not a TEC	5.1	7	0	7.00

1621-Smooth-barked Apple open forest on coastal lowlands of the Central Coast

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Cleared	No	0	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Low	No	0	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Mod	Yes	7	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1621_Planted	No	0	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	1621_Cleared	No	0	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	1621_Low	No	0	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	1621_Mod	Yes (including artificial)	7	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	1621_Planted	No	0	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like options

Appendix D – BAM Plot Data

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Zone ID	Recorders			
Date	19 09 22	HBT 76 Blackledge	MOD	B. STEWART			
Zone: 56	Datum: GDA 2020	Plot ID	Q01	Plot dimensions	50x20	Photo #	✓
Easting: 394602	Northing: 6376405	IBRA region	NNC	Midline bearing from 0 m	102°		
Vegetation Class		SYDNEY COASTAL DRY SCLEROPHYLL				Confidence: H M L	
Plant Community Type		3581 HUNTER COAST FOOTHILLS APPLE FORREST		EEC: ✓		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	7
	Shrubs	4
	Grasses etc.	9
	Forbs	7
	Ferns	0
	Other	4
Sum of Cover of native vascular plants by growth form group	Trees	42.8
	Shrubs	2.3
	Grasses etc.	28.7
	Forbs	6.1
	Ferns	0
	Other	0.5
High Threat Weed cover		6.7

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	2	—
50 – 79 cm	3	1
30 – 49 cm	✓	—
20 – 29 cm	✓	—
10 – 19 cm	✓	—
5 – 9 cm	—	—
< 5 cm	—	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	—	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300. .). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	65	30	55	45	20															
Average of the 5 subplots	43%																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 6, 16, 26, 36, 46 m along the plot midline. Litter cover includes leaves, seeds, twigs, bark pieces and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Mismatch	
Lithology		Soil Surface Texture	SANDY – CLAY LOAM	Soil Colour	DARK BROWN	Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify evidence)			
Fire damage			
Storm damage			
Weediness			
Other			MANAGED FOREST.

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3 yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19-09-22	HBT 76 BROKENBRAY	Q01	B. STEWART

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
TG	EUCALYPTUS PILULARIS		30%	6		
TG	EUCALYPTUS PIPERITA		5%	8		
TG	ANGOPHORA COSTATA.		5%	5		
EX	CINNAMOMUM CAMPHORA		5%	5		
SG	PITTOSPORUM UNDULATUM		2%	1		
SG	BANKSIA ULICIFOLIA		0.1	1		
HTW	PINUS ~~sp.~~ ELLIOTII		1%	3		
HTW	LIGUSTRUM SINENSE		0.5%	10		
TG	EUCALYPTUS ROBUSTA		0.5	1		
FG	DICHONDRA REPENS		5%	2500		
EX	RICHARDIA HUMISTRATA		2%	1000		
GG	OPLISMENUS AEMULA		20%	3000		
GG	MICROLAENA STIPOIDES		1%	100		
TG	GLOCHIDION FERDINANDI		0.1%	2		
OG	GLYCINE TABACINA		0.2%	10		
FG	HYDROCOTYLE SIBTHORPIOIDES		0.5%	500		
GG	CAREX ~~sp.~~ INVERSA.		0.1%	20		
EX	HYPOCHAERIS RADICATA		0.1%	20		
FG	LOBELIA PURPURASCENS.		0.2%	100		
SG	BREYNIA OBLONGIFOLIA		0.1%	1		
FG	DIANELLA CAERULEA		0.1%	2		
HTW	LANTANA CAMARA		0.1%	2		
GG	IMPERATA CYLINDRICA		5%	200		
GG	ENTOLASIA STRICTA		1%	100		
OG	MAEKAWAEA ~~RHYTIDOPHYLLA~~ RHYTIDOPHYLLA		0.1%	2		
FG	BRUNONIELLA AUSTRALIS.		0.1%	1		
GG	LOMANDRA LONGIFOLIA.		0.2%	5		
GG	LOMANDRA CONFERTIFOLIA		0.2%	5		
SG	LOMATIA SILAIFOLIA		0.1%	1		
OG	PARSONSIA STRAMINEA		0.1%	1		
HTW	OLEA EUROPEA SUBSP. CUSPIDATA		0.1%	1		
EX	FACELIS RETUSA		0.1%	1		
TG	~~EUCALYPTUS~~ CORYMBIA GUMMIFERA		2%	1		
GG	LEPIDOSPERMA LATERALE		0.1%	1		
GG	ENTOLASIA MARGINATA		0.1	1		
OG	BILLARDIERA SCANDENS		0.1%	1		
FG	CHEILANTHES SIEBERI		0.1%	1		
FG	OXALIS PERENNANS		0.1%	50		
FG	VIOLA BETONICIFOLIA		0.1%	1		
SG	ACACIA ~~LONGIFOLIA~~ MAIDENII		0.2%	1		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

HTW POLYGALA VIRGATA 0.1 2

Project: HBT 76 BROCKLESBY RD PEA.	
Assessor: G. STEWART	
Date: 19-09-22	Plot ID: Q02
Bearing: 280	Datum: GDA 2020
East: 394681	North: 6376311

HABITAT ENVIRONMENTAL SERVICES

Aspect: FLAT	Weeds: HIGH.
Soil/Geology: SANDY LOAM	Condition: PLANTED VEG - MANAGED.
Veg Structure: MANAGED FOREST	

PCT: 3581 - HUNTER COAST FOOTHILLS APPLE FOREST	EEC: NO.
	Veg Zone: PLANTED.

Litter Cover	
P1	5
P2	2
P3	2
P4	1
P5	2
Average:	2.4%

Tree Stems (DBH)	P	Stem Count	Hollows
>80cm	✓	1	0
50-79cm	✓	2	0
30-49cm	✗		
20-29cm	✗		
10-19cm	✗		
5-9cm	✗		
<5cm	✗		

Length Logs (m)	
0	
	Total: 0

GF Code	Species	Cover	Abundance
Tg.	EUCALYPTUS PIPERITA	10%	3
Sc	CALLISTEMON ~~SPP~~ VIMINALIS.	1%	2
EX	CITRUS SP. (LIME)	3%	4
Ex	MODIOLA CAROLINIANA	5%	500
EX	PLANTAGO LANCEOLATA	0.5%	50
Gg	CYNODON DACTYLON	50%	2000
Ex	~~SPOROBOLUS FOETIUS~~ AFRICANUS	1%	150
Gg.	OPLISMENUS AEMULUS	0.5%	100
EX	LYSIMACHIA ARVENSIS	0.5%	100
~~Ex~~	OXALIS ~~SP~~ PERENNANS	0.5%	250
Gg.	SCHOENUS APOGON	1%	400
EX.	SIDA RHOMBIFOLIA	0.2%	10
EX	POA ANUA	5%	500
Ex.	PLANTAGO MAJOR	0.2%	20
Fg	RUMEX BROWNII	0.1%	5
Ex.	PARONYCHIA BRASILIANA	0.1%	50
Ex.	RICHARDIA HUMISTRATA	0.2%	100
Ex-	STENOTAPHRUM SECUNDATUM	0.5%	50
Ex	GAMOCHAETA CALVICOLA	0.2%	50
ex	TRIFOLIUM REPENS.	0.3%	200
ex	HYPOCHAERIS RADICATA	0.1%	20
EX	STELLARIA MEDIA	0.2%	100
EX	~~P. [illegible]~~ SOLIVA SESSILIS	0.1%	200

Project: HBT 76	
Date: 19-09-22	Plot ID: Q02

HABITAT ENVIRONMENTAL SERVICES

GF Code		Cover	Abundance
EX.	NEPHROLEPIS ~~SP~~ CORDIFOLIA	0.3	30
HTW	ERHARTA ERECTA	2%	200
EX.	FUMARIA ~~SP~~ MURALIS SUBSP. MURALIS	0.3	50
EX.	~~GERANIUM SP (CULTIVAR)~~ PELARGONIUM SP.	1	10
EX	SONCHUS OLERACEUS	0.2	5
~~HTW~~ EX	SENNA PENDULA	0.2	5
HTW.	CONCHRUS CLANDESTINUS	0.5	10
HTW	BIDENS PILOSA	0.1	1
HTW.	LIGUSTRUM SINENSE	0.1	1

Total Species		Total Cover	
Trees	1	Trees	10
Shrubs	1	Shrubs	1
Grasses	3	Grasses	51.5
Forbs	2	Forbs	0.6
Ferns	0	Ferns	0
Other	0	Other	0
		HTW	2.9

Data Check	
Site/ Date	✓
Plot ID	✓
Bearing/ Coordinates	✓
Photos	✓
Landscape Info	✓
Litter/ Stems/ Logs	✓
Species/ Cover/ Abund.	✓

Project: BROCKLESBY RD.	
Assessor: B. STEWART	
Date: 24/2/23	Plot ID: Q03
Bearing: 135	Datum: GDA2020
East: 294419	North: 6376344

HABITAT ENVIRONMENTAL SERVICES

Aspect:	Weeds: MOD.
Soil/Geology: CLAY LOAM	Condition: LOW / EXOTIC
Veg Structure: GRASSLAND	

PCT: 3581 HUNTER COAST FOOTHILLS APPLE FORES	EEC: NO
	Veg Zone: CLEARED

Litter Cover	
P1	1
P2	1
P3	1
P4	1
P5	1
Average:	1

Tree Stems (DBH)	P	Stem Count	Hollows
>80cm	X		X
50-79cm	X		
30-49cm	X		
20-29cm	X		
10-19cm	X		
5-9cm	X		
<5cm	X		

Length Logs (m)	
7m	
	Total: 7m

Total Species		Total Cover	
Trees	0	Trees	0
Shrubs	0	Shrubs	0
Grasses	2	Grasses	95.2
Forbs	0	Forbs	0
Ferns	0	Ferns	0
Other	0	Other	0
		HTW	2.3

Data Check	
Site/ Date	✓
Plot ID	✓
Bearing/ Coordinates	✓
Photos	✓
Landscape Info	✓
Litter/ Stems/ Logs	✓
Species/ Cover/ Abund.	✓

Notes	
	CLEARED LAND. WAS ACTIVELY GRAZED

Project: BROCKLESBY RD	
Assessor: B. STEWART	
Date: 24/2/23	Plot ID: Q03
Bearing: 135	Datum: GDA2020
East: 394419	North: 6376344

HABITAT ENVIRONMENTAL SERVICES

GF Code	Species	Cover	Abundance
GG	CYNODON DACTYLON	95%	3000
EX	RICHARDIA HUMISTRATA	0.5	150
EX	SISYRINCHIUM ROSULATUM	0.3	50
HTW	AXONOPUS FISSIFOLIUS	0.5	50
HTW	LANTANA CAMARA	0.2	1
HTW	LIGUSTRUM SINENSE	0.5	10
EX	SIDA RHOMBIFOLIA	1	100
HTW	CENCHRUS CLANDESTINUS	1	50
EX	SETARIA PARVIFLORA	0.1	10
HTW	SENECIO MADAGASCARIENSIS	0.1	1
GG	JUNCUS ~~SP~~ KRAUSSII	0.2	50
EX	TRIFOLIUM SP.	0.1	5
EX	CIRSIUM VULGARE	0.5	10
EX	OXALIS CORNICULATA	0.2	50
EX	VERBENA BONARIENSIS	0.1	1
EX	NERIUM OLEANDER	0.1	1

Project: BROCKLESBY RD		HABITAT ENVIRONMENTAL SERVICES
Assessor: B. STEWART		
Date: 24/02/23	Plot ID: Q04	
Bearing: 231	Datum: GDA2020	
East: 394612	North: 6376326	

Aspect: FLAT	Weeds: MOD
Soil/Geology: SANDY LOAM.	Condition: LOW - REGEN.
Veg Structure: OPEN FOREST.	

PCT: 3581 HUNTER COAST FOOTHILLS APPLE FOREST	EEC: NO
	Veg Zone: LOW

Litter Cover	
P1	25
P2	5
P3	1
P4	2
P5	1
Average:	6.8%

Tree Stems (DBH)	P	Stem Count	Hollows
>80cm	X		
50-79cm	X		X
30-49cm	✓		
20-29cm	✓		
10-19cm	✓		
5-9cm	X		
<5cm	X		

Length Logs (m)	
	Total: 1m

Total Species		Total Cover	
Trees	1	Trees	10
Shrubs	0	Shrubs	0
Grasses	2	Grasses	52
Forbs	1	Forbs	0.1
Ferns	0	Ferns	0
Other	0	Other	0
		HTW	5.5

Data Check	
Site/ Date	✓
Plot ID	✓
Bearing/ Coordinates	✓
Photos	✓
Landscape Info	✓
Litter/ Stems/ Logs	✓
Species/ Cover/ Abund.	✓

Notes	
	LOW CONDITION REGEN.
	HISTORICALLY GRAZED.
	HIGH COVER OF BARE GROUND IN FLORISTIC PORTION -

0

Project: BROCKLEBY RD	
Assessor: B. STEWART	
Date: 24/2/23	Plot ID: Q04
Bearing: ~~___~~ -231	Datum: GDA2020
East: 394612	North: 6376326

HABITAT ENVIRONMENTAL SERVICES

GF Code	Species	Cover	Abundance
TG	EUCALYPTUS PIPERITA	10	5
EX	RICHARDIA HUMMISTRATA	1	150
HTN	AXONOPUS FISSIFOLIUS	0.5	50
FG	HYPERICUM GRAMINEUM	0.1	5
EX	GAMOCHAETA PURPUREA	0.3	50
GG	JUNCUS ~~sp~~ KRAUSSII	2	500
EX	SIDA RHOMBIFOLIA	0.2	30
EX	MALVA PARVIFLORA	0.2	30
GG	CYNODON DACTYLON	50	1000
EX	PARONICHIA BRASILIANA	0.1	1
HTN	CENCHRUS CLANDESTINUS	5	200

Project: BROCKLESBY RD.	
Assessor: B. STEWART	
Date: 24/2/23	Plot ID: Q05
Bearing: 090	Datum: GDA2020
East: 394473	North: 6376402

HABITAT ENVIRONMENTAL SERVICES

Aspect: FLAT	Weeds: COMMON PASTURE SPECIES.
Soil/Geology: SANDY LOAM	Condition: CLEARED (BARE)
Veg Structure: CLEARED	

PCT: 3581 HUNTER COAST FOOTHILLS APPLE FOREST	EEC: NO
	Veg Zone: CLEARED (BARE)

Litter Cover	
P1	2
P2	15
P3	45
P4	35
P5	15
Average:	~~28~~ 4%

Tree Stems (DBH)	P	Stem Count	Hollows
>80cm	X		
50-79cm	X		X
30-49cm	X		
20-29cm	X		
10-19cm	X		
5-9cm	X		
<5cm	X		

Length Logs (m)	
	Total: 0m

Total Species		Total Cover	
Trees	0	Trees	0
Shrubs	1	Shrubs	0.2
Grasses	0	Grasses	0
Forbs	0	Forbs	0
Ferns	0	Ferns	0
Other	0	Other	0
		HTW	0.3

Data Check	
Site/ Date	✓
Plot ID	✓
Bearing/ Coordinates	✓
Photos	✓
Landscape Info	✓
Litter/ Stems/ Logs	✓
Species/ Cover/ Abund.	✓

Notes	
	CLEARED VEGETATION
	BARE GROUND + LITTER.

0

Project: BROCKLESBY RD.	
Assessor: B. STEWART	
Date: 24/2/23	Plot ID: Q05
Bearing: 090	Datum: GDA2020
East: 394473	North: 6376402

HABITAT ENVIRONMENTAL SERVICES

GF Code	Species	Cover	Abundance
EX	SIDA RHOMBIFOLIA.	0.2	10
EX	PASPALUM SP.	25	1000
HTW	CINNAMOMUM CAMPHOR.	0.1	1
SH	BREYNIA OBLONGIFOLIA	0.2	1
HTW	LIGUSTRUM SINENSE	0.1	1
EX	COMMELINA BENGHALENSIS	0.1	10
EX	LYSIMACHIA ARVENSIS	0.1	5
~~HTW~~	RUMEX ACETOSELLA	0.1	1

Appendix E – CKPoM – Habitat Restoration Assessment

CKPOM – 7.2 Habitat Restoration Actions

i) Identification and prioritisation of habitat to be restored

Priority areas for koala habitat restoration are to be identified on the basis of the recommendations for each Koala Management Unit (see section 6.2 of this CKPoM) together with reference to the criteria outlined in section 7.5 of the CKPoM Resource Document. A hypothetical assessment has been made against the criteria listed below to determine if the restoration of a Koala Corridor though the site has merit.

- *the intended aim of revegetation works*

To maintain/restore connectivity within a proposed Development Site between bushland to the north and south. Patches of vegetation on the edge of the township of Medowie are highly fragmented. Bushland to the south of the Medowie town centre (within the vicinity of the Development Site) exist as small, disconnected patches of vegetation within limited connectivity between larger areas of bushland. Numerous, cleared parcels of land occur within this area (directly to the south of the most populated area of Medowie), creating considerable breaks between patches.

This area has the greatest potential to provide connection east (from Moffats Swamp Nature Reserve) to west (low-lying swampy areas to the north of Campvale), rather than north/south. Connectivity north/south within this area has lesser potential as dense residential areas occur within central, eastern and north-eastern region of the township of Medowie. Given this, the potential length of the corridor north of the Development Site could only extend another 260m north (to Lot 1 DP 508780 and Lot 2 DP 595932), before reaching two parallel roads and a dense residential area. Limited connectivity exits west of these two lots due to partially cleared properties, all of which are bordered by high traffic roads.

Vegetation directly to the west of the Development Site has recently been cleared to facilitate a separate development. As such, the is little potential to maintain/restore connectivity east/west through the Development Site, via the retention of vegetation. Given the small area of bushland to the north and tenuous links to other areas, the is also little potential to maintain/restore connectivity north/south through the Development Site.

Vegetation to north and south of the development has been assessed and is classified as 'Supplementary Koala Habitat'. No areas of 'Preferred Koala Habitat' occur to the immediate south of the site, as the Koala Planning Map (KPM) for Medowie and Tilligerry indicates.

- *size of habitat patches*

The patch to the north is approx. 7ha, noting that some weak connections exist to other areas. Vegetation to the south of the Development Site is fragmented, forming a mosaic of smaller patches (5 ha, 16 ha, 13 ha etc) with some links to Moffats Swamp Nature Reserve.

- *shape of habitat patches*

Irregular, mosaic pattern interspersed with cleared land.

- *type of koala habitat*

The Development Site predominantly contains 'Mainly Cleared' Land (contain exotic grassland, infrastructure and exotic trees). A small area of native vegetation bordering the northern boundary has been classified as 'Supplementary Koala Habitat' as part of the BDAR.

The Port Stephens Koala Habitat Planning Map for Medowie and Tilligerry maps vegetation to the south of the Development Site as 'Preferred Koala' Habitat, however, visual inspection has determined that the vegeation is commensurate within 'Supplementary Koala Habitat' and lacks Preferred Koala feed trees. The Port Stephens Koala Habitat Planning Map for Medowie and Tilligerry maps vegetation to the north of the Development Site as 'Marginal Koala Habitat', 'Other Vegetation' (exotic trees) and 'Mainly Cleared', however, visual inspection indicates that the 'Marginal Koala Habitat' is 'Supplementary Koala Habitat'.

No areas to the north of the site are mapped as 'Habitat Linking Areas' which are typically designated to areas that have the potential to provide opportunities for effective movement of dispersing sub adult koalas between breeding populations and vacant habitat areas.

- *size of koala populations/ presence of extant populations*

Within the last 18 years (typical length of time to indicate extant populations), the closest records of Koalas include:

- one record from 2017 within the property to south (38 Brocklesby Rd)
- one record from 2013 at the southern end of Brocklesby Rd
- eight records from Medowie Rd (between Ferodale Rd
- ten records from areas to the immediate north-west of the town centre (shops).

No records (from the last 18 years) exist within the site or within areas to the north of the site (in between the site and the residential areas of Medowie).

The Koala population is likely to be concentrated within Moffats Swamp Nature Reserve and Tilligerry State Conservation Area. Koalas detected are likely to be individuals dispersing from these areas. The location of most detections indicate that individuals may travel between these two protected areas. No evidence suggests that Koalas use the site, or areas north of the site, as a movement corridor between areas of higher quality habitat.

- *presence of threats to koalas*

Records indicate that dog attack and roadkill are prevalent. Road kills are more likely to occur along Medowie Road and Ferodale Road due to the higher amount of traffic.

- *effort required for restoration*

The Development Site contains very little native vegetation. Large areas of the site contain exotic grassland, ornamental trees, fruit trees (citrus trees) and pine trees.

A large effort would be required to plant out a vegetated corridor as no existing vegetation would provide connectivity for Koalas.

- *current land tenure and land use zoning*

The Development Site is zoned RU2: Rural Landscape under the Port Stephens Local Environmental Plan 2013 (PSLEP) and is identified in the Medowie Planning Strategy (Port Stephens Council 2016) as an area for potential future development (residential release areas). Currently there are three

dwellings within the proposed Development Site. All land is currently managed by landowners. The area is not identified as a corridor within the Medowie Strategy.

- *pre-European vegetation of the area*

Likely to be consistent with 'Supplementary' Koala Habitat within the north of the site being dominated by blackbutt and having low abundance of Koala feed trees.

- *other considerations, including the goal of the project*

Other considerations include the viability of the development if a corridor was to dissect the site north/south. This would lead to a loss of residential lots. Based on the current design two roads would run north/south within the site (boundary to boundary), one of which would have an increased verge width to accommodate additional tree plantings. The roadside would be planted with street trees that would be consistent with Koala food tree species listed in the CKPoM (*E. robusta*). These roads would provide for terrestrial connectivity through the site (north/south) maintaining the level of connectivity which currently exists. While street trees are proposed, these will only provide temporary refuge (once matured) and are unlikely to provide canopy linkage. Koala friendly fencing will be utilised within the development to ensure Koalas can move through residential areas.

Conclusion

The following factors indicate that the maintenance and/or restoration of a Koala corridor through the site is unlikely to be achieved:

- small extent of native vegetation within the site and lack of Koala feed trees.
- fragmented nature of habitat patches and lack of continued connectivity to the north (blocked by roads and residential areas).
- Low habitat value of the Koala habitat within areas to the north and south of the site (low abundance of feed trees, tenuous links to other areas, no evidence of Koala occupation)
- Restoration of a corridor would involve loss of residential lots and the requirement to revegetate a portion of site.

Taken together, the site does not meet the criteria for a priority area for koala habitat restoration. Moreover, the site presents very few beneficial reasons to justify the establishment of a corridor through the site to support Koala movements. The site was initially selected based on the absence of biodiversity values as the land supports very few areas of native vegetation, contains no EECs, and does not provide high quality habitat for habitat for any threatened species known to occur within the locality. The site selection process demonstrates that the 'avoidance' principle of the BOS has been adhered. Secondly, mitigation measures have been proposed to ensure any potential negative impacts are minimise, fulfilling the 'minimise' principle .

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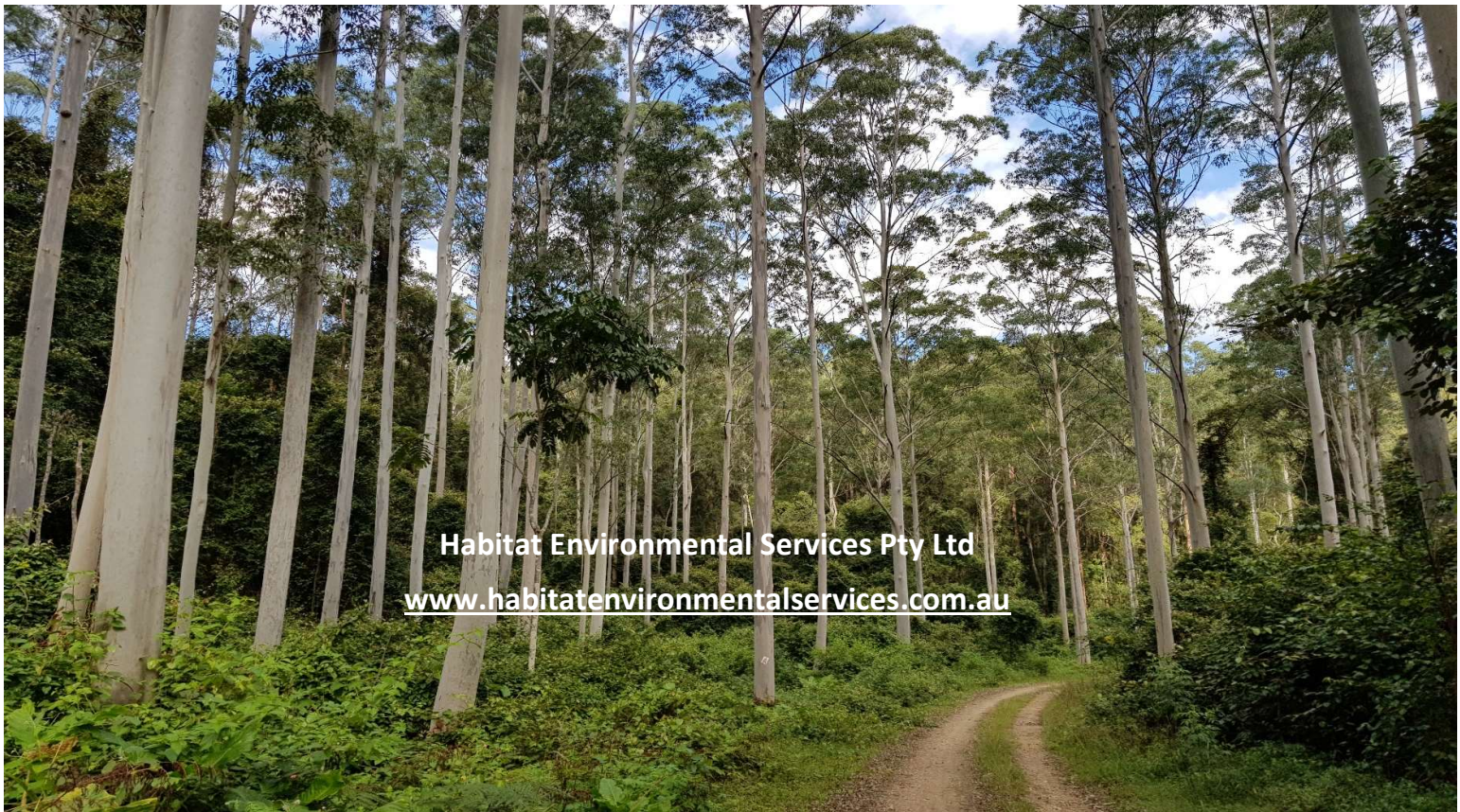

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