Technical report 1

Biodiversity development assessment report



EnergyCo

August 2025

Hunter Transmission Project

Biodiversity Development Assessment Report

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Hunter Transmission Project
Biodiversity Development Assessment Report

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This document is based on the Department of Planning and Environment BDAR template

Summary

Project description

The Hunter Transmission Project (HTP, the project) involves construction of a new overhead 500 kilovolt (kV) double circuit transmission line of around 100 kilometres, connecting the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in Olney State Forest, near Eraring in the Hunter region of New South Wales (NSW).

The project requires approval from the NSW Minister for Planning and Public Spaces under Division 5.2, Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Due to its strategic importance, the project has been declared as critical State significant infrastructure (CSSI) under section 5.13 of the EP&A Act.

Under this process, the Energy Corporation of NSW (EnergyCo, the proponent) is required to prepare an environmental impact statement (EIS) in accordance with the NSW Environmental Planning and Assessment Regulation 2021. Construction is expected to commence in 2027, subject to NSW Government and Commonwealth planning approvals, and be operational by the end of 2029.

This biodiversity development assessment report (BDAR) accompanies the project's EIS and uses the NSW Biodiversity Assessment Method 2020 (BAM) (DPIE 2020) to assess the projects impacts on biodiversity in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act). The BDAR outlines the projects approach to avoiding and minimising impacts on biodiversity and where unavoidable, residual impacts inform the projects offset requirements in accordance with the BAM and NSW Biodiversity Offset Scheme.

A referral of the project under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was submitted to the Australian Government and the project was determined a controlled action on 5 February 2025, due to potential impacts on listed threatened species and ecological communities (sections 18 and 18A) and Commonwealth land (sections 26 and 27A). The project will be assessed under a bilateral agreement between the Australian Government and the State of New South Wales (in accordance with section 45 of the EPBC Act).

Location

The project is located in the NSW Hunter region across 5 local government areas (LGAs); including Muswellbrook, Singleton, Cessnock, Central Coast and Lake Macquarie (site map at Figure 14.1 and location map at Figure 14.2). Regarding the BAM, the project is wholly within the Sydney Basin interim biogeographic regionalisation for Australia (IBRA) bioregion and spans 3 (Wyong, Yengo, Hunter) IBRA subregions.

The project transects 2 generally distinct environmental landforms, the valley floor and forested plateau and ranges, each with unique biodiversity values and ecosystems.

The valley floor environment and riverine floodplains of the Hunter River and its tributaries dominate the first half of the HTP from its northern starting point at the Baywater Power Station through to the township of Bulga. The predominant land use within this landscape is open cut coal mining and agriculture, which have generally resulted in highly disturbed environments. There are some isolated areas of remaining biodiversity value associated with threatened ecological communities (TECs) under the BC Act and EPBC Act. Of particular significance are the better-quality remnants of the TECs, Central Hunter Valley eucalypt forest and woodland and Warkworth Sands Woodland of the Hunter Valley that provide habitat for threatened species and the presence of existing conservation reserves and mine offset areas.

South of the township of Bulga the HTP specifically avoids the valley floor landscapes extending to the east of the subject land (term defined below) by transecting the forest ecosystems of the plateau and ranges. These are notably large areas of TECs and important habitat for the Regent Honeyeater and Swift Parrot. These ranges are dominated by a mixture of remnant moist sclerophyll vegetation within the sheltered valleys and dry sclerophyll forests on the ridgelines and upper slopes. These ecosystems are well represented within the national park estate and are not considered to be over cleared landscapes.

Key components

Key components of the project include:

- new overhead 500 kV double circuit transmission line of around 100 kilometres (the HTP corridor)
- two new switching stations (Bayswater South and Olney)
- upgrades to the existing Bayswater and Eraring substations
- adjustments and upgrades to existing transmission lines
- ancillary works including road upgrades, access tracks, and temporary construction facilities such as laydown areas, stringing sites, and construction support sites (some with temporary workers accommodation).

Key definitions

Project impact area	The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. This term is equivalent to Development Site under the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Biodiversity study area	A minimum 140 metre (m) wide transmission line corridor focused on the planned infrastructure that was surveyed in accordance with Stage 1 of the BAM. This approach enables a level of flexibility for future design refinement of the transmission line. Where impacts were likely to be larger, the biodiversity study area was widened to accommodate the larger area. The biodiversity study area incorporates the subject land and is within the assessment area as defined in the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Subject land (referred to as Disturbance area in the EIS)	The subject land is land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the assessment area which surrounds the subject land (i.e. the area of land in the 1500 m buffer zone around the subject land or 500 m buffer zone for linear projects). This is a subset of the project impact area and is used primarily to assess potential impacts on biodiversity values in the BDAR. Includes the following categories: — disturbance area A — disturbance area A (centreline) — disturbance area B — disturbance area HZ

Subject land

The subject land is a subset of the project impact area and is primarily used to assess potential impacts on biodiversity values in this BDAR. It refers to the area that would be directly impacted by construction of the project comprising the following:

- construction of all project infrastructure elements (including the proposed transmission line alignment, transmission line easement, switching stations, substation upgrades and other ancillary works)
- locations for construction elements such as construction support sites, access tracks, site access points, laydown and staging areas
- the operational impact area (including areas required for maintenance) as these areas would be established during the construction process.

The subject land has been assessed as a worst-case area of impact based on the project component locations and construction areas. The area would be confirmed and refined during finalisation of the design and construction methodology. The project's design and construction methodology would be developed to further the objectives of impact avoidance and minimisation.

The subject land incorporates different project elements with varying degrees of physical disturbance to reflect construction and operational requirements, and these will be applied to the biodiversity assessment. For this BDAR, these different types of disturbance have been divided into the following subset:

- **Disturbance area A** – refers to an area where vegetation would be completely removed.
- **Disturbance area A (centreline)** – is a subset of disturbance area A and refers to a 20 metre wide centreline area between proposed transmission line towers.
- **Disturbance area B** – an area within the transmission line easement, excluding disturbance area A and disturbance area A (centreline), where partial clearing would be undertaken. Vegetation with mature growth heights up to 2 metres can remain, while vegetation exceeding 2 metres will be managed to maintain these clearance heights.
- **Disturbance area HZ** – Hazard trees are those that have the potential to pose a risk to safe operation of the transmission line by falling onto the proposed transmission line towers, conductors and associated infrastructure within the transmission line easement.

A **no clearing zone** has also been defined and refers to the areas within the transmission line easement where vegetation removal is not required. These areas would occur where there is sufficient separation of 10 metres or more between the maximum operating temperature conductor position and the existing vegetation. This area is excluded from the subject land/disturbance area as no impacts occur within it but it has been defined to ensure it is clear what areas will not be affected.

Detailed definitions for these areas are provided in section 1.1.4, while indicative layouts of each disturbance area for a 500 kV transmission line is provided in Figure 1.1 and Figure 1.2 and the indicative application based on current design of HTP is provided in Figure 1.3.

The location of the subject land is shown in Figure 14.5a and Figure 14.5b. The subject land contains all areas impacted by the project. Specifically, the subject land incorporates disturbance areas A (including centreline), B and HZ.

Measures to avoid and minimise

Avoiding significant biodiversity values has been a key consideration through all phases of the project development, including the selection of the preferred project. In these early phases a tiered approach was adopted to avoiding areas with significant biodiversity values, including national parks, nature reserves, protected areas, offset areas, wetlands, and key fish habitat (see Figure ES.1). These biodiversity constraints rankings have been based on the following criteria:

Tier 1 biodiversity constraint – Areas to avoid

Tier 1 biodiversity constraints are areas of very high environmental sensitivity, with environmental approvals considered unlikely or unachievable. Tier 1 constraints are:

- Ramsar wetlands
- World Heritage areas
- national parks, ecological conservation areas (including flora reserves, state conservation areas, biobanks, wilderness protection areas).

Tier 2 biodiversity constraint – Areas to be avoided if reasonable, or minimise impact

Tier 2 biodiversity constraints are areas of high environmental sensitivity with environmental approvals considered complex and uncertain. This will require additional triggers for biodiversity offsets and further demonstration of avoiding and minimising impacts on such biodiversity values. If unavoidable, these may require significant, expensive, and perhaps unattainable offsets obligations. Tier 2 biodiversity constraints are:

- threatened ecological communities listed under the EPBC Act
- threatened ecological communities listed under the BC Act as serious and irreversible impact (SAII) entities
- other important wetlands and water sources for migratory birds protected by international agreements.

Tier 3 biodiversity constraint – Areas to minimise impact

Tier 3 biodiversity constraints are areas of high environmental sensitivity, with environmental approvals considered complex and uncertain. Avoiding and minimising impact recommended as biodiversity offsets will apply to unavoidable impacts that in some cases would require significant, expensive, and perhaps unattainable offsets obligations. Tier 3 biodiversity constraints are:

- threatened species (flora/fauna) listed under the BC Act and EPBC Act
- large, contiguous/intact areas of moderate or better-quality woodland vegetation (only patch sizes of > 5 hectares) (only within 3 kilometres of existing corridor)
- threatened ecological communities listed under the BC Act (non-SAII)
- key fish habitat which includes most permanent and semi-permanent freshwater habitats including Strahler 4/5 order streams
- groundwater dependent ecosystems and riparian corridors (Strahler 4/6 order streams) that require a 40 metres riparian buffer on these features as outlined under Table 14 of the BAM.

Informed by the results of field surveys and desktop assessments, the project has specifically avoided and minimised impacts on key areas with high conservation value by undertaking the following:

- avoiding Watagans National Park, Werakata National Park, Warrawolong Flora Reserve and parts of Jilliby State Conservation Area. Design refinements further minimised the impacts to Jilliby State Conservation Area
- avoiding and minimising impacts to TECs, in particular minimising clearing of woodland remnants and scarce valley floor vegetation such as the critically endangered Warkworth Sands Woodland
- avoiding and minimising the removal of critical habitat for key threatened species, such as the critically endangered Regent Honeyeater and Swift Parrot
- avoiding and minimising impacts to threatened species at risk of serious and irreversible impact (SAII) such as the Sooty Owl, Brush-tailed Rock Wallaby and Scrub Turpentine.

With the refinement of the project's design within the preferred corridor the following additional considerations were incorporated into the alignment and project assessment:

- **co-location:** placing sections of the transmission line alongside existing infrastructure or in disturbed areas, such as mining sites, forestry operations or cleared lands, where native vegetation and habitat quality are low
- **relocation:** adjusting the corridor route to avoid impacts on listed ecological communities and species following fields surveys, particularly avoiding known populations of threatened species, such as significant SAII species of Brush-tailed Rock Wallaby, microbats and threatened flora habitats
- **spanning and retention of forested gullies:** within the project impact area the extent of clearing in the State forests has been reduced further by spanning steep ravines, avoiding clearing vegetation in the valleys and partially clearing the easement in other areas, similar to the clearing for the existing 500 kV Eraring-Kemps Creek transmission line in Olney State Forest
- **partial clearing:** implementing controlled vegetation clearing within and adjacent to the transmission line easement, focusing only on vegetation taller than 2 metres
- **project design and alterations:**
  - **Olney 500 kV switching station:** relocating the eastern switching station from Eraring to Olney State Forest to minimise vegetation clearing through Olney State Forest, Martinsville and Eraring
  - **Olney switching station to TG 5A1/5A2 tie-ins:** realignment within Olney State Forest to minimise extent of native vegetation clearing
  - **Watagan State Forest:** realignment within Watagan State Forest to avoid significant Brush-tailed Rock Wallaby and threatened frog breeding habitats, Warrawolong Flora Reserve, old growth stands of vegetation and rainforest maximising the use of existing disturbed areas of the State forest hardwood plantation without impacting harvest operations
  - **Corrabare State Forest:** realignment within Corrabare State Forest to avoid the SAII Sooty Owl breeding location
  - **Pokolbin State Forest:** realignment within Pokolbin State Forest to avoid the significant Brush-tailed Rock Wallaby, microbat and threatened flora populations
  - **Singleton Military Area:** avoiding further fragmentation of large, intact areas of important Regent Honeyeater and Swift Parrot habitat within the Singleton Military Area through collocation with existing transmission lines
  - **Hunter Valley:** minimising impacts on high-quality remnant Central Hunter Valley eucalypt forest and Warkworth Sands Woodland by prioritising location of the project on derived and disturbed grassland and low-quality vegetation areas. Project design within the Hunter Valley also comprised of locating most of the transmission line along valley floors dominated by active coal mines and existing transmission easements, thereby avoiding national park estates
- **access:** using existing access tracks where possible to minimise additional vegetation clearing and minimising construction of new access tracks
- **site selection:** strategically placing substations and ancillary infrastructure to largely avoid impacts on listed communities and species, including potential SAII entities
- **micro-siting:** mechanisms to adjust project features during the detailed design phase to avoid areas with high biodiversity value when on the ground works commence.

Cumulatively, the implemented measures to avoid and minimise impacts on biodiversity have resulted in a reduction in clearing of native vegetation by >200 hectares. Significantly this includes >100 hectares of impact to TECs and a habitat for a range of SAII entity species.

Hunter Transmission Project Biodiversity Development Assessment Report

Figure ES.1
Biodiversity constraints and avoidance considerations

Legend

- Biodiversity study area

Existing environment

- Road
- Power station
- 330 kV transmission line
- 500 kV transmission line
- River
- Waterbody
- NPWS reserve
- State conservation area
- Flora reserve
- State forest
- Local government area
- Mining Biodiversity Offset Area (EMM)

Biodiversity constraints

- Tier 1 biodiversity constraint – Areas to avoid
- Tier 2 biodiversity constraint – Areas to be avoided if reasonable, or minimise impact
- Tier 3 biodiversity constraint – Areas to minimise impact

TIER 2 species listed under the BC Act as SAII entities

- Significant Flora Species - WSP (Tier 2 / SAII species)
- Significant Fauna Species - WSP (Tier 2 / SAII species)

TIER 3 species other than SAII entities listed under the BC Act and EPBC Act

- Significant Flora Species - WSP (Tier 3 / BC Act and/or EPBC Act listed)
- Significant Fauna Species - WSP (Tier 3 / BC Act and/or EPBC Act listed)



0 5 10 15
Kilometers

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:333,000 Date: 19/03/2025

Data sources: EMM, Beca, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Earthstar Geographics

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Plant Community Types

Areas of the subject land, particularly within the Hunter Valley floor, are dominated by agricultural and mining land uses associated with significant existing and historical disturbance. These areas comprise 450.56 hectares or 36% of the subject land and are identified as Category 1 – Exempt land under the NSW *Local Land Services Act 2013* (LLS Act) or verified as non-native land through field survey/aerial photo interpretation. They comprise of Category 1 land – 261.88 hectares, excluded Land – 82.42 hectares, non-disturbance area – 0.7 hectares and PCT 0 not classified – 105.56 hectares. These areas do not require further assessment under the BAM.

The residual areas of the subject land contain 761.98 hectares of native vegetation that are subject to impact by the project.

The native vegetation within the subject land has been aligned to the most likely plant community types (PCTs) as outlined in the BioNet Vegetation Classification Database. There were 34 PCTs identified within the subject land during the field survey (see Table ES.1). The extent of each PCT is shown in Figure 14.9 in Chapter 14 (Figures).

Native vegetation has been recorded by vegetation formation, class and associated PCT. The native vegetation recorded within the subject land has been assigned to 4 vegetation formations and 8 vegetation classes that occur across the Sydney Basin (Wyong, Yengo, Hunter IBRA subregions) IBRA region.

Table ES.1 Overall summary of PCTs identified within the subject land

PCT ID	PCT name	Wyong IBRA subregion subject land (ha)	Yengo IBRA subregion subject land (ha)	Hunter IBRA subregion subject land (ha)	Total subject land (ha)
3029	Lower North Wet Gully Palm Rainforest	4.81	0.00	0.00	4.81
3086	Lower North Hinterland Riparian Dry Rainforest	0.00	1.90	4.06	5.96
3087	Lower North Ranges Riparian Turpentine Forest	0.00	2.82	0.31	3.13
3150	Hunter Coast Ranges Turpentine Wet Forest	36.03	0.00	0.00	36.03
3151	Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	0.00	1.85	0.00	1.85
3152	Hunter Range Turpentine-Grey Myrtle Gully Forest	0.00	0.92	0.00	0.92
3230	Central Coast Escarpment Moist Forest	55.16	15.30	0.00	70.46
3237	Hunter Range Blue Gum Gully Forest	0.00	5.46	0.00	5.46
3238	Hunter Range Colluvial Apple-Gum Forest	0.00	0.05	0.00	0.05
3239	Hunter Range Sheltered Grey Gum Forest	4.90	99.26	5.81	109.97
3241	Lower North White Mahogany-Spotted Gum Moist Forest	0.00	10.21	2.09	12.30
3242	Lower North Ranges Turpentine Moist Forest	25.93	10.57	0.00	36.50
3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	1.31	0.31	0.00	1.62
3250	Northern Foothills Blackbutt Grassy Forest	2.02	0.00	0.00	2.02
3263	Watagan Range Turpentine-Mahogany Grassy Forest	39.10	0.00	0.00	39.10
3314	Central Hunter Slopes Grey Box Forest	0.00	0.00	77.88	77.88*
3315	Central Hunter Ironbark-Spotted Gum Forest	0.00	0.00	26.30	26.30*
3328	Lower Hunter Red Gum-Paperbark Riverflat Forest	0.00	0.45	0.00	0.45
3431	Central Hunter Ironbark Grassy Woodland	0.00	0.00	118.86	118.86*

PCT ID	PCT name	Wyong IBRA subregion subject land (ha)	Yengo IBRA subregion subject land (ha)	Hunter IBRA subregion subject land (ha)	Total subject land (ha)
3438	Hunter Escarpment Footslopes Ironbark Forest	0.00	1.97	10.22	12.19
3439	Hunter Escarpment Grey Gum Sheltered Forest	0.00	1.62	0.00	1.62
3444	Lower Hunter Spotted Gum-Ironbark Forest	0.00	1.21	36.66	37.87*
3446	Lower North Foothills Ironbark-Box-Gum Grassy Forest	0.00	1.35	0.02	1.37
3489	Hunter Escarpment Grey Box Forest	0.00	5.67	0.00	5.67
3581	Hunter Coast Foothills Apple Forest	0.67	0.00	0.00	0.67
3599	Blue Mountains Peppermint Shrub Forest	0.00	7.24	0.00	7.24
3605	Hunter Range Ironbark Forest	0.00	57.10	0.00	57.10
3617	Sydney Hinterland Peppermint-Apple Forest	33.65	1.91	0.00	35.56
3621	Sydney Hinterland Turpentine-Apple Gully Forest	4.86	0.00	0.00	4.86
3636	Warkworth Sands Woodland	0.00	0.00	22.08	22.08*
4015	Central Hunter Swamp Oak Riparian Forest	0.00	0.00	9.82	9.82*
4039	Hunter Range Creekflat Apple-Red Gum Forest	0.00	0.07	0.84	0.91
4072	Hunter River Oak Mesic Forest	0.00	0.07	0.14	0.21
4089	Namoi-Upper Hunter River Red Gum Forest	0.00	0.00	11.14	11.14*
Total		**208.44**	**227.31**	**326.23**	**761.98**

* These PCTs include vegetation zones with heights of less than 2 metres (derived/disturbed grassland) where impacts will be avoided in disturbance areas B and HZ. The overall area of native vegetation within the subject land is approximately 815.76 ha although 53.78 ha will be avoided due to impacts being restricted to disturbance area A only within vegetation zones having heights less than 2 metres. Given this, the total project impact area on native vegetation within the subject land is approximately 761.98 ha.

Threatened Ecological Communities (BC Act)

Based on the PCT association, there are 7 TECs listed (all as Endangered) under the *Biodiversity Conservation Act 2016* (BC Act) confirmed in the subject land (see Table 4.72). These include:

- Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion.

Threatened Ecological Communities (EPBC Act)

Three EPBC Act listed (all as Critically Endangered) TECs were confirmed to occur in the subject land (see Table 4.73). These include:

- Central Hunter Valley eucalypt forest and woodland
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland of the Hunter Valley.

Impacts, including direct, indirect, prescribed, and SAII

Residual direct impacts to PCTs

The overall direct impact to PCTs and habitat for the various threatened species is around 761.98 hectares as detailed in section 8.1.1. Of this area, 40% of the native vegetation is in varying degrees of disturbed condition state, including; derived grasslands (96.81 hectares) and thinned/poor/plantation woodlands (186.09 hectares) associated with previous clearing and mine rehabilitation and hardwood forestry plantations (31.41 hectares).

For derived grassland vegetation conditions, the impacts are limited to disturbance area A where there would be complete vegetation removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal. This has resulted in the avoidance of 53.78 hectares of native vegetation.

Residual direct impacts to TECs

The residual direct impacts TECs are detailed in Table ES.2 (BC Act) and Table ES.3 (EPBC Act).

The overall direct impacts to TECs listed under the BC Act within the subject land is around 207.43 hectares. The largest proportion of direct impacts is to the Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions TEC, impacting 141.38 hectares of thinned, poor or planted native vegetation. The overall direct impacts to TECs listed under the EPBC Act within the subject land is around 158.13 hectares.

Across all TECs under the BC Act and EPBC Act, direct impacts are primarily associated with disturbance area A with 124.40 hectares and 90.78 hectares expected to be directly impacted under the BC Act and EPBC Act respectively.

Table ES.2 Summary of residual direct impacts to BC Act listed TECs within the subject land

TEC name	Profile ID (from Threatened Biodiversity Data Collection (TBDC))	BC Act status	Direct impact within subject land (ha)
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	20126	E	141.38
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	20127	E	8.86
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	10942	E	37.87
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	20141	E	4.22
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	10416	E	1.37
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	10787	E	1.36
Warkworth Sands Woodland in the Sydney Basin Bioregion	10833	E	12.37
Total			**207.43**

Table ES.3 Summary of direct impacts to EPBC Act listed TECs within the subject land

TEC name	EPBC Act Status	Direct impact within the subject land (ha)
Central Hunter Valley eucalypt forest and woodland	CE	144.40
River-Flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria	CE	1.36
Warkworth Sands Woodland of the Hunter Valley	CE	12.37
Total		**158.13**

Residual direct impacts to species credit species

The project has been assessed to have a residual direct impact on a total of 66 threatened species of which 35 have been confirmed to have habitat present with the remaining 31 being assumed present due to survey deficiencies. Of the 66 threatened species identified to be potentially impacted by the project 38 are listed threatened flora species and 28 are threatened fauna species. In terms of impacts within the disturbance area, impacts for disturbance area A will have a complete impact (fully cleared) on all 66 species, whilst the impacts for disturbance area B will be restricted to a complete impact on 26 species, partial impact on 15 species, and no impact on 25 species. Within disturbance area HZ a complete impact has been assessed on 14 species with a partial impact on 12 species, and no impact on 40 species.

Due to some limited access restrictions within the projects subject land, EnergyCo have requested approval for the use of the recently released *Remote assessment of biodiversity values: Biodiversity Assessment Method guide* (DCCEEW, 2025) (the guide).

The guide is restricted to CSSI projects for application of BAM in situations where access to land on which impacts are likely to occur is not possible. The guide allows for the remote assessment of biodiversity values using a combination of existing data, tools, information and surrogate sites, where appropriate.

EnergyCo's request on 8 May 2025 for application of the guide across limited section of State Forest and private land holdings for a select number of threatened flora species was approved by CPHR on 14 May 2025. It should be noted that expert reports have not been used for this BDAR.

The residual impact to species credit species for each IBRA subregion is outlined in Table ES.4 and Table ES.5.

Table ES.4 Summary of residual direct impacts to threatened flora species credit species within the subject land

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact to habitat (ha) or individuals
Acacia bynoeana	Bynoe's Wattle	E	V	No	–	–	✓	0.00	9.77	9.77
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	EP	–	Yes	–	–	✓	0.00	16.92	16.92
Angophora inopina	Charmhaven Apple	V	V	No	✓	–	✓	0.00	1.74	1.74
Asperula asthenes	Trailing Woodruff	V	V	No	✓	–	✓	0.00	2.29	2.29
Brachyscome brownii	–	–	CE	No	–	✓	✓	14.72	-	25.42
Callistemon linearifolius	Netted Bottle Brush	V	–	No	✓	–	✓	0.00	446 individuals	446 individuals
Corybas dowlingii	Red Helmet Orchid	E	–	No	✓	–	✓	0.00	11.37	11.37
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* population in the Hunter Catchment	EP	–	No	–	–	✓	1 individual	22 individuals	23 individuals
Cynanchum elegans	White-flowered Wax Plant	E	E	No	✓	✓	✓	0.00	9.75	9.75
Dillwynia tenuifolia	–	V	–	No	–	✓	–	0.00	1.46	1.46
Diuris tricolor	Pine Donkey Orchid	V	–	No	–	–	✓	0.00	26.56	26.56
Eucalyptus camaldulensis – endangered population	*Eucalyptus camaldulensis* population in the Hunter catchment	EP	–	No	–	–	✓	1.50	1.80	3.30
Eucalyptus castrensis	Singleton Mallee	E	-	Yes	–	–	✓	0.00	0.21	0.21
Eucalyptus fracta	Broken Back Ironbark	E	–	Yes	–	✓	–	4.53	16.15	20.68
Eucalyptus glaucina[3]	Slaty Red Gum	V	V	No	–	✓	✓	0.00	1,176 individuals	1,176 individuals
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	–	✓	✓	0.00	17.68	17.68
Grammitis stenophylla	Narrow-leaf Finger Fern	E	–	No	✓	✓	–	0.00	5.76	5.76
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	V	No	–	–	✓	0.00	3.55	3.55

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact to habitat (ha) or individuals
Melaleuca biconvexa	Biconvex Paperbark	V	V	No	✓	–	–	0.00	9.35	9.35
Melaleuca groveana	Grove's Paperbark	V	–	No	–	✓	✓	187 individuals	3,155 individuals	3,342 individuals
Olearia cordata	–	V	V	No	–	✓	–	0.00	4.03	4.03
Ozothamnus tesselatus	–	V	V	No	–	–	✓	0.00	7.69	7.69
Persoonia hirsuta	Hairy Geebung	E	E	Yes	–	✓	–	0.00	1.46	1.46
Pomaderris queenslandica	Scant Pomaderris	E	–	No	–	–	✓	0.00	6.85	6.85
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	–	–	✓	0.00	30.99	30.99
Prasophyllum sp. Wybong	–	-	CE	No	–	–	✓	0.00	30.99	30.99
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	–	✓	✓	30.01	27.71	57.72
Pterostylis chaetophora	–	V	–	No	–	–	✓	0.00	30.99	30.99
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	–	–	✓	1.97	0.21	2.18
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	✓	✓	–	0.00	9.45	9.45
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	✓	✓	✓	1,164 individuals	1,230 individuals	2,394 individuals
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	✓	✓	✓	1.69	18.3	19.99
Rutidosis heterogama	Heath Wrinklewort	V	V	No	✓	✓	✓	0.00	15.68	15.68
Senna acclinis	Rainforest Cassia	E	–	No	✓	-	–	0.00	5.95	5.95
Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	✓	✓	✓	0.00	513 individuals	513 individuals
Tetratheca juncea	Black-eyed Susan	V	V	No	✓	–	–	0.00	2.85	2.85
Velleia perfoliata	–	V	V	No	–	✓	–	0.00	4.02	4.02
Zieria involucrata	–	E	V	No	–	✓	–	0.00	4.03	4.03

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table ES.5 Summary of residual direct impacts to threatened fauna species credit species within the subject land

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	✓	✓	✓	93.77	0.00	93.77
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	✓	✓	✓	2.96	90.27	93.23
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	✓	✓	✓	0.00	69.50	69.50
Cercartetus nanus	Eastern Pygmy-possum	V	–	No	✓	–	–	155.55	0.00	155.55
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	✓	✓	✓	506.36	0.00	506.36
Delma vescolineata	Hunter Valley Delma	E	E	No	–	–	✓	233.04	0.00	233.04
Heleioporus australiacus	Giant Burrowing Frog	V	E	No	✓	–	–	20.53	6.22	26.75
Hoplocephalus bitorquatus	Pale-headed Snake	V	–	No	✓	–	–	0.00	2.02	2.02
Hoplocephalus stephensii	Stephens' Banded Snake	V	–	No	✓	–	–	141.86	3.85	145.71
Lathamus discolor	Swift Parrot	E	CE	Yes	–	✓	✓	42.76	0.00	42.76
Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	✓	–	–	63.53	0.00	63.53
Mixophyes balbus	Stuttering Frog	E	V	Yes	✓	–	–	180.09	0.00	180.09
Mixophyes iteratus	Giant Barred Frog	V	V	No	✓	–	–	2.34	1.47	3.81
Myotis macropus	Southern Myotis	V	–	No	–	✓	✓	120.25	0.00	120.25
Ninox connivens	Barking Owl	V	–	No	✓	✓	✓	29.30	7.34	36.64
Ninox strenua	Powerful Owl	V	–	No	✓	✓	✓	103.73	21.10	124.83
Notamacropus parma	Parma Wallaby	V	V	No	✓	✓	–	304.98	0.00	304.98
Petauroides volans	Southern Greater Glider	E	E	No	✓	✓	✓	477.12	0.00	477.12
Petaurus norfolkensis	Squirrel Glider	V	–	No	✓	✓	✓	647.62	0.00	647.62
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	✓	✓	✓	145.64	10.38	156.02

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Phascogale tapoatafa	Brush-tailed Phascogale	V	–	No	–	–	✓	90.41	0.00	90.41
Phascolarctos cinereus	Koala	E	E	No	✓	✓	✓	244.24	40.50	284.74
Planigale maculata	Common Planigale	V	–	No	–	–	✓	18.21	0.00	18.21
Potorous tridactylus	Long-nosed Potoroo	V	V	No	✓	–	–	135.10	0.00	135.10
Pseudophryne australis	Red-crowned Toadlet	V	–	No	✓	✓	–	39.39	4.15	43.54
Tyto novaehollandiae	Masked Owl	V	–	No	✓	✓	✓	22.38	19.70	42.08
Tyto tenebricosa	Sooty Owl	V	–	Yes	✓	✓	✓	195.05	12.77	207.82
Vespadelus troughtoni	Eastern Cave Bat	V	–	Yes	✓	✓	✓	383.77	0.00	383.77

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Residual direct impacts to scattered trees

A total of 25 scattered trees were recorded within the subject land with 4 occurring within the Yengo IBRA subregion and 21 occurring within the Hunter IBRA subregion. The residual direct impacts to scattered trees for each the Yengo and Hunter IBRA subregions is presented in Table ES.6 and Table ES.7.

Table ES.6 Summary of residual direct impacts to scattered trees in the Yengo IBRA subregion

Class	Species	DBH category	Contain hollows	Number of trees
3489 – Hunter Escarpment Grey Box Forest				
2	*Eucalyptus sparsifolia*	≥20 centimetres (cm) and <50 cm DBH	No (visual assessment)	4
Total				**4**

Table ES.7 Summary of residual direct impacts to scattered trees in the Hunter IBRA subregion

Class	Species	DBH category	Contain hollows	Number of trees
3314 – Central Hunter Slopes Grey Box Forest				
1	*Eucalyptus moluccana*	<20 cm DBH	No (visual assessment)	1
3	*Eucalyptus moluccana*	>50 cm DBH	Yes (visual assessment)	1
3431 – Central Hunter Ironbark Grassy Woodland				
3	*Eucalyptus crebra*	>50 cm DBH	Yes (estimated)	6
3	*Eucalyptus moluccana*	>50 cm DBH	Yes (estimated)	6
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	3
4015 – Central Hunter Riparian Forest				
2	*Eucalyptus tereticornis*	≥20 cm and <50 cm DBH	Yes (visual assessment)	1
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	1
4089 – Namoi-Upper Hunter River Red Gum Forest				
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	2
Total				**21**

Indirect impacts

Residual indirect impacts associated with the project include:

- inadvertent impacts on adjacent habitat or vegetation including impact to habitat surrounding caves that are potential breeding habitat for threatened microbat species
- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat due to noise, dust or light spill
- transport of weeds, pests and pathogens from the subject land to adjacent vegetation
- increased risk of starvation, exposure and loss of shade or shelter
- loss of breeding habitats
- trampling of threatened flora species
- increased risk of fire
- increased risk of collision with lines and electrical and magnetic fields (EMF) impacts from new infrastructure.

Many of the residual indirect impacts are considered likely to be minimised through specific and targeted mitigation and management controls implemented during construction and operation.

A fauna risk assessment is provided in Appendix I (Powerline impacts on birds and ameliorative measures) and it identifies the following threatened species as a high risk of collision with powerline infrastructure. These species are all dual credit species (ecosystem credit and species credit species):

- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Calyptorhynchus lathami lathami* (South-eastern Glossy Black-Cockatoo)
- *Ninox strenua* (Powerful Owl)
- *Tyto tenebricosa* (Sooty Owl).

In the BAM calculator it is not possible to calculate credits for non-threatened or ecosystem credit species, so the use of surrogate species to provide additional impact compensation over and above that required for direct impacts is considered appropriate.

For this assessment these dual credit species have been treated as species credit species to enable calculation of additional species credits to account for these impacts. That is, they have been treated as breeding species (despite breeding actually not being observed). This is considered to be a cautious approach.

Within the areas assessed for indirect impacts from bird strike and EMF, impact calculations have assumed 10% of habitat for these species to be impacted. This cautious assumption is considered to be proportional to the likely extent of impacts to the airspace, when compared to full clearing of directly impacted areas (disturbance area A) in which the tree canopy layer that these species would use will be impacted. Limiting the assessed impacts to 10% of the available habitat is appropriate and representative given the impacts of birdstrike or EMF are at a much lower level than actual habitat removal. Impacted habitat was cautiously based on the assigned habitat PCT's in BioNet for each species.

All of these species are wide-ranging in the vicinity of the project's greenfield locations and a summary of indirect impact for each IBRA subregion is presented in Table ES.8 to Table ES.10.

Table ES.8 Indirect impacts to species credit species within the Wyong IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact to habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	25.95 – complete	18.67 – complete	0.37 – complete	2.96	42.03	44.99	4.50
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	6.86 – complete	9.18 – complete	0.14 – complete	0.00	16.18	16.18	1.62
Ninox strenua	Powerful Owl	V	–	17.77 – complete	12.02 – complete	0.15 – complete	29.94	0.00	29.94	2.99
Tyto tenebricosa	Sooty Owl	V	–	46.77 – complete	28.17 – complete	0.52 – complete	75.46	0.00	75.46	7.55

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table ES.9 Indirect impacts to species credit species within the Yengo IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact to habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	27.29 – complete	13.59 – complete	0.15 – complete	0.00	41.13	41.13	4.11
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	30.36 – complete	15.87 – complete	0.17 – complete	0.00	46.40	46.40	4.64
Ninox strenua	Powerful Owl	V	–	47.57 – complete	20.97 – complete	0.29 – complete	61.49	7.34	68.83	6.88
Tyto tenebricosa	Sooty Owl	V	–	91.87 – complete	34.79 – complete	0.28 – complete	119.59	7.34	126.93	12.69

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table ES.10 Indirect impacts to species credit species within the Hunter IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact to habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	5.78 – complete	1.33 – complete	0.00	0.00	7.11	7.11	0.71
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	5.59 – complete	1.33 – complete	0.00	0.00	6.92	6.92	0.69
Ninox strenua	Powerful Owl	V	–	17.26 – complete	8.80 – complete	0.00	12.30	13.76	26.06	2.61
Tyto tenebricosa	Sooty Owl	V	–	5.43 – complete	0.00	0.00	0.00	5.43	5.43	0.54

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Line strike impacts (Indirect impacts)

The proposed additional credit obligation for impacts to threatened bird species through indirect impacts due to line strike and EMF are provided in Table ES.11. An additional 2,322 species credits are proposed to be provided to account for indirect impacts to threatened bird species through indirect impacts due to line strike and EMF.

Table ES.11 Summary of indirect impacts on threatened fauna species for combined subregions

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Callocephalon fimbriatum	Gang-gang Cockatoo	93.23	9.32	40	373
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	69.50	6.95	40	278
Ninox strenua	Powerful Owl	124.83	12.48	40	499
Tyto tenebricosa	Sooty Owl	207.82	20.78	60	1247
Total proposed additional species credits for indirect impacts					**2,397**

Prescribed connectivity impacts

The project's residual indirect impacts associated with terrestrial connectivity require specific mitigation measures and additional species offset liabilities outlined in Table ES.12.

The proposed additional credit obligation for impacts to habitat connectivity provided for areas at which species have been recorded via targeted surveys and where these coincide with terrestrial connectivity locations, are shown on Figure 14.18.

Table ES.12 Prescribed connectivity impacts to species credit species

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Cercartetus nanus	Eastern Pygmy-possum	155.55	15.56	33	513
Petauroides volans	Southern Greater Glider	477.12	47.71	40	1,908
Petaurus norfolkensis	Squirrel Glider	647.62	64.76	40	2,590
Phascogale tapoatafa	Brush-tailed Phascogale	90.41	9.04	29	262
Total proposed additional species credits for prescribed impacts					**5,273**

Serious and irreversible impacts

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct. Potential SAII entities are listed in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE 2019). The following 12 SAII entities are known to occur within the subject land:

- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion.
- *Eucalyptus fracta* (Broken Back Ironbark)
- *Genoplesium insigne* (Variable Midge Orchid)
- *Rhodamnia rubescens* (Scrub Turpentine)
- *Rhodomyrtus psidioides* (Native Guava)
- Regent Honeyeater (*Anthochaera phrygia*)
- Large-eared Pied Bat *(Chalinolobus dwyeri)*
- Swift Parrot (*Lathamus discolor*)
- Stuttering Frog *(Mixophyes balbus)*
- Brush-tailed Rock-wallaby *(Petrogale penicillata)*
- Sooty Owl *(Tyto tenebricosa)*.

In addition, the following 5 SAII species are assumed to occur within the subject land:

- *Acacia pendula population in the Hunter catchment*
- *Eucalyptus castrensis* (Singleton Mallee)
- *Eucalyptus pumila* (Pokolbin Mallee)
- *Persoonia hirsuta* (Hairy Geebung)
- *Rhizanthella slateri* (Eastern Australian Underground Orchid).

A summary of the extent of the project's potential impacts on each of the SAII entities is assessed in Chapter 9 (Serious and irreversible impacts) and is provided in Table ES.13 and Table ES.14.

Except for the 2 TECs, the majority of the impacted SAII entities are associated with the forested plateau section of the project where extensive contiguous habitats exist.

Table ES.13 Summary of impacts to TECs at risk of a SAII

TEC name	Impact within subject land (hectares)
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	4.22
Warkworth Sands Woodland in the Sydney Basin Bioregion	12.37

Table ES.14 Summary of impacts to species at risk of SAII

Scientific name	Common name	Impact within subject land (hectares)
Anthochaera phrygia	Regent Honeyeater	93.77
Chalinolobus dwyeri	Large-eared Pied Bat	506.36
Eucalyptus fracta	Broken Back Ironbark	20.68
Lathamus discolor	Swift Parrot	42.76
Mixophyes balbus	Stuttering Frog	180.09
Petrogale penicillata	Brush-tailed Rock-wallaby	156.02
Rhodamnia rubescens	Scrub Turpentine	2,394 individuals
Rhodomyrtus psidioides	Native Guava	19.99
Tyto tenebricosa	Sooty Owl	207.82
Acacia pendula population in the Hunter catchment	–	16.92 (assumed)
Eucalyptus castrensis	Singleton Mallee	0.21 (assumed)
Eucalyptus pumila	Pokolbin Mallee	17.68 (assumed)
Persoonia hirsuta	Hairy Geebung	1.46 (assumed)
Rhizanthella slateri	Eastern Australian Underground Orchid	9.45 (assumed)

Impacts to NPWS estate and State forests

The project will connect a new overhead 500 kV transmission line between 2 new 500 kV substations at Bayswater and in Olney State Forest. The new substations will be connected to the existing 500 kV transmission lines near Bayswater and Eraring to unlock electricity supply from the Central West Orana and New England Renewable Energy Zones.

From the new 500 kV Bayswater substation, the line will maximise use of existing disturbed mining areas to run south-easterly to Lemington before making several crossings of the Hunter River to pass through the Hunter Valley Operations (HVO) coal mine, eventually reaching Bulga Coal mine operations, continuing south to cross over the existing 330 kV lines – Lines 81 and 82, and then co-locating for approximately 4.5 kilometres.

The line then continues south to maximise the use of public land into Pokolbin State Forest, emerging just east of Cedar Creek near Wollombi. It then traverses through NSW National Parks and Wildlife Service (NPWS) managed Corrabare North Flora Reserve and into Corrabare State Forest. The line then spans across to the Watagans through Watagan State Forest and Olney State Forest before truncating at the new 500 kV Olney substation and connecting to the existing Eraring-Kemps Creek double circuit 500 kV transmission line.

Ancillary works including road upgrades, access tracks, and temporary construction facilities are included in the design across these NPWS managed estates and State forests. These road upgrades include sections of Martinsville Hill Road and Watagan Road, parts of which are within NPWS managed estate of Jilliby State Conservation Area.

The subject land is located within the Hunter-Central Rivers catchment. The subject land crosses several poor to good quality watercourses including the Hunter River. Watercourses include the upper catchments of Wollombi Brook, which flow towards the north, and cross the subject land again just before entering the Hunter River near Warkworth.

Additionally, sections of the Dora Creek catchment cross through areas of NPWS managed estates and State forests throughout the southeast end of the subject land. This catchment ends within Lake Macquarie, with the other catchments of the subject land flowing through the Hunter River and into the Tasman Sea at Newcastle (NSW DPI 2006).

The catchments within the subject land have been impacted from a mixture of rural activities, forestry, urban development and mining. These activities have modified the natural aquatic environment substantially, including major infrastructure developments, roads, rail and agriculture.

Within the subject land, there have been 11 PCTs identified in NPWS managed estates and 19 PCTs identified within State forests and (see sections 8.7.1 and 8.7.2 respectively). Of these PCTs, 2 met the criteria for their associated threatened ecological community (TEC) under either the BC or EPBC Act. There were no TECs identified within the NPWS managed estate.

There have been 24 threatened flora species either confirmed or assumed to date in the State forests and 18 in the NPWS managed estate. There have been 25 threatened fauna species either confirmed or assumed to date in the State forests and 18 in the NPWS managed estate.

Additional detailed information on each of the individual reserves and state forests is provided in this BDAR.

Recommended mitigation measures

The recommended mitigation measures are outlined in Table ES.15. These measures are focused on the residual impacts from the project to native vegetation and threatened species habitat (including areas of planted native vegetation).

These safeguards seek to minimise potential adverse impacts of the project. All mitigation measures described in this BDAR, and the EIS, would be incorporated into the Network Operator's construction contractor's environmental management strategies and issue-specific construction environmental sub-plans, or the Network Operator's operational environmental management system.

Table ES.15 Summary of mitigation and management measures for residual impacts (direct, indirect and prescribed)

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
B1	Biodiversity impacts	A biodiversity management plan (BMP) will be prepared and implemented for the duration of construction. The plan will include (as a minimum): — the location and extent of areas of vegetation clearance and habitat disturbance, and how these will be suitably demarcated on site — the location and extent of areas to be protected (e.g. retained vegetation, hollow-bearing trees, nests, burrows and other habitat features (including applicable buffers to habitat features) located inside the construction area or in close proximity to the clearing areas — pre-clearing surveys and procedures — two-phase clearing process to allow fauna to move into adjoining habitat — measures to be implemented on site to clearly demarcate areas to be retained as 'no go areas' — a threatened species unexpected finds protocol — revegetation/rehabilitation plan (including seed collection where appropriate) — monitoring of partial clearance	Detailed design Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
		— controlling erosion (unless separate ERSED) — bushfire management — salvage of resources — fauna handling and rescue procedure — education of construction teams — adaptive management procedures (including triggers) — monitoring, evaluation reporting and compliance. 'No go area' demarcation devices must be established prior to the commencement of clearing works in each construction area and be maintained throughout the construction phase.	
B2	Avoidance of threatened species, threatened ecological communities and SAII entities	The locations of threatened ecological communities and habitat for threatened species and SAII entities will be considered and potential impacts avoided or minimised to the greatest extent practicable during finalisation of the detailed design and construction methodology. This will include: — micro-siting of transmission line infrastructure within the HTP corridor — prioritising disturbance in areas with a vegetation integrity score <17 as per section 9 of the NSW Biodiversity Assessment Method (2020) (BAM) — sensitive biodiversity areas to be avoided (including species polygons, buffered threatened species locations, areas of threatened ecological communities, relevant serious and irreversible impact (SAII) and matters of national environmental significance (MNES). As part of this measure a hierarchy of biodiversity constraints will be developed and mapped to provide an overarching avoidance prioritisation framework to inform detailed design and the BMP.	Detailed design Construction
B3	Avoidance of threatened species and threatened ecological communities	Prior to construction activities taking place within 100 m of rocky areas containing caves, overhangs or crevices, cliffs or escarpments and during the breeding season for the Large-eared Pied Bat, Eastern Cave Bat (November to February) and Large Bent-winged Bat, Little Bent-winged Bat (December to February), an ecologist will be engaged to determine if the species are present. If present, an assessment of proposed activities will be completed to determine what, if any, activities can take place within the 100 m and what mitigation measures need to be implemented. Measures may include cessation of certain activities, amending the construction methodology including selecting alternative plant or equipment. Any requirements for a management plan could also be determined at that time.	Detailed design Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
B4	Micro-siting of associated works and access tracks	Micro-siting of temporary construction infrastructure (including laydown areas, construction support sites and access tracks) will be undertaken to minimise vegetation clearing and disturbance of watercourses within the biodiversity study area. This will include: — prioritising areas of low biodiversity value — utilising existing access tracks, where feasible — locating waterway crossings at narrow width locations — minimising the quantity of cut and fill activities.	Detailed design Construction
B5	Connectivity corridors	A Connectivity strategy will be developed and implemented to avoid and minimise impacts to connectivity for threatened species. The exact location and detailed design of under-transmission line glider poles, retained tall tree stumps and/or rope bridges will be nominated as part of a connectivity strategy guided by the locations of habitat connectivity outlined in Figure 14.17 and Figure 14.18. Connectivity corridors, in the form of installation of under-transmission line glider poles (in accordance with clearance requirements for transmission lines and infrastructure) where the construction area will impact habitat connectivity for arboreal species (see Appendix J – Examination of regional and terrestrial habitat connectivity) will be investigated and installed in appropriate locations. Key BC Act target species are Squirrel Glider, Yellow-bellied Glider and Greater Glider. The strategy will be developed for all relevant threatened species. This strategy will require ongoing management of connectivity corridors.	Detailed design (connectivity strategy) Construction Operation (easement management)
B6	Compensatory habitat methodology	A supplementary hollow and nest strategy will be developed and implemented for the installation of nest boxes or other hollow creation method to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing. Nest box/chainsaw-type hollows will be installed prior to commencement of clearing works where practicable in each construction area. Where supplementary hollows are proposed to be established on land adjacent to the easement.	Detailed design Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
B7	Biosecurity impacts	A biosecurity management plan will be prepared in accordance with EIS mitigation measure AG3. This will be prepared to cover biosecurity aspects such as weed and pathogen introduction and management. The plan will form a sub-plan to the BMP.	Construction
B8	Tree protection measures	Tree protection measures are to be installed and maintained for trees to be retained within the hazard zone, in accordance with AS 4970-2009 – Protection of Trees in Development Sites throughout construction.	Construction
B9	Pre-clearing surveys	Pre-clearing surveys will be guided by the biodiversity management plan and completed prior to clearing at each location by a suitability qualified ecologist. The proposed clearing extents will be marked out on site prior to the pre-clearing surveys. Pre-clearing surveys will be carried out prior to the commencement of clearing works. During the surveys, the ecologist will: — survey the proposed clearing extent (including confirmed clearing extents within the assumed habitat of SAII entities) — identify any fauna that will require relocation prior to clearing, including inspection of any built structures and wooden fence posts to be demolished — confirm if occupied habitats need to remain until fledging/movement of young can occur — confirm that biodiversity exclusion zones are demarcated — confirm that hollow-bearing trees within and adjacent to the clearing extents are prominently marked/tagged; and — confirm that nest boxes are in place (where required) in suitable locations adjacent to areas to be cleared, or suitable locations for installation have been identified.	Detailed design Construction
B10	Ecology inductions, toolbox talks, targeted training	All relevant project personnel, including relevant sub-contractors will be trained on biodiversity management protocols and requirements for the project, through inductions, toolbox talks and targeted training, and provided with sensitive biodiversity area maps (showing clearing boundaries and exclusion zones) and updates as required. Inductions and training will be completed prior to commencement of work for all relevant personnel.	Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
B11	Retention of understorey vegetation in riparian areas	Understorey vegetation will be protected within vegetated riparian zones where reasonable and feasible (within the definition of NSW *Water Management Act 2000*). Vegetation clearing will be limited to the tree stratum and shrubs above 2 metres in height only, with root systems and trunk bases being retained in-situ.	Construction Operation
B12	Rehabilitation of riparian areas	A riparian vegetation management plan (RVMP) will be developed and implemented for the project to manage activities within vegetated riparian zones to minimise impacts to aquatic environments. The plan will be prepared prior to and implemented during any disturbance to a riparian area. The plan will identify the measures to be implemented to minimise impacts from construction activities (such as temporary and permanent waterway crossings) within riparian and aquatic environments. A schedule of works will be stipulated within the approved RVMP. Riparian areas subject to disturbance will be progressively stabilised and rehabilitated. The RVMP will form a sub-plan to the BMP.	Detailed design Construction
B13	Installation of bird diverters	Bird diverters will be installed on transmission lines at appropriate locations to reduce impacts on aerial fauna species from collision with transmission lines and infrastructure. The exact position and diverter model will be finalised during detailed design by a qualified ecologist in consultation with CPHR. Installation of the bird diverters will occur within 2 weeks of transmission line installation or as soon as practical and will remain in place and/or replaced as required.	Detailed design Construction Operation
B14	Vegetation offsets requirements	The predicted clearing of native vegetation identified in the biodiversity development assessment report (BDAR) will be monitored against the recorded clearing. A revised BAM calculation (BAM-C) on the project's final disturbance to biodiversity post construction will be completed. Any additional (or reduced) credit liability identified will be met as part of the biodiversity offset scheme requirements and secured under the SODA.	Construction
B15	Unexpected finds	A species unexpected finds protocol will be implemented if threatened ecological communities or flora and fauna species, not assessed in the biodiversity assessment, are identified in the subject land.	Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
B16	Water quality, watercourse geomorphology and aquatic habitat	Watercourse crossings (especially but not only to Key Fish Habitat) will be designed to minimise disturbance and harm within riparian corridors and aquatic habitat will be rehabilitated where practicable in accordance with the following guidelines: — *Guidelines for controlled activities on waterfront land* (NRA 2018) — *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull and Witheridge 2003) — Policy and guidelines for fish habitat conservation and management (DPI 2013).	Detailed design Construction
B17	Operational guidelines and procedures	Guidelines and procedures will be developed and implemented for maintenance of the project during operation as part of the Network Operator's environmental management system. These guidelines and procedures will cover the following: — vegetation clearing and maintenance commitments in the BDAR and environmental impact statement (EIS) — avoiding access and disturbance in areas of high biodiversity conservation significance; outside of the areas required for construction — avoiding maintenance of vegetation that does not need to be maintained during operation.	Operation
B18	Minimise indirect impacts from light spill	Lighting designs to be in accordance with the *National Light Pollution Guidelines for Wildlife* (Commonwealth DCCEEW 2023).	Detailed design Operation
B19	Minimise indirect impacts on threatened Amphibians	An Amphibian management plan will be prepared and implemented for the duration of construction. The plan is to include (as a minimum): — the location and extent of areas of threatened Amphibians breeding habitats, and how these will be suitably demarcated on site — the location and extent of areas to be protected (e.g. retained vegetation and other habitat features (including applicable buffers to habitat features) located inside the construction area or in close proximity to the clearing areas — measures to control the spread of Chytrid Fungus within the subject land and adjoining threatened Amphibian habitat — monitoring requirements to ensure effective control	Detailed design Construction

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)
		— measures to be implemented on site to clearly demarcate areas to be retained as 'no go areas'. 'No go area' demarcation devices will be established prior to the commencement of clearing works in the location and extent of areas of threatened Amphibians breeding habitats. This plan will form a sub-plan to the BMP.	
B20	Minimise indirect impacts of Myrtle Rust on threatened plants	A Myrtle Rust procedure will be developed to ensure the project is consistent with the objectives of NSW Forestry Corporation and NPWS Myrtle Rust management.	Detailed design Construction
B21	Minimise impacts to biodiversity as a result of vegetation clearing	Implement the clearing procedures, control measures and post-construction restoration measures to ensure biodiversity values are retained as assessed in the BDAR.	Detailed design Construction Operation

Biodiversity Offsets Scheme requirements

EnergyCo intends to enter into a Strategic Offset Delivery Agreement (SODA) with the Secretary of the Department of Climate Change, Energy, Environment and Water (Commonwealth DCCEEW, the Department) for the project. Under this agreement, responsibility for delivering biodiversity offsets will be transferred to the Department with commensurate funding.

Offset selection will be guided by a conservation investment strategy for the region. The strategy will outline priority areas and actions to protect and restore biodiversity values, improve habitat connectivity, support species resilience to climate change and provide permanent conservation outcomes while also benefitting landholders. The Department is preparing a strategy which will be published on the Commonwealth DCCEEW website prior to entry into the SODA.

Biodiversity offsets secured under the SODA will constitute either the retirement of like-for-like credits or conservation actions that are targeted at impacted entities. The Department will engage with credit owners, landholders and other potential partners in offset delivery through a range of programs including Credit Supply Fund auction processes, sponsored biodiversity stewardship agreements under the Stewardship Support Program, acquisition of new public land to create credits and tailored Savings our Species projects.

Overall summary of credits required

The ecosystem credits and species credits required for the project are provided by IBRA subregion in Chapter 11 (Biodiversity credit report). A total of 17,087 ecosystem credits and 209,996 species credits (29,671 flora and 180,325 fauna) are required (see Table ES.16, Table ES.17 and Table ES.18 respectively).

In addition to these credits there are:

- 22 ecosystem credits for impacts to scattered trees (see Table ES.19 and Table ES.20)
- 5273 proposed additional species credits for prescribed impacts to habitat connectivity (see Table ES.12)
- 2397 proposed additional species credits for indirect impacts due to bird strike and EMF (see Table ES.11).

Ecosystem credits

The ecosystem impacts that require an offset (as per BAM subsection 9.2.2(2.)) are outlined in Table ES.16.

Table ES.16 Summary of the total ecosystem credits required

Plant Community Type	Area (ha)	Credits required
3029-Lower North Wet Gully Palm Rainforest	4.81	118
3086- Lower North Hinterland Riparian Dry Rainforest	5.96	193
3087- Lower North Ranges Riparian Turpentine Forest	3.13	76
3150-Hunter Coast Ranges Turpentine Wet Forest	36.06	723
3151-Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	1.85	34
3152-Hunter Range Turpentine-Grey Myrtle Gully Forest	0.92	21
3230-Central Coast Escarpment Moist Forest	70.46	1785
3237-Hunter Range Blue Gum Gully Forest	5.46	116
3238-Hunter Range Colluvial Apple-Gum Forest	0.05	1
3239-Hunter Range Sheltered Grey Gum Forest	109.97	2732
3241-Lower North White Mahogany-Spotted Gum Moist Forest	12.30	371
3242-Lower North Ranges Turpentine Moist Forest	36.50	836
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	1.62	39
3250-Northern Foothills Blackbutt Grassy Forest	2.02	47
3263-Watagan Range Turpentine-Mahogany Grassy Forest	39.10	987
3314-Central Hunter Slopes Grey Box Forest	77.88	1480
3315-Central Hunter Ironbark-Spotted Gum Forest	26.30	399
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	0.45	7
3431-Central Hunter Ironbark Grassy Woodland	118.86	2286
3438-Hunter Escarpment Footslopes Ironbark Forest	12.19	325
3439-Hunter Escarpment Grey Gum Sheltered Forest	1.62	42
3444-Lower Hunter Spotted Gum-Ironbark Forest	37.87	1139
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	1.37	41
3489-Hunter Escarpment Grey Box Forest	5.67	168
3581-Hunter Coast Foothills Apple Forest	0.67	16
3599-Blue Mountains Peppermint Shrub Forest	7.24	185
3605-Hunter Range Ironbark Forest	57.10	1288
3617-Sydney Hinterland Peppermint-Apple Forest	35.56	947
3621-Sydney Hinterland Turpentine-Apple Gully Forest	4.86	104
3636-Warkworth Sands Woodland	22.08	166

Plant Community Type	Area (ha)	Credits required
4015-Central Hunter Riparian Forest	9.82	257
4039-Hunter Range Creekflat Apple-Red Gum Forest	0.91	35
4072-Hunter River Oak Mesic Forest	0.21	7
4089-Namoi-Upper Hunter River Red Gum Forest	11.14	116
Total ecosystem credits		**17,087**

Threatened species credits

The threatened species impacts that require an offset (as per BAM subsection 9.2.2(2.)) are outlined in Table ES.17 and Table ES.18.

Table ES.17 Impacts that require an offset – threatened flora species credits

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Area (ha)/ count	Credits required
Acacia bynoeana	Bynoe's Wattle	E	V	No	9.77	104
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	EP	–	Yes	16.92	774
Angophora inopina	Charmhaven Apple	V	V	No	1.74	51
Asperula asthenes	Trailing Woodruff	V	V	No	2.29	79
Callistemon linearifolius	Netted Bottle Brush	V	–	No	446 (count)	670
Corybas dowlingii	Red Helmet Orchid	E	–	No	11.37	327
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* population in the Hunter Catchment	EP	–	No	23 (count)	46
Cynanchum elegans	White-flowered Wax Plant	E	E	No	9.75	403
Dillwynia tenuifolia	–	V	–	No	1.46	44
Diuris tricolor	Pine Donkey Orchid	V	–	No	26.56	416
Eucalyptus camaldulensis – endangered population	*Eucalyptus camaldulensis* population in the Hunter catchment	EP	–	No	3.3	14
Eucalyptus castrensis	Singleton Mallee	E	–	Yes	0.21	16
Eucalyptus fracta	Broken Back Ironbark	E	–	Yes	20.68	1072
Eucalyptus glaucina	Slaty Red Gum	V	V	No	1176 (count)	2212
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	17.68	937
Grammitis stenophylla	Narrow-leaf Finger Fern	E	–	No	5.76	176

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Area (ha)/ count	Credits required
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	–	No	3.55	104
Melaleuca biconvexa	Biconvex Paperbark	V	V	No	9.35	280
Melaleuca groveana	Grove's Paperbark	V	–	No	3342 (count)	6684
Olearia cordata	–	V	V	No	4.03	129
Ozothamnus tesselatus	–	V	V	No	7.69	155
Persoonia hirsuta	Hairy Geebung	E	E	Yes	1.46	66
Pomaderris queenslandica	Scant Pomaderris	E	–	No	6.85	182
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	30.99	688
Prasophyllum sp. Wybong	–	–	CE	No	30.99	1032
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	57.72	1926
Pterostylis chaetophora	–	V	–	No	30.99	681
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	2.18	67
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	9.45	446
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	2394 (count)	7182
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	19.99	936
Rutidosis heterogama	Heath Wrinklewort	V	V	No	15.68	221
Senna acclinis	Rainforest Cassia	E	–	No	5.95	177
Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	513 (count)	1026
Tetratheca juncea	Black-eyed Susan	V	V	No	2.85	91
Velleia perfoliata	–	V	V	No	4.02	128
Zieria involucrata	–	E	V	No	4.03	129
Total threatened flora species credits						**29,671**

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table ES.18 Impacts that require an offset – threatened fauna species credits

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Area (ha)	Credits required
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	93.77	5313
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	93.23	3615
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	69.50	2616
Cercartetus nanus	Eastern Pygmy-possum	V	–	No	155.55	5017
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	506.36	24386
Delma vescolineata	Hunter Valley Delma	E	E	No	223.04	3340
Heleioporus australiacus	Giant Burrowing Frog	V	E	No	26.75	663
Hoplocephalus bitorquatus	Pale-headed Snake	V	–	No	2.02	63
Hoplocephalus stephensii	Stephens' Banded Snake	V	–	No	145.71	4716
Lathamus discolor	Swift Parrot	E	CE	Yes	42.76	2369
Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	63.53	2217
Mixophyes balbus	Stuttering Frog	E	V	Yes	180.09	8737
Mixophyes iteratus	Giant Barred Frog	V	V	No	3.81	93
Myotis macropus	Southern Myotis	V	–	No	120.25	2491
Ninox connivens	Barking Owl	V	–	No	36.64	1406
Ninox strenua	Powerful Owl	V	–	No	124.83	4807
Notamacropus parma	Parma Wallaby	V	V	No	304.98	9718
Petauroides volans	Southern Greater Glider	E	E	No	477.12	18222
Petaurus norfolkensis	Squirrel Glider	V	–	No	647.62	23507
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	156.02	7439
Phascogale tapoatafa	Brush-tailed Phascogale	V	–	No	90.41	2235
Phascolarctos cinereus	Koala	E	E	No	284.74	10693
Planigale maculata	Common Planigale	V	–	No	18.21	335
Potorous tridactylus	Long-nosed Potoroo	V	V	No	135.10	4370
Pseudophryne australis	Red-crowned Toadlet	V	–	No	43.54	1073
Tyto novaehollandiae	Masked Owl	V	–	No	42.08	1598
Tyto tenebricosa	Sooty Owl	V	–	Yes	207.82	11797
Vespadelus troughtoni	Eastern Cave Bat	V	–	Yes	383.77	17489
Total threatened fauna species credits						**180,325**

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Scattered tree credits

The ecosystem credits required for impacts to 25 scattered trees will result in an offset requirement of 22 ecosystem credits. A summary is presented in Table ES.19 and Table ES.20.

Table ES.19 Ecosystem credit summary for impacts to scattered trees in the Yengo IBRA subregion

PCT	TEC	HBT Cr	No HBT Cr	Credits
3489-Hunter Escarpment Grey Box Forest	Not a TEC	0	2	2
Total ecosystem credits		**0**	**2**	**2**

Table ES.20 Ecosystem credit summary for impacts to scattered trees in the Hunter IBRA subregion

PCT	TEC	HBT Cr	No HBT Cr	Credits
3314-Central Hunter Slopes Grey Box Forest	Not a TEC	1	0	1
3431-Central Hunter Ironbark Grassy Woodland	Not a TEC	15	0	15
4015-Central Hunter Riparian Forest	Not a TEC	2	0	2
4089-Namoi-Upper Hunter River Red Gum Forest	Not a TEC	2	0	2
Total ecosystem credits		**20**	**0**	**20**

Hunter Valley delma BAM-C update

An update to the BAM-C occurred on 4 August and resulted in revisions within the Hunter IBRA subregion for the *Delma impar* (Striped legless lizard) and also resulted in the introduction of the *Delma vescolineata* (Hunter Valley delma). Due to the timing of this BAM-C update, the credit liability changes associated with Delma spp. has not been incorporated into this version of the BDAR. These revisions and changes will be incorporated into the Response to Submission phase for the project.

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Glossary

Access tracks	Temporary and permanent tracks used to access the project. Refer to *Chapter 4 (Project description)* of the EIS for further details.
Affected species	A species that is likely to be affected through by direct and/or indirect impacts as a result of the project.
Alignment	Project or transmission line.
Assessment area	The assessment area includes the subject land and the area of land within the 1500 metre (m) buffer zone surrounding the subject land (or 500 m buffer zone for linear-shaped proposals). This is determined as per subsection 3.1.2 of the Biodiversity Assessment Method (BAM). The assessment area is used to address site context in accordance with section 3 of the BAM.
Avoid	Measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the project to completely avoid impacts on biodiversity values, or certain areas of biodiversity.
Biodiversity	The biological diversity of life is commonly regarded as being made up of the following 3 components: — genetic diversity – the variety of genes (or units of heredity) in any population — species diversity – the variety of species — ecosystem diversity – the variety of communities or ecosystems.
Biodiversity Assessment Method (BAM)	The NSW Biodiversity Assessment Method 2020
Biodiversity Assessment Method Calculator (BAM-C)	The web application that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a project or created at a biodiversity stewardship site.
Biodiversity credits	Ecosystem credits or species credits
Biodiversity Credit Report	The report produced by the Biodiversity Assessment Method Calculator (BAM-C) that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land to compensate for losses to biodiversity values from the impacts of project.

Biodiversity risk weighting	The BAM uses a biodiversity risk weighting to evaluate the ecological risks of threatened entities from the Biodiversity Offsets Scheme (BOS). The biodiversity risk weighting comprises 2 parts: — sensitivity to loss considers the increased threat posed to an entity from offsetting the loss of habitat or population — sensitivity to gain considers the ability of a species to respond to improvements in habitat condition at a biodiversity stewardship site. The biodiversity risk weighting for determining the credit requirement for ecosystem credits is based on: — the sensitivity to loss for the listed threatened ecological community (TEC) identified on the subject land, or if the vegetation is not a TEC, the sensitivity to loss for the plant community type (PCT) identified on the subject land (i.e. threat status of the TEC takes precedence to determine the sensitivity to loss, regardless of the estimated percent cleared value for the PCT) — the highest sensitivity to gain ranking for the ecosystem credit species associated with that TEC or PCT. The BAM-C will apply the biodiversity risk weighting to each vegetation zone based on the survey data the assessor collected from the subject land in Stage 1 and the impact assessment outcomes determined by the assessor in Stage 2.
Biodiversity study area	A minimum 140 m wide transmission line corridor focused on the planned infrastructure that was surveyed in accordance with Stage 1 of the BAM. This approach enables a level of flexibility for future design refinement of the transmission line. Where impacts were likely to be larger, the biodiversity study area was widened to accommodate the larger area. The biodiversity study area incorporates the subject land and is within the assessment area as defined in the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Biodiversity value	Are the following values: — vegetation integrity – being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state — habitat suitability – being the degree to which the habitat needs of threatened species are present at a particular site — biodiversity values, or biodiversity-related values, prescribed by the regulations under the NSW *Biodiversity Conservation Act 2016* (BC Act).
Construction impact area	The area that would be directly impacted by the construction of the project, including (but not limited to) transmission towers and lines, stringing sites, access roads, access tracks, substations, switching stations, adjustments and upgrades to existing lines, communications infrastructure, temporary worker accommodation, construction support sites, laydown areas and utility adjustments.
Construction access routes	Roads used by construction vehicles (light and heavy).

Construction support site	An area used as the base for construction activities, usually for the storage of plant/equipment and materials, processing facilities (concrete batching, aggregate crushing, grinding and screening), maintenance facilities/workshops, staff facilities, firefighting equipment, helicopter landing pad and support facilities, access and parking, and wastewater treatment. Some construction support sites would also include temporary worker accommodation. Construction support sites are discussed in *section 4.3.5* of the draft EIS.
Cumulative impact	The combined impacts of the project on a matter with other relevant future projects.
Development site	An area of land that is subject to a proposed development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and includes all areas of disturbance including both full and partial clearing areas. Development site has the same meaning as 'Project impact area' as defined within the EIS and other supporting documents of the project and refers to all areas covered by the application.
Disturbance area	This is used primarily to assess potential impacts on biodiversity values in the *Technical Report 1 – Biodiversity development assessment report*. Includes the following categories: — disturbance area A — disturbance area A (centreline) — disturbance area B — disturbance area HZ. Noted that the BDAR uses subject land rather than Disturbance area; and that these disturbance categories - are subsets of subject land.
Disturbance area A	The area where vegetation would be completely removed. It includes areas at and around proposed transmission towers (including tower pads and batters), stringing sites, laydown areas, switching stations, substation upgrades, construction support sites, new and upgraded access tracks and road upgrades. Impacts within this area would include sub-surface disturbance from construction activities such as grading, excavation, and full tree removal. With the exception of areas that only require temporary disturbance (i.e. temporary access tracks and stringing sites), this area would also be subject to ongoing maintenance during operation (including vegetation removal to ground level) for operational and safety requirements (including bushfire risk management).
Disturbance area A (centreline)	A 20 m wide centreline area between proposed transmission towers where all vegetation would be removed to ground level during construction. This area would also be subject to ongoing maintenance during operation (i.e. removal to maintain vegetation clearance requirements) for operational and safety requirements (including bushfire risk management).

Disturbance area B	The area within the transmission line easement, excluding disturbance area A and disturbance area A (centreline), where partial clearing would be undertaken. Removal of vegetation (including trees) would be undertaken only where it has the potential to exceed clearance heights. These heights are set for operational and safety requirements, including bushfire risk management (a minimum of 13.5 m below the conductors at maximum operating temperature). Vegetation with mature growth heights up to 2 m can remain, while vegetation exceeding 2 m will be managed to maintain these clearance heights. This area would be subject to ongoing maintenance during operation.
Disturbance area hazard tree zone (HZ)	Hazard trees are those that have the potential to pose a risk to safe operation of the transmission line by falling onto the proposed transmission towers, conductors and associated infrastructure within the transmission line easement. A hazard tree zone has been identified in limited areas on either side of the transmission line easement through LiDAR analysis of tree heights and topography. Hazard tree management would occur during operation to maintain safe operating clearances for the conductors and proposed transmission line tower structures. The hazard tree zone will be inspected for trees in the height range of 20 m or more, which is typically in the high-risk category. High-risk category trees will be assessed for structural instability and managed according to the risk present, including tree removal if required.
Dual credit species	In some circumstances the TBDC may identify a threatened species that requires assessment for ecosystem credits and species credits (referred to as dual credit species). For dual credit species, part of the habitat is assessed as a species credit (e.g. breeding habitat or land mapped on an important habitat map for a species). The remaining habitat components for the species are assessed as an ecosystem credit (e.g. foraging habitat). Dual credit species are generally either highly mobile species that rely on particular habitat components for breeding, such as maternity caves for bats, tree hollows for some large forest owls or cockatoos; or are species for which particular areas in the landscape are important for their survival, such as selected beaches for migratory shorebirds.
Ecosystem credit	A measurement of the value of threatened species habitat for species that can be reliably predicted to occur with a PCT.
Ecosystem credit species	Ecosystem credit species are threatened species whose occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys.
EnergyCo	The Energy Corporation of New South Wales constituted by section 7 of the NSW *Energy and Utilities Administration Act 1987* as the NSW Government-controlled statutory authority appointed as the infrastructure planner under the NSW *Electricity Infrastructure Investment Act 2020* responsible for the delivery of NSW's REZs. The proponent for the HTP.
Eraring Power Station	Existing power station at Eraring operated by Origin Energy.
Exclusion zone	A safe clearance area around the transmission line and towers to protect public safety, the network and to maintain access to the asset. It delineates the area where most land use activities are prohibited. The zone is located within the easement and is defined according to the operational voltage and design of the infrastructure.

Groundwater	Water found in the subsurface in the saturated zone below the water table or piezometric surface i.e. the water table marks the upper surface of groundwater systems.
High Threat Weed	A high threat weed is a vascular plant that, if not controlled, will invade and outcompete native plant species. Plants considered to be high threat weeds are listed on the high threat weeds list published in the BAM-C.
Hollow bearing tree (HBT)	A living or dead tree that has at least 1 hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 centimetres; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Hunter Transmission Project (HTP) or project	The HTP as described in *Chapter 4 (Project description)* of the EIS and identified in the overview figures of the EIS.
HTP corridor	Comprises: — the transmission line corridor connecting Bayswater South switching station to Olney switching station — the transmission line corridor connecting the Bayswater South switching station to the existing 500 kV transmission line near Bayswater Power Station — the transmission line corridor connecting the Olney switching station to the existing 500 kV transmission line between Eraring and Kemps Creek. The HTP corridor is around 140 m wide.
HTP North, HTP Central and HTP South	— 3 geographical zones defined as: HTP North – Bayswater to Broke includes the Bayswater Power Station, major coal mining complexes in the Upper Hunter Valley, Mount Thorley Industrial Estate, Singleton Military Area, and several rural properties generally on the alluvial floodplains of the Hunter River. — HTP Central – Pokolbin to Corrabare includes the Pokolbin and Corrabare State forests and the rural residential areas between these forests at Cedar Creek, Millfield and Laguna. — HTP South – Olney to Eraring includes the Watagan and Olney State forests, Watagans National Park, the residential areas in Martinsville and Cooranbong, and Eraring Power Station.
IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion	A subregion of a bioregion identified under the IBRA system.
Indirect impact	An impact on biodiversity values that occurs when project related activities affect threatened species, threatened species habitat, or ecological communities in a manner other than direct impact.
Laydown areas	Established to allow for flexibility in construction and to minimise the need for vehicle movements to and from the construction support sites. These would act as temporary staging, storage, and complex plant/equipment setup areas. They would also act as traffic control nodes during construction of the HTP.
Locality	The area within 10 kilometres of the subject land.

Local population	The population that occurs in the subject land. In cases where multiple populations occur in the subject land or a population occupies part of the subject land, impacts on each subpopulation must be assessed separately.
Minimise	A process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of the project on biodiversity values.
Mining complexes	Refer to mining complexes such as: — Mt Arthur Coal Mine — Maxwell Underground Coal Mine — Hunter Valley Operations mining complex — United Wambo mining complex — Mount Thorley Warkworth mining complex — Bulga mining complex.
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Mitigation	Action to reduce the severity of an impact.
Mitigation measure	Any measure that facilitates the safe movement of wildlife and/or prevents wildlife mortality.
Native vegetation	Means any of the following types of plants native to New South Wales: — trees (including any sapling or shrub or any scrub) — understorey plants — groundcover (being any type of herbaceous vegetation) — plants occurring in a wetland.
No clearing zone	Areas within the transmission line easement where vegetation removal is not required. These areas would occur where there is sufficient separation of 10 m or more between the maximum operating temperature conductor position and the existing vegetation. This area is excluded from the subject land/disturbance area.
Operation impact area	The area that would be occupied by permanent components of the project and/or maintained, including transmission line easements, transmission lines and towers, substations, switching stations, communications infrastructure, maintenance facilities, permanent access roads to substations and switching stations and access tracks to the transmission line easement.
Patch size	An area of intact native vegetation that: — occurs on the subject land or biodiversity stewardship site — includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the subject land or biodiversity stewardship site.
PCT classification system	The system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification Database.
Plant community type	A NSW plant community type identified using the PCT classification system.
Population	A group of organisms, all of the same species, occupying a particular area.

Pre-construction minor works	Activities with a low potential to impact the environment that may be permissible in advance of construction and without the requirement for an approved environmental management strategy/construction management plan.
(The) proponent	The Energy Corporation of NSW (EnergyCo)
Project impact area	The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. This term is equivalent to Development Site under the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Renewable Energy Zone (REZ)	A geographic area identified and declared by the NSW Government as a Renewable Energy Zone.
Sensitivity to gain/loss class	Sensitivity to gain/loss considers the ability of a species to respond to improvements in habitat condition at a biodiversity stewardship site or the increased threat posed to an entity from offsetting the loss of habitat or population. Sensitivity to gain/loss are 2 parts of the Biodiversity Risk Weighting.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Species credit species	Threatened species that are assessed in accordance with section 6.4 of the BAM. Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, a species may be assumed present within the subject land.
Stage 1: Biodiversity Assessment	Stage 1 of the BAM. It establishes a single consistent approach to assessing the biodiversity values on land subject to the project.
Stage 2: Impact Assessment	Stage 2 of the BAM. It provides for an impact assessment on biodiversity values on land subject to the project.
Stringing site	Used for the preparation, assembly and operation of stringing equipment to connect the transmission line to the towers. Stringing sites would be positioned along the HTP corridor. On other transmission projects, they may be referred to as ‘brake and winch’ sites.

Subject land (referred to as Disturbance area in the EIS)	The subject land is land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the assessment area which surrounds the subject land (i.e. the area of land in the 1500 m buffer zone around the subject land or 500 m buffer zone for linear projects). This is a subset of the project impact area and is used primarily to assess potential impacts on biodiversity values in the BDAR. Includes the following categories: — disturbance area A — disturbance area A (centreline) — disturbance area B — disturbance area HZ
Substation	A facility used to increase or decrease voltages between incoming and outgoing lines (e.g. 330 kV to 500 kV).
Threatened Biodiversity Data Collection	Part of the BioNet database, published by the Department and accessible from the BioNet website at www.bionet.nsw.gov.au.
Threatened ecological community	Means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act or any additional ecological community listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Threatened species	Critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Transgrid	Preferred network operator for the HTP.
Transmission line easement	An area surrounding and including the transmission lines which is a legal proprietary right and allows for ongoing access and maintenance of the transmission lines. Landowners can typically continue to use most of the land within transmission line easements, subject to some restrictions for safety and operational reasons.
Transmission tower	For 500 kV transmission lines, this is typically a free-standing steel lattice structure (suspension or tension tower). Transmission towers for the HTP would generally be up to 85 m high.
Vegetation class	A level of classification of vegetation communities defined in Keith (2004). There are 99 vegetation classes in NSW.
Vegetation formation	A broad level of vegetation classification as defined in Keith (2004). There are 16 vegetation formations and sub-formations in NSW.
Vegetation integrity	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.
Vegetation integrity score	The quantitative measure of vegetation condition.
Vegetation type	A NSW plant community type (PCT)
Vegetation zone	A relatively homogenous area of native vegetation that is the same PCT and broad condition state.

Abbreviations

ASL	above sea level
APZ	asset protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
CPHR	Conservation Programs, Heritage and Regulation
DBH	diameter at breast height over bark
EC	ecological community listed under the EPBC Act
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	endangered ecological community
EMF	electrical and magnetic fields
EWMS	environmental work method statement
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
SVTM	NSW State Vegetation Type Map
Syn.	Synonym
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
VEC	vulnerable ecological community

Declarations

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

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* (BC Act).

Signature: 

Date: 21/08/2025

BAM Assessor Accreditation no: BAAS17020

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix A provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

All EPBC Act-listed threatened species and communities that occur on the subject land, or in the vicinity, have been identified in the BDAR/EIS, including those that are ecosystem credit species.

ii. Details and experience of author/s and contributors

Authors and contributors

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Roger Dharmarajan	–	Senior Associate Ecologist	Targeted flora surveys	Master's Degree – Agriculture
Allan Richardson	–	Associate Ecologist Zoology specialist	Targeted threatened fauna surveys	Bachelor of Environmental Science (Honours)
Devon Raiff	BAAS23009	Senior Ecologist Botany specialist	Report preparation, BAM-C data entry and analysis, BAM plot surveys, targeted threatened flora surveys	Bachelor of Science Certificate III – Land and Conservation
Gavin Shelley	–	Senior Ecologist Zoology specialist	Targeted threatened fauna surveys	Bachelor of Environmental Science and Management
Tasman Carr	–	Ecologist Botany specialist	Report preparation, BAM plot surveys, targeted threatened flora surveys	Bachelor of Science (Geography)
Tori Wilson	–	Ecologist Zoology specialist	Report preparation, targeted threatened fauna surveys	Bachelor of Animal Science Graduate Certificate of Captive Vertebrate Management Graduate Certificate of Environmental Management (Conservation)
Sebastian Miller	–	Ecologist Botany specialist	Report preparation, BAM-C data entry and analysis, BAM plot surveys, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Marine Science
Olivia Zadro	–	Ecologist Botany Specialist	Targeted threatened flora surveys	Bachelor of Science (Ecology)
Madeleine Brighton	–	Ecologist	Report preparation, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Science (Environmental Biology) (Hons)
Charlotte Gurney-Read	–	Ecologist	Report preparation, targeted threatened fauna surveys	Master of Science Global Ecology and Conservation

Name	BAM Assessor Accreditation no. (if relevant)	Position/role	Tasks performed	Relevant qualifications
Charlotte George	–	Ecologist Zoology specialist	Report preparation, targeted threatened fauna surveys	Bachelor of Science (Honours) Graduate Certificate Environmental Science
Alicia Palmer	–	Ecologist	Report preparation, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Science (Honours)
Tia Gabruch	–	Senior Environmental Consultant Aquatic Ecology	Surveys and reporting for Aquatic Biodiversity Impact Assessment	Bachelor of Science (Honours)
Montana Morgan	–	Graduate Ecologist	Report preparation, targeted threatened flora surveys	Bachelor of Science (Advanced)
Marcus Hoskin	–	Graduate Ecologist	Report preparation, targeted threatened fauna surveys	Bachelor of Environmental Biology
Lucy Gill	–	Graduate Ecologist	Report preparation, BAM plot surveys, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Environmental Science and Management (Hons)
Taylor Stein	–	Graduate Ecologist	Report preparation, BAM plot surveys, targeted threatened flora surveys	Bachelor of Environmental Science and Management (Hons)
Christie Malyon	–	Graduate Ecologist	Report preparation, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Environmental Science and Management (Graduate July 2023)
Morgan Cardiff	–	Associate Environmental Scientist	Targeted threatened flora surveys	Bachelor of Environmental Science Master of Science (Sustainable Resource Management)
Emily Ireland	–	Resource Management Planner	Targeted threatened fauna/flora surveys	Master of Planning
Eleny Bunn	–	Graduate Environmental Scientist	Targeted threatened fauna surveys	Bachelor of Science (Environmental Sustainable Futures)

Name	BAM Assessor Accreditation no. (if relevant)	Position/role	Tasks performed	Relevant qualifications
Emily Mitchell	–	GIS Consultant	Figure preparation	Master of Information Technology (Business Analytics) Certificate IV Spatial Information Services Bachelor of Development Studies (Urban and Regional Planning)
Emma Buxton	–	GIS Consultant	Figure preparation	Bachelor of Science Graduate Certificate of Bushfire Protection
Sub-contractors				
Corey Mead (Treehouse Fauna Services)	BAAS19050	Fauna Ecologist	Targeted threatened fauna surveys	Bachelor of Applied Science – Coastal Management
Lachlan McRae	–	Fauna Ecologist	Targeted threatened fauna surveys	PhD on the ecology and conservation of the threatened large-eared pied bat (*Chalinolobus dwyeri*) and eastern cave bat (*Vespadelus troughtoni*) (in progress) Bachelor of Environmental Science and Management (Honours)
Stephen Mahony (Nightvision Ecology)	–	Senior Fauna Ecologist	Targeted threatened fauna surveys, drone pilot	Bachelor of Science (Biology)
Nathan Stewart (Nightvision Ecology)	–	Senior Fauna Ecologist	Targeted threatened fauna surveys, drone pilot	Bachelor of Environmental Science and Management
Rebecca Seeto (Nightvision Ecology)	–	Senior Fauna Ecologist	Targeted threatened fauna surveys, drone pilot	Bachelor of Biotechnology (Honours)
Nicholas Gale (Nightvision Ecology)	–	Fauna Ecologist	Targeted threatened fauna surveys, drone observer	Bachelor of Science (Honours) Wildlife & Conservation Biology (Science)
Oliver Brynes (Nightvision Ecology)	–	Fauna Ecologist	Targeted threatened fauna surveys, drone pilot	Bachelor of Environmental Science and Management (Honours)

Name	BAM Assessor Accreditation no. (if relevant)	Position/role	Tasks performed	Relevant qualifications
Greg Ford (Balance Environmental)	–	Fauna Ecologist	Anabat analysis	Bachelor of Applied Science (Biology) Graduate Diploma in Resource Management
Amanda Lo Cascio	–	Fauna Ecologist	Anabat analysis	Bachelor of Science (Zoology), Master of Environment (Conservation)
Paul Rossington (EMM Consulting)	BAAS18065	Botanist	Targeted threatened flora surveys – team leader	Master of Wildlife Management, Habitat Program Bachelor of Science
Luke O'Brien (EMM Consulting)	–	Fauna Ecologist	Targeted threatened fauna surveys – team leader	Bachelor of Science Bachelor of Environmental Science and Management
Zachary Blake (EMM Consulting)	–	Ecologist	Targeted threatened flora and fauna surveys	Bachelor of Science
Louise Neville (EMM Consulting)	–	Botanist	Targeted threatened flora surveys	Bachelor of Biomedical Science Master of Environmental Science
Justin Chey (EMM Consulting)	–	Fauna Ecologist	Targeted threatened fauna surveys	Bachelor of Environmental Science and Management (Sustainability) Diploma of Conservation and Land Management
Eugene Dodd (EMM Consulting)	–	Botanist	Targeted threatened flora surveys – team leader	Master of Research Bachelor of Science

iii. Conflict of interest

I Alex Cockerill declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature: 

Date: 21/08/2025

BAM Assessor Accreditation no: BAAS17020

Stage 1: Biodiversity assessment

1 Introduction

1.1 Proposed development

1.1.1 Development overview

The Hunter Transmission Project (HTP, the project) involves the construction of a new overhead 500 kilovolt (kV) double circuit transmission line of around 100 kilometres connecting the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in the Olney State Forest near Eraring in the Hunter region of New South Wales (NSW).

Due to its strategic importance, the NSW Minister for Planning and Public Spaces has declared the HTP to be critical State significant infrastructure (CSSI) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Under this process, the Energy Corporation of NSW (EnergyCo, the proponent) is required to prepare an environmental impact statement (EIS) in accordance with the NSW Environmental Planning and Assessment Regulation 2021.

This biodiversity development assessment report (BDAR) accompanies the EIS for the project and addresses the Secretary's environmental assessment requirements (SEARs) issued on 13 August 2024 (see Table 1.1).

In addition to the SEARs, advice from several government agencies was received on the HTP. Agency advice relevant to and considered in this BDAR is provided on the Major Projects website maintained by the NSW Department of Planning, Housing and Infrastructure (DPHI).

Table 1.1 HTP SEARs – technical assessment issue for biodiversity

HTP SEARs: Biodiversity
— an assessment of the biodiversity impacts of the project, in accordance with the NSW *Biodiversity Conservation Act 2016* , the biodiversity assessment method (BAM) and documented in a biodiversity development assessment report (BDAR). The BDAR must: — be prepared using the approved BDAR template — document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM — assess any impacts to nearby conservation areas and nature reserves;
— an assessment of the likely direct and indirect impacts of the project on listed aquatic threatened species, populations or ecological communities, scheduled under the NSW *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts; and
— if an offset is required, details of the measures proposed to address the offset obligations.

1.1.2 Location

The project involves development across 5 local government areas (Muswellbrook, Singleton, Cessnock, Central Coast and Lake Macquarie). The HTP corridor extends generally west to east and consists of a transmission line corridor connecting a new Bayswater South switching station to the existing 500 kV transmission line near the Baywater power station and the Olney switching station to the existing 500 kV transmission line between Eraring and Kemps Creek. The project also includes adjustments and upgrades to existing transmission lines connecting Bayswater and Eraring power stations. The location of the project is shown in Figure 14.1 and Figure 14.2.

1.1.3 Key definitions

Project impact area	The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. This term is equivalent to Development Site under the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Biodiversity study area	A minimum 140 m wide transmission line corridor focused on the planned infrastructure that was surveyed in accordance with Stage 1 of the BAM. This approach enables a level of flexibility for future design refinement of the transmission line. Where impacts were likely to be larger, the biodiversity study area was widened to accommodate the larger area. The biodiversity study area incorporates the subject land and is within the assessment area as defined in the BAM. The boundary of the biodiversity study area aligns with (or is within) the project impact area as defined in the EIS, with the exception of access tracks that do not require upgrades or ground disturbance, which have been excluded from the biodiversity study area.
Subject land (referred to as Disturbance area in the EIS)	The subject land is land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the assessment area which surrounds the subject land (i.e. the area of land in the 1500 m buffer zone around the subject land or 500 m buffer zone for linear projects). This is a subset of the project impact area and is used primarily to assess potential impacts on biodiversity values in the BDAR. Includes the following categories: — disturbance area A — disturbance area A (centreline) — disturbance area B — disturbance area HZ

1.1.4 Project description

The Hunter Transmission Project (HTP, the project) is critical State significant infrastructure (CSSI). It must be built by the end of 2029 to protect energy security in NSW as the remaining coal-fired power stations close.

The HTP includes:

- a new overhead 500 kilovolt (kV) double circuit transmission line of around 110 kilometres
- 2 new switching stations (Bayswater South and Olney)
- upgrades to the existing Bayswater and Eraring substations
- adjustments and upgrades to existing transmission lines
- property adjustment works to facilitate access to the transmission lines and switching stations
- utility adjustments required for the construction of the transmission network infrastructure
- ancillary works to support construction including road upgrades, establishment of new access tracks and upgrades to existing access tracks, construction support sites (some with temporary worker accommodation), and other construction facilities such as laydown areas.

The new transmission line would transport electricity generated in the Central-West Orana and New England Renewable Energy Zones (REZs). It would connect the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in the Olney State Forest near Eraring. This would strengthen the State's core electricity grid and supply clean and reliable energy to NSW consumers for generations to come.

An overview of the HTP is provided in Table 1.2 and shown in Figure 14.1. The key project elements are shown in Figure 14.5a and Figure 14.5b.

Further details are provided in Chapter 4 (Project description) of the project's EIS.

Table 1.2 Project overview

The project	— The critical State significant infrastructure application for the HTP covers 5 local government areas — Most development would be concentrated in and around the HTP corridor. Some ancillary development such as construction support sites and temporary worker accommodation, road upgrades and laydown areas would be outside the HTP corridor.
Project impact area	— The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.
Construction and operation	— Construction impact area around 2351 ha — Operation impact area around 1261 ha
Subject land (referred to as Disturbance area in the EIS)	— Disturbance area around 1266 ha — Disturbance area A around 683 ha — Disturbance area A (centreline) around 214 ha — Disturbance area B around 367 ha — Disturbance area HZ around 1.84 ha
New transmission line and transmission towers	— Overhead 500 kV double circuit transmission line of around 110 km between Bayswater South 500 kV switching station and Olney 500 kV switching station — Steel lattice towers up to 85 m high and that are spaced anywhere between 75 m to around 1.3 km apart (typically between 300 m and 600 m) — 500 kV transmission lines with a minimum vegetation clearance of 13.5 m — Ancillary infrastructure such as earth wire and communications systems — Construction easement of around 140 m wide — Operational easement around 70 m wide.
Switching stations/ substation works	— New Bayswater South 500 kV switching station – construction impact area around 26.6 ha — Modifications at the existing Bayswater 500 kV/330 kV substation within the existing footprint — New Olney 500 kV switching station – construction impact area around 20 ha — Augmentation and modifications at the existing Eraring 500 kV/330 kV substation, including installation of 2 new transformers.

Adjustments / upgrades and crossings – existing transmission lines	— Adjustments to existing double circuit 500 kV transmission line at Bayswater:
	  – Line 5A1 and 5A2: Eraring – Kemps Creek 500 kV at Ravensdale to connect to the new Olney 500 kV switching station
	  – Line 5A3: Bayswater – Mt Piper 500 kV at Bayswater to connect to the new Bayswater South 500 kV switching station
	  – Line 5A4: Bayswater – Wollar 500 kV at Bayswater to connect to the new Bayswater South 500 kV switching station
	— Adjustments to existing double circuit 330 kV transmission lines:
	  – Line 31: Bayswater – Regentville 330 kV
	  – Line 32: Bayswater – Sydney West 330 kV
	  – Line 81: Newcastle – Liddell 330 kV
	— Crossing of existing double circuit 330 kV transmission lines:
	  – Line 31: Bayswater – Regentville 330 kV at Bayswater
	  – Line 32: Bayswater – Sydney West 330 kV at Bayswater
	  – Line 81: 330 kV: Newcastle – Liddell 330 kV at Lemington and again at the Singleton Military Area
	  – Line 82: 330 kV: Tomago – Liddell 300 kV at Warkworth and again at the Singleton Military Area.

Upgrades – existing transmission lines and towers	— Upgraded earth wire on Line 5A3 and Line 5A4 — Upgraded earth wire and communications systems on Line 5A1 and Line 5A2 — Tower strengthening on various existing towers on Line 5A1, Line 5A2, Line 5A3 and Line 5A4.
Road works	— Modifications to the existing public road network — New and upgraded access tracks for construction and operation.
Construction support sites	— Five construction support sites: Hebden Road, Pikes Gully Road, Gouldsville Road, Wollombi Road and Freemans Drive — Helicopter pads (helipads) indicatively at: Hebden Road, Pikes Gully Road, Gouldsville Road and Freemans Drive.
Ancillary sites	— Laydown areas, which would be established to allow for flexibility in construction and to minimise the need for vehicle movements to and from the construction support sites.
Utility adjustments	— Third party utility works including gas, telecommunications, water, sewer and stormwater.
Timing	— Construction to start in 2027 — Operational by the end of 2029.

1.1.4.1 Subject land

The subject land is a subset of the project impact area and is primarily used to assess potential impacts on biodiversity values in this BDAR. It refers to the area that would be directly impacted by construction of the project comprising the following:

- construction of all project infrastructure elements (including the proposed transmission line alignment, transmission line easement, switching stations, substation upgrades and other ancillary works)
- locations for construction elements such as construction support sites, access tracks, site access points, laydown and staging areas
- the operational impact area (including areas required for maintenance) as these areas would be established during the construction process.

The subject land has been assessed as a worst-case area of impact based on the project component locations and construction areas. The area would be confirmed and refined during finalisation of the design and construction methodology. The project's design and construction methodology would be developed to further the objectives of impact avoidance and minimisation.

The subject land incorporates different project elements with varying degrees of physical disturbance to reflect construction and operational requirements, and these will be applied to the biodiversity assessment. For this BDAR, these different disturbance areas have been divided into the following subsets of disturbances:

- disturbance area A
- disturbance area A (centreline)
- disturbance area B
- disturbance area HZ.

A **no clearing zone** has also been defined. This area is excluded from the subject land / disturbance area as no impacts occur within it but it has been defined to ensure it is clear what areas will not be affected.

The specific location of the infrastructure associated with disturbance area A is based on an indicative concept design for impact assessment purposes and is subject to change with variations to the design of the project. Biodiversity assessments have been conducted using these indicative locations to provide representative results for impacts throughout the project, and have the potential to contribute to further design changes, including variations to avoid perceived high impact areas.

Definitions for these areas are provided below, while indicative layouts of each disturbance area for a 500 kV transmission line is provided in Figure 1.1 and Figure 1.2 with the indicative application based on current design of HTP in Figure 1.3.

Disturbance area A – refers to an area where vegetation would be completely removed. It includes areas at and around proposed transmission line towers (including tower pads and batters), stringing sites, laydown areas, switching stations, substation upgrades, construction support sites, new and upgraded access tracks and road upgrades.

Impacts within this area would include sub-surface disturbance from construction activities such as grading, excavation, and full tree removal.

With the exception of areas that only require temporary disturbance (i.e. temporary access tracks and stringing sites), this area would also be subject to ongoing maintenance during operation (including vegetation removal to ground level) for operational and safety requirements (including bushfire risk management).

Disturbance area A (centreline) – is a subset of disturbance area A and refers to a 20 metre wide centreline area between proposed transmission line towers where all vegetation would be removed to ground level during construction.

This area would also be subject to ongoing maintenance during operation (i.e. removal to maintain vegetation clearance requirements) for operational and safety requirements (including bushfire risk management).

Disturbance area B – an area within the transmission line easement, excluding disturbance area A and disturbance area A (centreline), where partial clearing would be undertaken. Removal of vegetation (including trees) would be undertaken only where it has the potential to exceed clearance heights. These heights are set for operational and safety requirements, including bushfire risk management (a minimum of 13.5 metres below the conductors at maximum operating temperature). Vegetation with mature growth heights up to 2 metres can remain, while vegetation exceeding 2 metres will be managed to maintain these clearance heights.

This area would be subject to ongoing maintenance during operation.

Disturbance area HZ – Hazard trees are those that have the potential to pose a risk to safe operation of the transmission line by falling onto the proposed transmission line towers, conductors and associated infrastructure within the transmission line easement. A hazard tree zone has been identified in limited areas on either side of the transmission line easement through LiDAR analysis of tree heights and topography.

No clearing zone – refers to the areas within the transmission line easement where vegetation removal is not required. These areas would occur where there is sufficient separation of 10 metres or more between the maximum operating temperature conductor position and the existing vegetation. These areas are excluded from the subject land (see Figure 1.2).

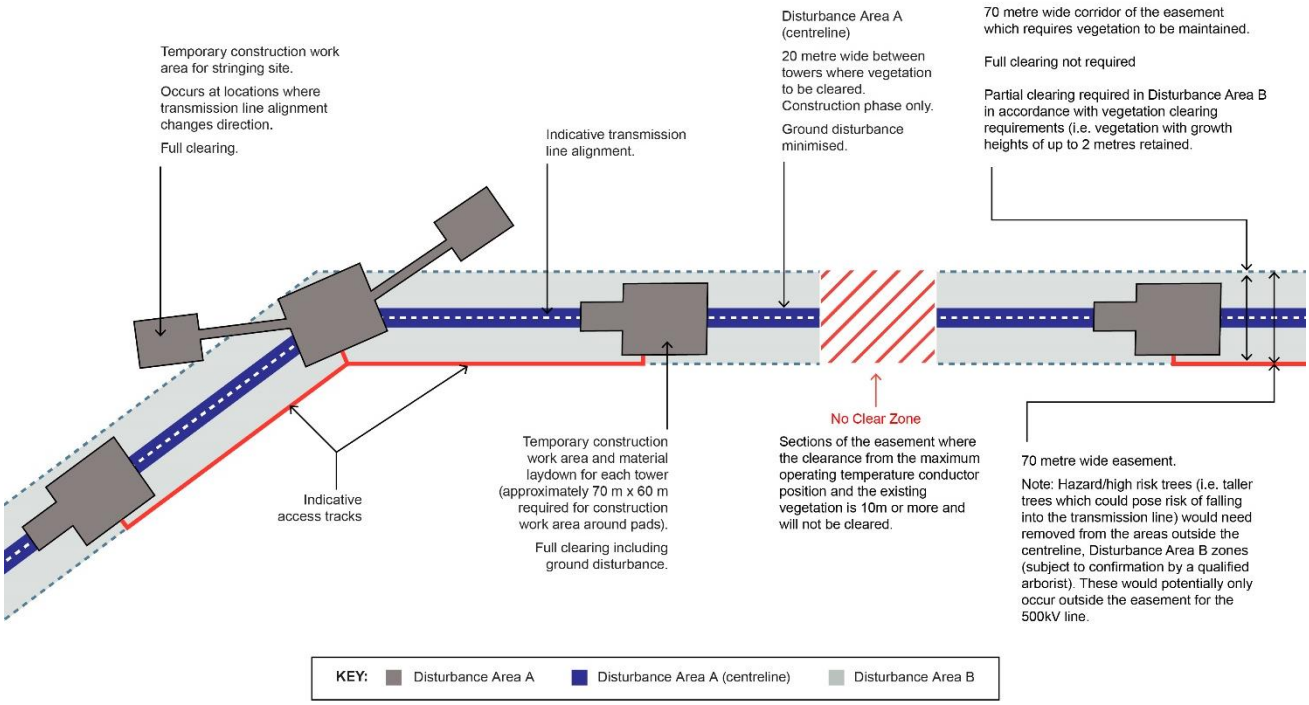


Figure 1.1 Indicative disturbance area definition for a typical 500 kV transmission line section during construction

Refinement of the disturbance areas has also occurred to enable, as much as possible before detailed design, that:

- the small slivers and gaps of vegetation which would be unlikely to be avoided during construction have been included as being impacted
- the layout of the different forms of vegetation clearing, especially where they occur in a complex matrix or where zones are too small to be realistically cleared by a contractor using large plant machinery have been simplified
- all instances where clearing zones overlap, have micro-gaps or micro-intersections have been adjusted where possible by completing an analysis of all spatial data.

These disturbance areas are ‘worst case’ upper limit thresholds. They have been developed to enable all potential impacts to be captured so the project credit liability is appropriate. As these disturbance areas are refined through detailed design, it is expected that impacts, and thus credit liabilities, will be reduced further.

For clarity where overlapping disturbance areas occur, the higher level of disturbance has been used for the basis of Biodiversity Assessment Method Calculator (BAM-C) calculations and impact assessment.

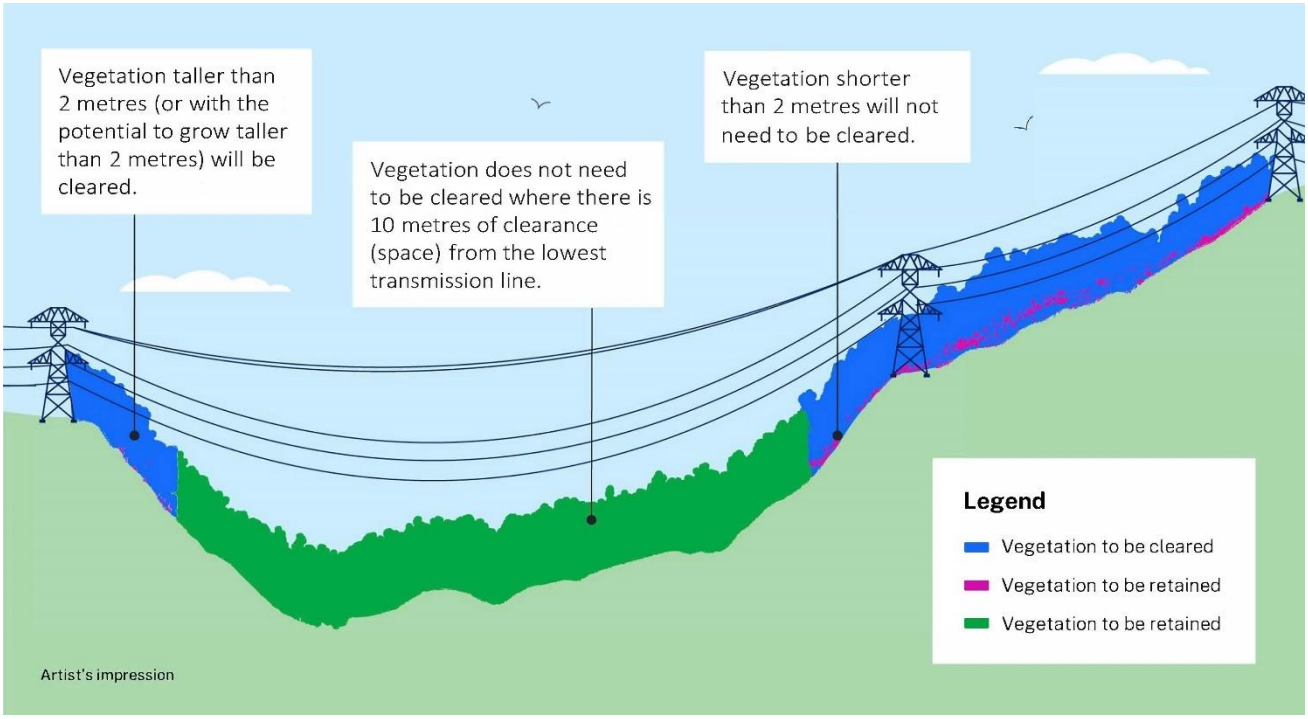


Figure 1.2 Indicative disturbance area and no clearing zone cross section for a typical 500 kV transmission line section during construction

1.1.4.2 Operational clearing assumptions for 500 kV lines

The following approach to disturbance areas is proposed during operation. Refinement during detailed design and construction planning may allow for some increase in vegetation height to occur if vegetation clearances are achievable.

For the 70-metre wide 500 kV easement, operational vegetation clearing would be required to maintain safe operation of the transmission lines. To achieve this, the following clearances would be implemented during operation (refer to Figure 1.3):

- Disturbance area A (including centreline) – complete clearing to ground level (including removal of root balls) for 10 metres either side of the centreline.
- Disturbance area B – partial clearing is proposed in this area. Vegetation with growth heights of up to 2 metres can be retained within 10 metres of the centreline out to 35 metres distance from the centreline to the extent of the easement.
- Disturbance area HZ – Hazard tree management requires ongoing maintenance during operation to maintain safe operating clearances for the conductors and proposed transmission line tower structures. The hazard tree zone will be inspected for trees in the height range of 20 metres or more, which is in the high-risk category. High-risk category trees will be assessed for structural stability. A structurally sound tree with no obvious risk of falling will be left standing. Trees with obvious defects that pose a risk will be removed.
- Permanent access tracks – impacts will be minimal but would generally involve clearing of any vegetation regrowth and/or trimming of trees that pose fall-in risk to the access track corridor to enable safe vehicle passage.

1.1.4.3 Clearing controls

To ensure the clearing and construction of the above disturbance areas is consistent with the assessment of the EIS in accordance with BAM, specific clearing controls have been identified for each disturbance area.

The specific clearing controls are directly associated with areas of mapped 'sensitive biodiversity' value (see Figure 14.21), including:

- locations of threatened plants (e.g. *Rhodamnia rubescens*)
- streams from top of bank
- breeding habitats for threatened amphibians.

In addition to the specific clearing controls for sensitive biodiversity the following standard mitigation controls will also apply to all disturbance areas. These include:

- erosion and sedimentation controls to avoid downstream impacts to amphibian breeding habitats and other sensitive biodiversity areas
- pest management controls
- measures for reducing the risk of spread of Amphibian Chytrid Fungus Disease
- precautions to limit the spread of myrtle rust
- removal of root balls/root stock will be limited to civil/construction areas wherever possible.
- pre-clearing surveys and staged clearing process
- spreading of mulch on bare earth/disturbed areas to stabilise prior to rehabilitation
- relocation of hollow tree barrels as habitat in select areas
- relocation of any fauna by a suitably qualified ecologist
- reinstatement with ground cover (native seed)
- timing restrictions (outside of breeding periods for certain species).

Disturbance area A (including centreline)

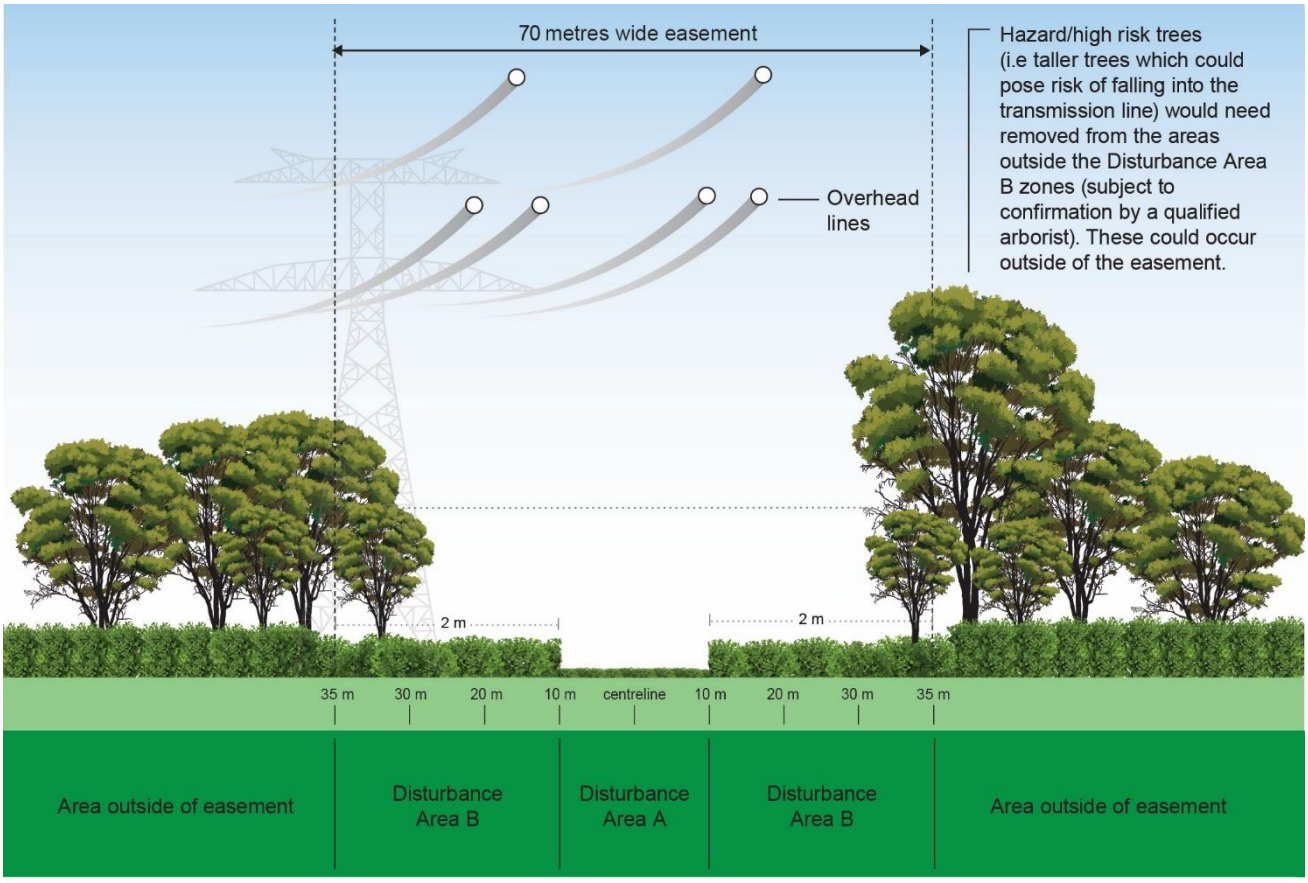
Clearing methods within disturbance area A and disturbance area A (centreline) do not require the retention of native vegetation and are therefore not constrained by equipment type or clearing methodology beyond the standard clearing mitigation controls and the following specific controls within the mapped sensitive biodiversity areas:

- implementing water quality controls and structures to prevent water quality changes from existing levels within downstream sensitive biodiversity - amphibian breeding habitats (see Figure 14.21). An erosion and sediment control plan will need to be tailored so it complements this clearing approach.
- implementation of myrtle rust controls in areas of sensitive biodiversity – *Rhodamnia rubescens* (see Figure 14.21).

Disturbance area B

- Clearing methods within disturbance area B must minimise impacts to the understorey vegetation, defined by growth height below 2 metres. The removal of vegetation within this area will require:
  - avoiding the use of tracked machinery where possible
  - maintaining in situ an average of 40% of existing understorey vegetation across the disturbance area B
  - retaining all mapped sensitive biodiversity – threatened species of plant (see Figure 14.21)
  - maximise retention where possible of mapped sensitive biodiversity – *Rhodamnia rubescens* (see Figure 14.21).
- Implementing hand clearing (not heavy plant) in the following mapped sensitive biodiversity areas (see Figure 14.21):
  - locations of threatened plants for avoidance
  - identified stream buffers measured as 5 metres from top of bank.

- Implementing water quality controls and structures to prevent water quality changes from existing levels within downstream sensitive biodiversity – amphibian breeding habitats. An erosion and sediment control plan will need to be tailored so it complements this clearing approach.
- Implementation of myrtle rust controls in mapped sensitive biodiversity – *Rhodamnia rubescens*.



Vegetation in the easement to be maintained to achieved minimum clearance requirements (based on growth heights). (Assessed as up to 2 metres growth heights).

Figure 1.3 Indicative disturbance area locations and widths applied for a typical 500 kV transmission line section

1.1.4.4 Clearing specification for work package

A summary table of the disturbance types, potential impacts, proposed clearing method and specifications is provided in Table 1.3.

Table 1.3 Summary of disturbance type and clearing methods

Disturbance type	Component	Transmission line easement section	Impact type	Clearing method	Control measures/specifications	Post construction restoration
Disturbance area A (including centreline)	Tower sites, substation sites, access tracks, stringing sites, construction support sites, laydown area and central 20 metre (m) strip of the transmission line easement.	10 m either side of centreline. (total 20 m).	Full clearing to ground, including root ball removal.	No restrictions, tracked heavy machinery permitted.	— Standard mitigation controls. — In sensitive biodiversity areas associated with mapped breeding habitats for threatened amphibians (see Figure 14.21) – implementing water quality controls and structures to maintain existing water quality levels and prevent impact to downstream amphibian breeding habitats. — In sensitive biodiversity areas associated with mapped Locations of threatened plants (*Rhodamnia rubescens*) (see Figure 14.21) – implement myrtle rust controls.	— Disturbance area A (centreline) to be rehabilitated to maintain erosion and sedimentation controls. — No changes to existing water quality levels in areas of sensitive biodiversity areas associated with mapped breeding habitats for threatened amphibians (see Figure 14.21). — Areas not associated with permanent access tracks or permanent infrastructure to be remediated as part of restoration phase of the project with existing native understorey species with growth heights below 2 m. Species mix to be dictated by pre-disturbance vegetation types identified in the EIS. — Mulched material will be evenly spread on bare disturbed areas to assist with the protection of the soil. Spread of mulched material to a depth of >50 millimetres (mm) will be avoided where practicable. — Herbicides will be applied as required. — Temporary off transmission line easement: laydown areas, stringing sites, workshops, site offices and accommodation will be remediated as part of restoration phase of the project.

Disturbance type	Component	Transmission line easement section	Impact type	Clearing method	Control measures/specifications	Post construction restoration
Disturbance area B	Operational easement 25 m strips outside the central 20 m corridor.	Outer 10–35 m either side of 20 m centreline.	All vegetation that impinges clearances to the overhead conductors will be removed. Partial clearing only that minimise impacts to the understorey vegetation, defined by growth height not exceeding 2m at maturity.	Non-tracked machinery/plant within disturbance area B. Tracked and wheeled machinery will be permitted through disturbance area A central 20 m of the transmission line easement (fully cleared). This is to remove fell timber within the adjoining disturbance area B.	— Standard mitigation controls. — Maintaining a proportion of understorey vegetation in situ across the total area for disturbance area B in the transmission line easement. — Retention of threatened species of plant associated with mapped locations of threatened plants (see Figure 14.21) with growth height forms of < 2 m in height. — In sensitive biodiversity areas associated with mapped breeding habitats for threatened amphibians (see Figure 14.21) – implementing water quality controls and structures to prevent impact to downstream amphibian breeding habitats. — In sensitive biodiversity areas associated with mapped locations of threatened plants (*Rhodamnia rubescens*) (see Figure 14.21) – implement myrtle rust controls. — Where possible, retain felled habitat trees in situ.	— Maintaining a proportion of understorey vegetation < 2 m in height in situ across the area. Some vegetation may require removal to access tall growing trees that could exceed the VCR in the future.

Disturbance type	Component	Transmission line easement section	Impact type	Clearing method	Control measures/specifications	Post construction restoration
					— Mulched material will be evenly spread on bare disturbed areas to assist with the protection of the soil. Spread of mulched material to a depth of >50 mm will be avoided where practicable.	
Disturbance area B – mapped sensitive biodiversity areas	Locations of threatened plants for avoidance (see Figure 14.21). Streams 5 m buffer zone from top of bank (see Figure 14.21).	Outer 10–35 m either side of 20 m centreline	As above and minimise impacts on the surrounds and avoid degrading the water quality.	Hand Clearing – Vegetation to be cut down by chain saws and removed from the transmission line easement. Tracked and wheeled vehicles will be permitted through disturbance area A central 20 m of the transmission line easement. This is to remove fell timber within the disturbance area B.	— In sensitive biodiversity areas associated with mapped breeding habitats for threatened amphibians (see Figure 14.21) – implementing water quality controls and structures to prevent impact to downstream amphibian breeding habitats. — In sensitive biodiversity areas associated with mapped locations of threatened plants (*Rhodamnia rubescens*) (see Figure 14.21) – implement myrtle rust controls. — Where possible, retain felled habitat trees in situ.	— Maintaining a proportion of understorey vegetation < 2 m in height in situ across the area.

Disturbance type	Component	Transmission line easement section	Impact type	Clearing method	Control measures/specifications	Post construction restoration
Disturbance area HZ	Hazard trees 10 m either side of operational transmission line easement in areas of canopy heights >20 m in height.	Limited areas identified through LiDAR analysis within 10 m either side of 70 m wide easement.	Partial clearing of structurally unsound canopy trees only, minimise impacts to the understorey vegetation, defined by growth height forms of < 2 m in height.	Non-tracked machinery/plant/ hand clearing.	— Implement clearing mitigation controls. — Maintaining a proportion of understorey vegetation in situ across the area. — Retention of threatened species of plant with growth forms of < 2 m in height. — Where possible, retain felled habitat trees in situ.	— Maintaining a proportion of understorey vegetation < 2 m in height in situ across the area.
No clearing zone	Gullies and other areas where project design and construction does not require vegetation to be removed.	Entire width of easement in areas that meet the Vegetation Clearing Requirements (>10 m from conductor).	No impact	No clearing required as construction methods able to avoid this area.	N/A	Not required as vegetation retained.

1.1.4.5 Subject land

As outlined in the BAM, the subject land is the land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the assessment area which surrounds the subject land (i.e. the area of land in a buffer zone around the subject land being 500 metres for the transmission line and 1500 metres for construction support sites, switching stations and substations).

The location of the subject land is shown in Figure 14.5a and Figure 14.5b. The subject land contains all areas impacted by construction and operation. Specifically, the subject land incorporates the disturbance area and subset components including disturbance areas A (including centreline), B and HZ.

1.1.4.6 Project timing

Construction of the project would commence in 2027, subject to NSW Government and Commonwealth planning approvals and be operational by the end of 2029.

1.1.5 Other documentation

This BDAR is part of the HTP EIS. This BDAR should be read in conjunction with the EIS and other associated technical studies.

1.2 Biodiversity Offsets Scheme entry

Entry to the Biodiversity Offset Scheme (BOS) is triggered by developments, projects and activities that meet certain thresholds for significant impacts on biodiversity, or on an opt-in basis.

For State significant development and State significant infrastructure projects, the BOS applies unless the Secretary of DPHI and the environment agency head of NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) determine that the project is not likely to have a significant impact.

In this case, the BOS applies to the project.

1.3 Excluded impacts

Clause 6.8(3) of the BC Act specifies that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1 – exempt land (as defined in Part 5A of the LLS Act), other than prescribed impacts (as defined in clause 6.1 of the NSW Biodiversity Conservation Regulation 2017. Prescribed impacts must therefore be assessed for category 1 – exempt land.

Areas of category 1 – exempt land have been identified in the subject land through a combination of desktop modelling and field survey (where possible), and through consultation with Conservation Programs, Heritage and Regulation (CPHR). Further details of the determination process are provided in section 4.1 and Appendix B (Determination of excluded impacts).

The location of excluded impacts is provided in Figure 14.6.

1.4 Matters of national environmental significance

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), proposed actions with the potential to significantly impact matters protected by the EPBC Act must be referred to the Australian Minister for the Environment and Water, to determine whether they are controlled actions and require approval from the Minister. This includes an action that is likely to have a significant impact on matters of national environmental significance (MNES), such as Commonwealth listed threatened species and ecological communities.

The project was determined to be a controlled action on 5 February 2025, due to impacts on listed threatened species and ecological communities (sections 18 and 18A) and Commonwealth land (sections 26 and 27A). The project will be assessed under a bilateral agreement between the Australian Government and the State of New South Wales (in accordance with section 45 of the EPBC Act).

The NSW Assessment Bilateral Agreement provides for certain actions that are State significant development (SSD) or State significant infrastructure (SSI) within the meaning of the EP&A Act, to be accredited for the purposes of meeting the requirements for assessment and public exhibition of an action under the provisions of the EPBC Act. However, a separate EPBC Act approval is still required.

MNES under the EPBC Act have been identified within the subject land and these are identified in the BDAR in sections 4.3.2, 5.1.3 and 5.1.4, and Appendix C (Matters of national environmental significance).

In addition to threatened entities listed under the BC Act, the BAM requires discussion of threatened ecological communities and species listed under the EPBC Act. The SEARs also require that MNES, listed under the EPBC Act, are considered. Details of MNES within the subject land along with discussion of impacts, mitigations and offset requirements are provided in Appendix C (Matters of national environmental significance).

1.5 Information sources

The following information sources were used in the preparation of this report:

- aerial photographic imagery (Maxar (Vivid) imagery captured at various dates between 2014 and 2024)
- BioNet (NSW) Mitchell Landscapes – Version 3.1 (DPIE 2021)
- NSW Interim Biogeographic Regionalisation of Australia (IBRA region and subregion – Version 7.0) (DEE 2018)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Bureau of Meteorology 2024)
- Directory of Important Wetlands of Australia (DAWE 2021)
- BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a).
- BioNet Atlas (NSW DCCEEW 2024b)
- BioNet Vegetation Classification Database (NSW DCCEEW 2024c)
- Commonwealth Species Profiles and Threats Database (Commonwealth DCCEEW 2024a)
- BAM Important Area Maps for threatened species (NSW DCCEEW 2024d)
- Register of Declared Areas of Outstanding Biodiversity Value – Critical habitat declarations in NSW (NSW DCCEEW 2024e)
- Biodiversity Assessment Method 2020 (DPIE 2020)
- BAM survey guidelines, including:
  - *Threatened reptiles: Biodiversity Assessment Method survey guide* (DPE 2022c)
  - *Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide* (DPE 2022d)
  - *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020a)
  - Flora Species with Specific Survey Requirement
  - *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021)

- *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020b)
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC 2004).

The following vegetation mapping datasets were reviewed:

- NSW State Vegetation Type Map release C2.0M2.1 (November 2024) (NSW DCCEEW 2024f)
- Lake Macquarie local government area (LGA) Vegetation Community Map 2022 VIS_ID 5117 – Version 1 (Bell and Driscoll 2022)
- Vegetation of the Singleton Military Area -VIS_ID 3913 (Sinclair Knight Merz and Eastcoast Flora Survey 2012).

Other related documents used to refine vegetation mapping and plant community type (PCT) allocation included:

- NSW BioNet Flora Survey Plots – PCT Reference Sites: full floristic plots used in the development of the quantitative PCT classification. Currently available for eastern NSW PCTs version C2.0. (DPE 2022a)
- NSW State Vegetation Type Map technical notes 2022 (NSW DCCEEW 2022)
- Eastern NSW plant community type percentage cleared calculation technical notes 2022 (DPE 2022b).

Other BDARs and biodiversity reports were reviewed to obtain existing information on biodiversity in the locality with specific focus placed on areas assessed in previous BDARs that overlap with the biodiversity study area. The reports reviewed included:

- *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022)
- *Mt Pleasant Optimisation Project – Appendix E – Biodiversity Development Assessment Report* (Hunter Eco 2021)
- *Mangoola Coal Continued Operations Project – Biodiversity Assessment Report* (Umwelt 2019)
- *Ecology Report for the Continuation of Rix's Creek Mine, Singleton LGA* (Bell 2015)
- *Warkworth Coal Mine Continuation Project – Biodiversity Assessment Report* (Cumberland Ecology 2014a)
- *Bengalla Mine Continuation – Biodiversity Assessment Report* (Cumberland Ecology 2014b)
- *Bulga Coal Mine Optimisation – Ecological Impact Assessment* (Umwelt 2013).

2 Methods

2.1 Site context methods

This section describes the approach to identifying and assessing the landscape context in accordance with Chapter 3 of the NSW Biodiversity Assessment Method 2020 (BAM), and the requirements set out in Part 1 of the BAM 2020 Operational Manual – Stage 1 (DoP 2020) (BAM 2020 Operational Manual). It provides information on a range of landscape features that occur on the subject land and in surrounding areas. The landscape features are used to inform the habitat suitability for threatened species and the potential movement of species across the landscape. This information is used in the landscape context component of BAM-C.

2.1.1 Landscape features

Section 3 of the BAM sets out the requirement to assess landscape features and to establish the site context of the subject land in the surrounding landscape. The landscape features include:

- Interim Biogeographic Regionalisation of Australia (IBRA) bioregions and IBRA subregions
- rivers, streams, estuaries and wetlands
- habitat connectivity
- karst, caves, crevices, cliffs, rocks and other geological features of significance
- areas of outstanding biodiversity value
- NSW (Mitchell) landscape
- any additional features that are required to be assessed according to any applicable SEARs.

Landscape features within the subject land were identified using regional vegetation mapping resources, aerial photographic interpretation and field survey.

Details on the assessment of landscape features are provided in section 3.2.

2.1.2 Native vegetation cover

Determination of native vegetation cover within the subject land was undertaken using regional vegetation mapping resources, aerial photograph interpretation, existing reports, knowledge of the subject land and field survey.

Details of methods used to determine native vegetation cover are provided in section 4.1.

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Review of existing information

Mapping of native vegetation extent within the subject land is required under section 4.1 of the BAM with detailed requirements outlined in section 3.2 of the BAM 2020 Operational Manual.

Existing information was used to identify PCTs and TECs within the subject land, and map vegetation boundaries, regional vegetation mapping resources, aerial photograph interpretation, existing reports and knowledge of the subject land. Native vegetation within the subject land was aligned to the most likely PCT as outlined in the BioNet Vegetation Classification Database (NSW DCCEEW 2024b).

Existing BDARs and other biodiversity reports were reviewed to obtain existing information on biodiversity in the locality with specific focus placed on areas assessed in previous BDARs that overlap with the project as outlined in section 1.5.

2.2.2 Mapping native vegetation extent

Mapping of native vegetation extent within the subject land was undertaken using regional vegetation mapping resources, aerial photograph interpretation, existing reports, knowledge of the subject land and field survey.

Native vegetation extent within the subject land was determined through digitisation of areas of vegetation using the aerial photos provided on the ArcGIS online World Imagery map server. The aerial photography used was Maxar (Vivid) imagery captured at various dates between 2014 and 2022. The objects displayed in the Maxar (Vivid) imagery are within 5meters of the true location.

Vegetation within the subject land and locality has been mapped at the regional scale in the NSW State Vegetation Type Map (SVTM) release C2.0M2.1 and the subsequent updated C2.0M2.1. This mapping data provides a guide to the occurrence and distribution of PCTs, vegetation classes, and vegetation formations. The SVTM was used as an aid in mapping native vegetation extent within the subject land.

The following vegetation mapping projects were used to guide and assist vegetation mapping within the subject land:

- NSW State Vegetation Type Map release C2.0M2.1 (November 2024) (NSW DCCEEW 2024)
- Lake Macquarie Local Government Area (LGA)Vegetation Community Map 2022 VIS_ID 5117 - Version 1 (Bell and Driscoll 2022)
- Vegetation of the Singleton Military Area -VIS_ID 3913 (Sinclair Knight Merz and Eastcoast Flora Survey 2012).

Other related documents used to refine vegetation mapping and PCT allocation included:

- NSW BioNet Flora Survey Plots – PCT Reference Sites: full floristic plots used in the development of the quantitative PCT classification. Currently available for eastern NSW PCTs version C2.0. (DPE 2022a)
- NSW State Vegetation Type Map technical notes 2022 (NSW DCCEEW 2022)
- Eastern NSW plant community type percentage cleared calculation technical notes 2022 (DPE 2022b).

In addition, existing BDARs and biodiversity reports were also used to guide the mapping of native vegetation where the subject land overlaps with these projects. The PCT mapping provided in the *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022) was reviewed for consistency PCT identification.

Data on geology, dominant canopy species, native species richness, vegetation structure and condition were collected from areas able to be accessed during field surveys to validate and refine this existing vegetation mapping to determine their associated PCT in accordance with the BioNet Vegetation Classification Database.

In addition, the Plot to PCT Assignment Tool was used for identifying PCTs in eastern NSW.

Where property access was available, native vegetation extent was verified in the field. Where property access was limited or not granted, native vegetation extent was determined on aerial photograph interpretation in conjunction with reference to the SVTM, with cross references made to ground truthed areas of vegetation at similar landscape positions, geology and soil types.

2.2.3 Plot-based vegetation survey

Field validation (ground-truthing) of the existing vegetation classifications was completed based on random meander surveys and BAM vegetation integrity plots.

Field verification was undertaken to confirm the vegetation structure, dominant and characteristic species of each stratum, landscape position, native diversity, condition, presence of threatened ecological communities and other diagnostic features. Field data was compared and analysed against the regional vegetation mapping key diagnostic species to confirm each vegetation type. Where a vegetation type did not strictly meet all characteristics of a single PCT the PCT which best fit the vegetation on site was allocated.

There were 286 vegetation integrity plots completed during the survey from May 2023 to March 2025 over 90 field team days. The locations of vegetation integrity plots are shown in Figure 14.7. The data collected during the survey was supplemented with BAM vegetation integrity plot data from the *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022). The survey aimed to meet or exceed the minimum number of plots required per vegetation zone area (see Table 2.1).

Table 2.1 Minimum number of plots required per vegetation zone area

Vegetation zone area (ha)	Minimum number of plots
<2	1 plot
>2–5	2 plots
>5–20	3 plots
>20–50	4 plots
>50–100	5 plots
>100–250	6 plots
>250–1,000	7 plots; more plots may be needed if the condition of the vegetation is variable across the zone
>1,000	8 plots; more plots may be needed if the condition of the vegetation is variable across the zone

2.2.3.1 Use of BAM plots that are outside of the subject land

Section 4.2.1 of BAM states that the assessor must perform a plot-based vegetation survey of the subject land to identify the most likely PCTs on the subject land. The final assessed subject land was not defined at the beginning of the field survey and evolved throughout the life of the survey to take into account design changes and avoidance of biodiversity values. As such, the field survey was based around a larger study area that contained the subject land (biodiversity study area). The biodiversity study area was a minimum 140 metre wide corridor that was focussed on the area of planned infrastructure. Where impacts were likely to be larger, such as at the construction support sites, laydown areas, and the switching stations, the study area was widened to accommodate the larger area. The biodiversity study area incorporated the subject land. There were 286 vegetation integrity plots completed during the survey from May 2023 to March 2025 over 90 field team days. Due to ongoing design refinements and alignment changes only a selection of 138 of these plots were deemed suitable for use in this assessment (see Figure 14.7 for an illustration of where these plots were located). An additional 40 plots were applied in the partial impact assessment, with these plots located within existing transmission easements. This is further assessed in Appendix M.

The plot-based vegetation surveys undertaken outside of the subject land are within contiguous patches of the same PCTs and condition classes represented within the vegetation zones. Importantly, the vegetation zones where plot-based vegetation surveys were undertaken outside of the subject land are subject to the same land management regimes as the vegetation zones within the subject land.

Additionally, due to access restrictions, the plot-based vegetation survey could not be undertaken within all parts of the subject land or in all PCTs or vegetation zones within the EIS timeframe. To account for this, plot-based vegetation surveys within vegetation corresponding to these PCTs were completed in accessible areas outside of the subject land. This was done to provide local data on the PCTs for use in the BAM-C so that results relevant to the local area could be developed instead of completely relying on PCT benchmark data that is not directly relevant to the locality.

Plots applied in this assessment that are located outside of the subject land have been assessed in Table 2.2 with justification that they adequately represent the vegetation zones that they have been assigned to in the subject land.

2.2.3.2 Use of existing BAM plot data

Where BAM Plot data already existed for PCTs within or adjacent to the subject land this data was used to supplement the data collected during the survey, as per BAM section 4.2. Plot Q46 from the *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022) was utilized to supplement the data required for PCT 4089 – Namoi-Upper Hunter River Red Gum Forest (Derived) to meet the minimum number of plots required for the zone as per section 4.3.4 of the BAM.

This plot has been included in assessment in Table 2.2 to demonstrate that it represents the vegetation zone that it has been assigned to in the subject land.

Table 2.2 Vegetation integrity plot data collected from outside the subject land

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
Wyong				
HTP-MS-59	60	3029	Mod-good	HTP-MS-59 is located within the same gully adjoining the mapped patch of PCT 3029 (Mod-good) within the Wyong IBRA subregion. The canopy of this plot is composed of 35% *Ceratopetalum apetalum*, 15% *Acmena smithii* and 15% *Syncarpia glomulifera subsp. glomulifera*. The floristics and functions in this plot are similar to those found in other plots (HTP-MS-43, HTP-MS-52, HTP-MS-63) assigned to this vegetation zone within the Wyong IBRA subregion, with *Ceratopetalum apetalum* dominant in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.626 with PCT 3029 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-15	219	3150	Plantation	LCSM-15 is located on a slope in a neighbouring patch of plantation near the patches of mapped PCT 3150 (Plantation) in the Wyong IBRA subregion. The canopy of the plot is composed of 40% *Eucalyptus saligna*. The floristics and functions in this plot are similar to those found in the other plot (HTP-MS-50) assigned to this vegetation zone within the Wyong IBRA subregion, with *Eucalyptus saligna* also dominant in this plot. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak second centroid match of 0.801 with PCT 3150 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3082, however this PCT doesn't occur within the Wyong IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
LCSM-11	44	3230	Mod-good	LCSM-11 is located along the same contour that runs through a patch of mapped PCT 3230 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 40% *Syncarpia glomulifera* and 20% *Eucalyptus piperita*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-48, HTP-MS-60, HTP-MS-62, LCSM-03 and LCSM-08) assigned to this vegetation zone within the Wyong IBRA subregion, with either or both *Syncarpia glomulifera* and *Eucalyptus piperita* also dominant in these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate second centroid match of 0.722 with PCT 3230 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 4115, however this PCT doesn't occur within the Wyong IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-12	246	3230	Plantation	LCSM-12 is located along the same patch of plantation that's mapped within the subject land as PCT 3230 (Plantation) in the Wyong IBRA subregion. The canopy of the plot is composed of 60% *Eucalyptus agglomerata*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-57, LCSM-14 and LCSM-17) assigned to this vegetation zone within the Wyong IBRA subregion, with *Eucalyptus agglomerata* also dominant in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate fourth centroid match of 0.780 with PCT 3230 (see Appendix D (Vegetation survey data)). The greater centroid matches were PCTs 3263, 3164 and 3242, however due to the plantation condition that this plot can't be accurately assigned to a PCT through the Plot to PCT Assignment Tool. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
LCSM-14	8	3230	Plantation	LCSM-14 is located along the same patch of plantation that's mapped within the subject land as PCT 3230 (Plantation) in the Wyong IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus agglomerata*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-57, LCSM-12 and LCSM-17) assigned to this vegetation zone within the Wyong IBRA, with *Eucalyptus agglomerata* also dominant in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3230 (see Appendix D (Vegetation survey data)). Due to the plantation condition that this plot can't be accurately assigned to a PCT through the Plot to PCT Assignment Tool. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-17	21	3230	Plantation	LCSM-17 is located along the same patch of plantation that's mapped within the subject land as PCT 3230 (Plantation) in the Wyong IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus saligna*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-57, LCSM-12 and LCSM-14) assigned to this vegetation zone within the Wyong IBRA subregion, however *Eucalyptus saligna* isn't dominant in these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3230 (see Appendix D (Vegetation survey data)). Due to the plantation condition that this plot can't be accurately assigned to a PCT through the Plot to PCT Assignment Tool. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-26	127	3239	Mod-good	LCSM-26 is located along the top of same slope that is mapped within the subject land as PCT 3239 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 20% *Angophora costata* and 20% *Eucalyptus agglomerata*. The floristics and functions in this plot are similar to those found in the other plot (TS-17) assigned to this vegetation zone within the Wyong IBRA subregion, with *Eucalyptus agglomerata* also dominant in this plot, with *Angophora costata* also present. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.659 with PCT 3239 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-17	157	3242	Mod-good	HTP-MS-17 is located along the top of same slope that is mapped within the subject land as PCT 3242 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 32% *Syncarpia glomulifera* and 12% *Eucalyptus acmenoides*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-11, HTP-MS-46, HTP-MS-54 and HTP-MS-55) assigned to this vegetation zone within the Wyong IBRA subregion, with *Syncarpia glomulifera* and *Eucalyptus acmenoides* also present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.714 with PCT 3242 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-14	81	3250	Mod-good	TC-14 is located along the top of same slope that is mapped within the subject land as PCT 3250 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus pilularis*. The floristics and functions in this plot are similar to those found in the other plot (TC-15) assigned to this vegetation zone within the Wyong IBRA, with *Eucalyptus pilularis* also dominant in this plot. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.670 with PCT 3250 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-15	8	3250	Mod-good	TC-15 is located along the top of same slope that is mapped within the subject land as PCT 3250 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus pilularis*. The floristics and functions in this plot are similar to those found in the other plot (TC-14) assigned to this vegetation zone within the Wyong IBRA subregion, with *Eucalyptus pilularis* also dominant in this plot. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.606 with PCT 3250 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-12	69	3263	Mod-good	HTP-MS-12 is located along the top of same slope that is mapped within the subject land as PCT 3263 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 15% *Corymbia maculata*, 10% *Eucalyptus agglomerata* and 10% *Syncarpia glomulifera subsp. glomulifera*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-16, LCSM-21, LCSM-24, LCSM-25) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Corymbia maculata*, *Eucalyptus agglomerata* and *Syncarpia glomulifera subsp. glomulifera* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.654 with PCT 3263 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-21	56	3263	Mod-good	LCSM-21 is located along the top of same slope that is mapped within the subject land as PCT 3263 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus agglomerata*, 30% *Eucalyptus punctata* and 20% *Angophora costata*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-12, HTP-MS-16, LCSM-24, LCSM-25) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Eucalyptus agglomerata*, *Eucalyptus punctata* and *Angophora costata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.697 with PCT 3263 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-16	23	3581	Mod-good	TC-16 is located along the same slope and patch of vegetation that's mapped within the subject land as PCT 3581 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 15% *Angophora costata* and 10% *Eucalyptus pilularis*. This is consistent with the BioNet Vegetation Classification Database description of PCT 3581, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.636 with PCT 3581 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
LCSM-06	72	3617	Mod-good	LCSM-06 is located along the top of same slope that is mapped within the subject land as PCT 3617 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus sieberi* and 20% *Syncarpia glomulifera*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-65, LCSM-05 and TS-04) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Eucalyptus sieberi* and *Syncarpia glomulifera* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.709 with PCT 3617 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3589, however this PCT doesn't occur within the Wyong IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TS-04	54	3617	Mod-good	TS-04 is located along the top of same slope that is mapped within the subject land as PCT 3617 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 25% *Banksia serrata*, 20% *Syncarpia glomulifera* and 15% *Eucalyptus sieberi*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-65, LCSM-05 and LCSM-06) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Banksia serrata*, *Eucalyptus sieberi* and *Syncarpia glomulifera* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.740 with PCT 3617 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
LCSM-04	11	3621	Mod-good	LCSM-04 is located along the same slope that is mapped within the subject land as PCT 3621 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 60% *Syncarpia glomulifera* and 20% *Eucalyptus piperita*. The floristics and functions in this plot are similar to those found in the other plots (LCSM-07 and LCSM-10) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Syncarpia glomulifera* and *Eucalyptus piperita* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.654 with PCT 3621 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-07	6	3621	Mod-good	LCSM-07 is located along the same slope that is mapped within the subject land as PCT 3621 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus piperita*. The floristics and functions in this plot are similar to those found in the other plots (LCSM-04 and LCSM-10) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Eucalyptus piperita* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.678 with PCT 3621 (see Appendix D). The first centroid match was PCT 3589, however this PCT doesn't occur within the Wyong IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-10	3	3621	Mod-good	LCSM-10 is located along the same slope that is mapped within the subject land as PCT 3621 (Mod-good) in the Wyong IBRA subregion. The canopy of the plot is composed of 20% *Syncarpia glomulifera* and 20% *Eucalyptus piperita*. The floristics and functions in this plot are similar to those found in the other plots (LCSM-04 and LCSM-07) assigned to this vegetation zone within the Wyong IBRA subregion, with also *Syncarpia glomulifera* and *Eucalyptus piperita* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.717 with PCT 3621 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
Yengo				
HTP-MS-10	697	3087	Mod-good	HTP-MS-10 is located in a similar gully that is mapped within the subject land as PCT 3087 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 20% *Syncarpia glomulifera subsp. glomulifera*, 15% *Acmena smithii* and 10% *Stenocarpus sinuatus*. The floristics and functions in this plot are similar to those found in the other plots (LCSM-29 and TC-09) assigned to this vegetation zone within the Yengo IBRA, with *Syncarpia glomulifera subsp. glomulifera* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.685 with PCT 3087 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-75	20	3151	Mod-good	HTP-MS-75 is located in the same gully that is mapped within the subject land as PCT 3151 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 3% *Streblus brunonianus* and a subcanopy of 40% *Backhousia myrtifolia*. This is consistent with the BioNet Vegetation Classification Database description of PCT 3151, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.684 with PCT 3151 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-13	5	3230	Mod-good	HTP-MS-13 is located along the same slope that is mapped within the subject land as PCT 3230 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 22% *Eucalyptus piperita*, 5% *Angophora floribunda* and 5% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (LCSM-29 and TC-09) assigned to this vegetation zone within the Yengo IBRA, with also *Angophora floribunda* present in all of these plots This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.718 with PCT 3230 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-29	2	3230	Mod-good	LCSM-29 is located along the same slope that is mapped within the subject land as PCT 3230 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 40% *Eucalyptus agglomerata*, 20% *Angophora floribunda* and 20% *Eucalyptus saligna*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-13 and TC-09) assigned to this vegetation zone within the Yengo IBRA, with also *Angophora floribunda* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong third centroid match of 0.668 with PCT 3230 (see Appendix D (Vegetation survey data)). The second centroid match was PCT 3277, however this PCT doesn't occur within the Wyong IBRA subregion. The first centroid match was PCT 3250, however the absence of Eucalyptus pilularis in the canopy of LCSM-29 indicates that it is more likely to be assigned to PCT 3230. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-78	17	3237	Mod-good	HTP-MS-78 is located at the start of the same gully that is mapped within the subject land as PCT 3237 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus sparsifolia* and 15% *Syncarpia glomulifera*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-79 and HTP-MS-80) assigned to this vegetation zone within the Yengo IBRA, with also *Eucalyptus sparsifolia* and *Syncarpia glomulifera* present in most plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.714 with PCT 3237 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3250, however MS-78 is located at the start of a gully near Pokolbin State Forest, which makes it less likely to be PCT 3242 (found on sheltered slopes of coastal hills and ranges) and more likely to be PCT 3237 (found in dry Narrabeen sandstone gullies). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-79	25	3237	Mod-good	HTP-MS-79 is located at the start of the same gully that is mapped within the subject land as PCT 3237 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus saligna* and 8% *Angophora euryphylla*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-78 and HTP-MS-80) assigned to this vegetation zone within the Yengo IBRA, with also *Eucalyptus saligna* present in most plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.716 with PCT 3258 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3258, however HTP-MS-78 is located at the start of a gully near Pokolbin State Forest, which makes it less likely to be PCT 3258 (found on sandy alluvial creek flats in dissected sandstone plateaus) and more likely to be PCT 3237 (found in dry Narrabeen sandstone gullies). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-19	197	3239	Mod-good	HTP-MS-19 is located along the same slope that is mapped within the subject land as PCT 3239 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 25% *Eucalyptus agglomerata* and 8% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-18, HTP-MS-25, DL-03 and TS-18) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus agglomerata* and *Eucalyptus punctata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.712 with PCT 3239 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-25	158	3239	Mod-good	HTP-MS-25 is located along the same slope that is mapped within the subject land as PCT 3239 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 12% *Eucalyptus crebra* and 8% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-18, HTP-MS-19, DL-03 and TS-18) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus punctata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.709 with PCT 3239 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-20	181	3241	Mod-good	HTP-MS-20 is located along similar topography and elevation that is mapped within the subject land as PCT 3241 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 25% *Angophora floribunda* and 20% *Eucalyptus acmenoides*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-82) assigned to this vegetation zone within the Yengo IBRA, however *Angophora floribunda* and *Eucalyptus acmenoides* are not present in the other plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.735 with PCT 3241 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-82	11	3241	Mod-good	HTP-MS-82 is located along the same slope that is mapped within the subject land as PCT 3241 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 18% *Corymbia maculata* and 10% *Eucalyptus sparsifolia*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-20) assigned to this vegetation zone within the Yengo IBRA, however *Corymbia maculata* and *Eucalyptus sparsifolia* are not present in the other plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3241 (see Appendix D (Vegetation survey data)). However, it did contain *Corymbia maculata* canopy that was co-dominant with *Angophora costata* and *Eucalyptus racemosa*. The spare midstory included *Denhamia silvestris*, *Indigofera australis* and *Persoonia linearis*. The low-density ground layer wasn't representative of PCT 3241, with *Lomandra obliqua* and *Rytidosperma pallidum* frequently occurring in this plot. While these groundcover species weren't characteristic of PCT 3241, recent fire activity may have influenced the presence and abundance of species more representative of PCT 3241. The closest reference plot to this plot is assigned to PCT 3241 and occurs on along a similar ridgeline. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
LCSM-28	293	3242	Mod-good	LCSM-28 is located along similar topography and elevation to what is mapped within the subject land as PCT 3241 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 40% *Syncarpia glomulifera* and 20% *Angophora floribunda*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-83 and TC-11) assigned to this vegetation zone within the Yengo IBRA, however *Syncarpia glomulifera* and *Angophora floribunda* are not present in the other plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.673 with PCT 3242 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-18	347	3244	Mod-good	DL-18 is located along similar topography and elevation to what is mapped within the subject land as PCT 3244 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 20% *Corymbia maculata* and 10% *Eucalyptus punctata*. This is consistent with the BioNet Vegetation Classification Database description of PCT 3244, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.638 with PCT 3244 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-05	9	3599	Mod-good	TC-05 is located along the same slope that is mapped within the subject land as PCT 3599 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 25% *Angophora costata* and 10% *Syncarpia glomulifera*. The floristics and functions in this plot are similar to those found in the other plots (TC-12 and TC-17) assigned to this vegetation zone within the Yengo IBRA, with *Angophora costata* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.694 with PCT 3599 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-12	13	3599	Mod-good	TC-12 is located along the same crest that is mapped within the subject land as PCT 3599 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 10% *Eucalyptus piperita* and 5% *Angophora costat*a. The floristics and functions in this plot are similar to those found in the other plots (TC-05 and TC-17) assigned to this vegetation zone within the Yengo IBRA, with *Angophora costata* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.703 with PCT 3599 (see Appendix D(Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
TC-17	8	3599	Mod-good	TC-17 is located along the same slope that is mapped within the subject land as PCT 3599 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 8% *Angophora costata* and 4% *Eucalyptus scias*. The floristics and functions in this plot are similar to those found in the other plots (TC-05 and TC-12) assigned to this vegetation zone within the Yengo IBRA, with *Angophora costata* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.714 with PCT 3599 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3617, however the exposed slope that TC-17 resides on is more characteristic of PCT 3599, than the more sheltered slopes of PCT 3617. Furthermore, reference plots for PCT 3599 are significantly closer to TC-17 than are reference plots for PCT 3617. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-04	6	3605	Mod-good	DL-04 is located along the same crest that is mapped within the subject land as PCT 3605 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus racemosa*, 5% *Eucalyptus globoidea* and 5% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (DL-21, DL-22, HTP-MS-15 and HTP-MS-26) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus punctata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.729 with PCT 3605 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3604, however the mid-story in DL-04 was more representative of PCT 3605 than it was of PCT 3604. This mid-story included Acacia parvipinnula, Exocarpus strictus and Podolobium ilicifolium, with the ground layer consisting of a mix of *Dianella longifolia*, *Entolasia stricta* and *Lepidosperma laterale*. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-21	289	3605	Mod-good	DL-21 is located along similar topography and elevation to what is mapped within the subject land as PCT 3605 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus sparsifolia* and 5% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (DL-04, DL-22, HTP-MS-15 and HTP-MS-26) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus sparsifolia* and *Eucalyptus punctata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.684 with PCT 3605 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3239, however DL-21 is located along an exposed slope in Pokolbin State Forest, with a canopy dominated by *Eucalyptus sparsifolia*, which is more representative of PCT 3605 than PCT 3239, which is found on more sheltered slopes with either *Eucalyptus punctata* or *Syncarpia glomulifera* dominant in the canopy. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-22	1453	3605	Mod-good	DL-22 is located along similar topography and elevation to what is mapped within the subject land as PCT 3605 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 25% *Eucalyptus sparsifolia* and 5% *Corymbia maculata*. The floristics and functions in this plot are similar to those found in the other plots (DL-04, DL-21, HTP-MS-15 and HTP-MS-26) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus sparsifolia* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.686 with PCT 3605 (see Appendix D (Vegetation survey data)). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-26	27	3605	Mod-good	HTP-MS-26 is located along similar topography and elevation to what is mapped within the subject land as PCT 3605 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus agglomerata* and 12% *Eucalyptus punctata*. The floristics and functions in this plot are similar to those found in the other plots (DL-04, DL-21, DL-22 and HTP-MS-15) assigned to this vegetation zone within the Yengo IBRA, with *Eucalyptus punctata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.666 with PCT 3605 (see Appendix D (Vegetation survey data)). The first centroid match was PCT 3239, however HTP-MS-26 is located along an exposed slope in Corrabare State Forest and is dominated by a stringybark (*Eucalyptus agglomerata*), its likely that this plot is more representative of PCT 3605 than it is of PCT 3239, which is found on more sheltered slopes with either *Eucalyptus punctata* or *Syncarpia glomulifera* dominant in the canopy. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TC-18	21	3617	Mod-good	TC-17 is located along the same slope that is mapped within the subject land as PCT 3617 (Mod-good) in the Yengo IBRA subregion. The canopy of the plot is composed of 16% *Angophora costata*, 15% *Eucalyptus piperita* and 8% *Syncarpia glomulifera*. This is consistent with the BioNet Vegetation Classification Database description of PCT 3617, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3617 (see Appendix D (Vegetation survey data)). However, this plot occurs on sandy soils near a crest in Corrabare State Forest. Its canopy is consistent with PCT 3617, with a high canopy cover of *Angophora costata* and *Eucalyptus piperita*, with *Syncarpia glomulifera* also present. The mid-story consisted of characteristic species that included *Banksia spinulosa*, *Platysace linearifolia* and *Lomatia silaifolia*, with the ground layer consisting of *Entolasia stricta*, *Pteridium esculentum* and *Lomandra obliqua*. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
Hunter				
DL-67	596	3241	Mod-good	DL-67 is located along similar topography to what is mapped within the subject land as PCT 3241 (Mod-good) in the Hunter IBRA subregion, and is located near a past confirmed plot for PCT 3241. The canopy of the plot is composed of 50% *Acmena smithii*, 15% *Eucalyptus acmenoides* and 15% *Glochidion ferdinandi*. This is consistent with BioNet Vegetation Classification Database description of PCT 3241, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong third centroid match of 0.716 with PCT 3241 (see Appendix D (Vegetation survey data)). The second centroid match was PCT 3318 however this PCT doesn't occur within the Hunter IBRA subregion. The first centroid match was PCT 3236, which grades into tall moist grassy forest PCT 3241 on less sheltered aspects. DL-67 has a more exposed aspect and lacks the high vine cover and abundance that would be present in PCT 3236. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-23	123	3314	Disturbed Grassland	HTP-MS-23 is located along the same slope that is mapped within the subject land as PCT 3314 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 25% *Austrostipa verticillata*, 15% *Cynodon dactylon*, 10% *Bothriochloa decipiens var. decipiens* and 10% *Sporobolus creber*. The floristics and functions in this plot are similar to those found in the other plots (NE-2, TS-12 and TS-13) assigned to this vegetation zone within the Hunter IBRA, with *Austrostipa verticillata* and *Sporobolus creber* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3314 (see Appendix D (Vegetation survey data)). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
NE-2	9	3314	Disturbed Grassland	NE-2 is located along the same slope that is mapped within the subject land as PCT 3314 (Disturbed Grassland and Thinned) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 30% *Aristida spp*. and 15% *Sporobolus creber*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-23, TS-12 and TS-13) assigned to this vegetation zone within the Hunter IBRA, with and *Aristida spp*. and *Sporobolus creber* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3314 (see Appendix D (Vegetation survey data)). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
TS-13	21	3314	Disturbed Grassland	TS-13 is located along the same slope that is mapped within the subject land as PCT 3314 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 10% *Austrostipa verticillata* and 5% *Sporobolus creber*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-23, TS-12 and NE-2) assigned to this vegetation zone within the Hunter IBRA, with and *Austrostipa verticillata* and *Sporobolus creber* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3314 (see Appendix D (Vegetation survey data)). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DR-07	70	3314	Poor	DR-07 is located along the same hill that is mapped within the subject land as PCT 3314 (Poor) in the Hunter IBRA subregion. The canopy of the plot is composed of 10% *Eucalyptus moluccana* with an exotic cover of 30% *Hyparrhenia hirta*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-88 and TC-08) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* and *Hyparrhenia hirta* recorded in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.729 with PCT 3314 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-37	100	3314	Thinned	DL-37 is located along the same terrain that is mapped within the subject land as PCT 3314 (Thinned) in the Hunter IBRA subregion. The canopy of the plot is composed of 40% *Eucalyptus moluccana* and 20% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-03, HTP-MS-05 and NE-1) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* and *Allocasuarina luehmannii* recorded in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3314 (see Appendix D). However, it consists of a canopy dominated by *Eucalyptus moluccana* with a heavy regrowth of *Allocasuarina luehmannii* in the midstory. Other potential communities for this plot include PCT 3431 and 3485, which share similar features with PCT 3314. However, the canopy recorded in DL-37 only consists of *Eucalyptus moluccana*, with other diagnostic canopy species for PCT 3431 (*E. crebra*) and PCT 3485 (*E. dawsonii*) absent from the plot and its respective patch. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-MS-03	317	3314	Thinned	HTP-MS-03 is located along the same terrain that is mapped within the subject land as PCT 3314 (Thinned) in the Hunter IBRA subregion. The canopy of the plot is composed of 8% *Eucalyptus moluccana* and 28% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DL-37, HTP-MS-05 and NE-1) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* and *Allocasuarina luehmannii* recorded in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.749 with PCT 3314 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-05	147	3314	Thinned	HTP-MS-03 is located along the same terrain that is mapped within the subject land as PCT 3314 (Thinned) in the Hunter IBRA subregion. The canopy of the plot is composed of 5% *Eucalyptus moluccana* and 36% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DL-37, HTP-MS-03 and NE-1) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* and *Allocasuarina luehmannii* recorded in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate firth centroid match of 0.768 with PCT 3314 (see Appendix D). HTP-MS-05 had a higher centroid match with PCT 3404, 3431, 3485 and 4015, than it did with PCT 3314. HTP-MS-05 had a canopy that consisted of *Eucalyptus moluccana* with heavy regrowth of *Allocasuarina luehmannii* in the midstory. The mid-dense ground layer was mainly comprised of *Austrostipa verticillata, Cymbopogon refractus* and *Sporobolus creber*. It doesn't represent PCT 3404, which commonly includes a high cover of *Eucalyptus conica*, occasionally with *Eucalyptus melliodora*. It doesn't represent PCT 4015, which commonly consists of a high cover of *Casuarina glauca* either exclusively or in combination with a sparse cover of red gums. PCT 3485 isn't easy to distinguish from PCT 3314 and 3431 because it shares many of the ground cover species in a similar topographic position, however it differs in that *Eucalyptus dawsonii* is very frequently recorded with a high foliage cover and is almost absent from PCT 3314 and 3431. Similar to PCT 3431, PCT 3314 is also widespread on the Permian sediments but is associated with rises and areas of greater relief and is generally shrubbier and only rarely includes *Eucalyptus crebra*, which is similar to what was recorded in HTP-MS-05. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-75	190	3315	Derived	DL-75 is located along the same terrain that is mapped within the subject land as PCT 3315 (Derived and Thinned) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 70% *Cymbopogon refractus*. The floristics and functions in this plot are similar to those found in the other plots (DL-76 and DL-78) assigned to this vegetation zone within the Hunter IBRA, with *Cymbopogon refractus* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3315 (see Appendix D). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-64	529	3315	Thinned	DL-64 is located along similar terrain that is mapped within the subject land as PCT 3315 (Derived and Thinned) in the Hunter IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus moluccana*, 3% *Eucalyptus crebra* and 3% *Corymbia maculata*. The floristics and functions in this plot are similar to those found in the other plots (DL-74 and DL-77) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus crebra* and *Corymbia maculata* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong firth centroid match of 0.726 with PCT 3315 (see Appendix D). DL-64 had a higher centroid match with PCT 3319, 3329, 3431 and 3446, than it did for 3315. PCT 3319 and 3329 don't occur within the Hunter IBRA subregion. DL-64 consisted of a canopy dominated by *Eucalyptus moluccana*, with *E. crebra* and *Corymbia maculata* also present. The sparse midstory included 3 species of Acacia (*A. implexa, A. linearifolia* and *A. parramattensis*) with *Solanum stelligerum* being the most abundant. The dense ground layer had a diverse mix of grasses and forbs, with *Cymbopogon refractus* and *Sporobulus creber* having the greatest cover. PCT 3446 differs from PCT 3315, in that PCT 3446 very frequently has *Breynia oblongifolia, Leucopogon juniperinus, Persoonia linearis* and *Notelaea longifolia* its mid-stratum, which isn't the case in DL-64, with only *Breynia oblongfolia* present at a very low abundance. While DL-64 has a canopy that's difficult to distinguish between PCT 3315 and 3431, the absence of *Allocasuarina luehmannii* in the plot likely reduces the potential of it belonging to PCT 3431. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-77	19	3315	Thinned	DL-77 is located along the same terrain that is mapped within the subject land as PCT 3315 (Derived and Thinned) in the Hunter IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus paniculata*, with some plantings within the existing vegetation. The floristics and functions in this plot are similar to those found in the other plots (DL-64 and DL-74) assigned to this vegetation zone within the Hunter IBRA, however *Eucalyptus paniculata* is absent from these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate third centroid match of 0.755 with PCT 3315 (see Appendix D). DL-77 had a higher centroid match with PCT 3431 and 4015 than it did with PCT 3315. The output from this plot was likely affected due to the plot also consisting of planted *Eucalyptus paniculata*, with *Corymbia maculata* absent from the plot. This plot was assigned to PCT 3315 due to neighbouring vegetation being assigned to PCT 3315 (thinned) and PCT 3315 (derived). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-40	361	3431	Disturbed Grassland	DL-40 is located along similar terrain that is mapped within the subject land as PCT 3431 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 50% *Sporobolus creber*, 20% *Cynodon dactylon* and 10% *Cymbopogon refractus*. The floristics and functions in this plot are similar to those found in the other plots (DR-01, DR-04 and DR-05) assigned to this vegetation zone within the Hunter IBRA, with *Sporobolus creber* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate second centroid match of 0.797 with PCT 3431 (see Appendix D). The second centroid match was PCT 3723, however this PCT doesn't occur within the Hunter IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DR-01	46	3431	Disturbed Grassland	DR-01 is located along the same terrain that is mapped within the subject land as PCT 3431 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 55% *Bothriochloa biloba* and 20% *Sporobolus creber*. The floristics and functions in this plot are similar to those found in the other plots (DL-40, DR-04 and DR-05) assigned to this vegetation zone within the Hunter IBRA, with *Sporobolus creber* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 3431 (see Appendix D). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DR-04	137	3431	Disturbed Grassland	DR-04 is located along the same terrain that is mapped within the subject land as PCT 3431 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 30% *Sporobolus creber* and 20% *Chloris ventricosa*. The floristics and functions in this plot are similar to those found in the other plots (DL-40, DR-01 and DR-05) assigned to this vegetation zone within the Hunter IBRA, with *Sporobolus creber* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak firth centroid match of 0.899 with PCT 3431 (see Appendix D). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DR-05	99	3431	Disturbed Grassland	DR-05 is located along the same terrain that is mapped within the subject land as PCT 3431 (Disturbed Grassland) in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 40% *Sporobolus creber* and 15% *Chloris ventricosa*. The floristics and functions in this plot are similar to those found in the other plots (DL-40, DR-01 and DR-04) assigned to this vegetation zone within the Hunter IBRA, with *Sporobolus creber* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak third centroid match of 0.832 with PCT 3431 (see Appendix D). However, since this plot is located within the disturbed grassland condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DR-02	151	3431	Plantation	DR-02 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 5% *Eucalyptus blakelyi x camaldulensis* and 20% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DR-03 and HTP-MS-01) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus blakelyi* and *Allocasuarina luehmannii* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate third centroid match of 0.787 with PCT 3431 (see Appendix D). However, since this plot is located within the plantation condition class and has a modified canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DR-03	44	3431	Plantation	DR-03 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 10% *Eucalyptus blakelyi* and 15% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DR-02 and HTP-MS-01) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus blakelyi* and *Allocasuarina luehmannii* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak third centroid match of 0.803 with PCT 3431 (see Appendix D). However, since this plot is located within the plantation condition class and has a modified canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-01	119	3431	Plantation	HTP-MS-01 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 5% *Eucalyptus blakelyi x camaldulensis* and 5% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DR-02 and DR-03) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus blakelyi* and *Allocasuarina luehmannii* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak second centroid match of 0.806 with PCT 3431 (see Appendix D). However, since this plot is located within the plantation condition class and has a modified canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-52	44	3431	Poor	DL-52 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 15% *Eucalyptus crebra*. The floristics and functions in this plot are similar to those found in the other plots (DL-26 and HTP-MS-02) assigned to this vegetation zone within the Hunter IBRA, however *Eucalyptus crebra* is absent in these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a weak second centroid match of 0.803 with PCT 3431 (see Appendix D). The first centroid match was PCT 3462, however this PCT doesn't occur within the Hunter IBRA subregion. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-02	145	3431	Poor	HTP-MS-02 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 5% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DL-26 and HTP-MS-02) assigned to this vegetation zone within the Hunter IBRA, with *Allocasuarina luehmannii* present in some of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate third centroid match of 0.775 with PCT 3431 (see Appendix D). HTP-MS-02 had a higher centroid match with PCT 3404 and 3485, than it did with 3431. This plot consists of mid-story regrowth of *Allocasuarina luehmannii* and *Acacia salicina*, with no other tree species present. The grassy ground layer is mainly dominated by *Aristida ramosa, Chloris ventricosa* and *Sporobolus creber*, with *Chielanthes sieberi*. The absence of a canopy made it difficult to distinguish these 3 PCTs, with neighbouring vegetation used to determine what the dominant canopy species may have been. Since there was a dominance of *Eucalyptus crebra* nearby and a complete absence of *Eucalyptus conica* (3404) and *Eucalyptus dawsonii* (3485), HTP-MS-02 was assigned to PCT 3431. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-45	259	3431	Thinned	DL-45 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 40% *Eucalyptus moluccana*. The floristics and functions in this plot are similar to those found in the other plots (DL-30, DL-46, DL-47 and DR-06) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.699 with PCT 3431 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-46	296	3431	Thinned	DL-46 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 30% *Eucalyptus moluccana* and 10% *Eucalyptus crebra*. The floristics and functions in this plot are similar to those found in the other plots (DL-30, DL-45, DL-47 and DR-06) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus moluccana* and *Eucalyptus crebra* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.665 with PCT 3431 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-47	365	3431	Thinned	DL-47 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 5% *Eucalyptus crebra* and 60% *Allocasuarina luehmannii*. The floristics and functions in this plot are similar to those found in the other plots (DL-30, DL-45, DL-46 and DR-06) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus crebra* and *Allocasuarina luehmannii* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.746 with PCT 3431 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DR-06	182	3431	Thinned	DR-06 is located along the same terrain that is mapped within the subject land as PCT 3431 in the Hunter IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus tereticornis* and 5% *Notelaea microcarpa*. The floristics and functions in this plot are similar to those found in the other plots (DL-30, DL-45, DL-46 and DL-47) assigned to this vegetation zone within the Hunter IBRA, however *Eucalyptus tereticornis* and *Notelaea microcarpa* wasn't recorded in any of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.727 with PCT 3431 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-TB-01	100	3636	Thinned	HTP-TB-01 is located along the same terrain that is mapped within the subject land as PCT 3636 in the Hunter IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus crebra* and 4% *Angophora floribunda*. The floristics and functions in this plot are similar to those found in the other plots (HTP-TB-02 and HTP-MS-31) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus crebra* and *Angophora floribunda* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong second centroid match of 0.717 with PCT 3636 (see Appendix D). TB-01 had a higher centroid match for PCT 3431, than it did for PCT 3636. While TB-01 consists of species characteristic of both PCT 3431 and 3636, including a *Eucalyptus crebra* canopy with *Angophora floribunda* and *Allocasuarina luehmannii*, the presence of the alluvial sands throughout the plot area suggests that this plot is more representative of PCT 3636. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
HTP-TB-02	60	3636	Thinned	HTP-TB-02 is located along the same terrain that is mapped within the subject land as PCT 3636 in the Hunter IBRA subregion. The canopy of the plot is composed of 22% *Eucalyptus crebra* and 3% *Angophora floribunda*. The floristics and functions in this plot are similar to those found in the other plots (HTP-TB-01 and HTP-TB-02) assigned to this vegetation zone within the Hunter IBRA, with *Eucalyptus crebra* and *Angophora floribunda* present in most of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong forth centroid match of 0.719 with PCT 3636 (see Appendix D). TB-02 had a higher centroid match for PCT 3315, 3431 and 3438, than it did for PCT 3636. PCT 3438 is restricted to the Permian sediments on escarpment footslopes near Singleton. While TB-02 consists of species characteristic of PCT 3315, 3431 and 3636, including a *Eucalyptus crebra* canopy with *Angophora floribunda* and *Allocasuarina luehmannii*, the presence of the alluvial sands throughout the plot area suggests that this plot is more representative of PCT 3636. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-50	135	4015	Derived	DL-50 is located along similar terrain that is mapped within the subject land as PCT 4015 in the Hunter IBRA subregion. In the absence of canopy, the plot groundcover is composed of 40% *Microlaena stipoides* and 10% *Juncus usitatus*. The floristics and functions in this plot are similar to those found in the other plots (DL-50) assigned to this vegetation zone within the Hunter IBRA, with *Microlaena stipoides* present in all these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 4015 (see Appendix D). However, since this plot is located within the derived condition class and lacked a canopy, it wasn't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-72	632	4015	Thinned	DL-72 is located along similar terrain that is mapped within the subject land as PCT 4015 in the Hunter IBRA subregion. The canopy of the plot is composed of 60% *Casuarina glauca*. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-39 and DL-29) assigned to this vegetation zone within the Hunter IBRA, with *Casuarina glauca* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.714 with PCT 4015 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
HTP-MS-39	45	4015	Thinned	HTP-MS-39 is located along same terrain that is mapped within the subject land as PCT 4015 in the Hunter IBRA subregion. The canopy of the plot is composed of 8% *Casuarina glauca* and 8% *Eucalyptus dawsonii*. The floristics and functions in this plot are similar to those found in the other plots (DL-29 and DL-72) assigned to this vegetation zone within the Hunter IBRA, with *Casuarina glauca* present in all of these plots. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a strong first centroid match of 0.651 with PCT 4015 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

Vegetation integrity plot name	Distance from subject land (approx.) (m)	PCT No.	Condition Class	Justification for the use of the data
DL-41	56	4039	Mod-good	DL-41 is located along the same stream that is mapped within the subject land as PCT 4039 (Mod-good) in the Hunter IBRA subregion. The canopy of the plot is composed of 20% *Eucalyptus tereticornis* and 10% *Eucalyptus punctata*. This is consistent with the BioNet Vegetation Classification Database description of PCT 4039, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have no centroid matches with PCT 4039 (see Appendix D). However, it was located on the sandy alluvial soils along the flats that drain the sandstone slopes of Pokolbin State Forest. The canopy of this plot was mainly dominated by *Eucalyptus tereticornis*, with *Eucalyptus punctata* also present. The mid-story consisted of a mix of *Acacia implexa, Breynia oblongifolia* and *Trema tomentosa var. aspera*, with the grassy ground layer including *Cynodon dactylon, Gahnia aspera, Microlaena stipoides* and *Oplismenus aemulus*. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
DL-68	773	4072	Mod-good	DL-68 is located along same stream that is mapped within the subject land as PCT 4072 in the Hunter IBRA subregion, and is located near a past confirmed plot for PCT 4072. The canopy of the plot is composed of 40% *Casuarina cunninghamiana subsp. cunninghamiana*. This is consistent with the BioNet Vegetation Classification Database description of PCT 4072, and with what's present within the areas mapped within the subject land. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a moderate first centroid match of 0.759 with PCT 4072 (see Appendix D). The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.
Q46 (Umwelt 2024)	419	4089	Derived	Q46 (Umwelt 2024) is located on a similar bank along the Hunter River to what is mapped within the subject land as PCT 4072 in the Hunter IBRA subregion. This plot has been verified and confirmed by CPHR as belonging to PCT 42 (Derived native Grassland), with *Austrostipa verticillata* and *Cynodon dactylon* dominating the vegetation zone it was assigned to. PCT 42 (River Red Gum / River Oak riparian woodland wetland in the Hunter Valley) has since been split into PCT 3397 and PCT 4089, with the known distribution of PCT 3397 being outside of the subject land. The floristics and functions in this plot are similar to those found in the other plots (HTP-MS-69 and HTP-MS-70) assigned to this vegetation zone within the Hunter IBRA, with *Austrostipa verticillata* and *Cynodon dactylon* present in most of these plots. The location of this plot is shown in Figure 14.7 demonstrating how this plot relates to the vegetation zones mapped in this BDAR.

2.2.4 *Vegetation integrity survey*

2.2.4.1 Vegetation integrity plot – method

Vegetation integrity plots were completed in accordance with section 4.3.3 of the BAM. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in Figure 2.1.



Figure 2.1 Vegetation integrity plot layout

The following site attributes were recorded at each vegetation integrity plot location:

- **Location:** (easting – northing grid type MGA 94, Zone 56).
- **Vegetation structure and dominant species and vegetation condition:** Vegetation structure was recorded through estimates of percentage foliage cover, average height and height range for each vegetation layer.
- **Native and exotic species richness** (within a 400-metre squared quadrat): This consisted of recording all species by systematically walking through each 20 metre x 20 metre plot. The cover and abundance (percentage of area of quadrat covered) of each species was estimated. The growth form, stratum/layer and whether each species was native/exotic/high threat weed was also recorded.
- **Number of trees with hollows** (1000 metre squared quadrat): This was the frequency of hollows within living and dead trees within each 50 metre x 20 metre plot. A hollow was only recorded if (a) the entrance could be seen: (b) the estimated entrance width was at least 5 centimetres across: (c) the hollow appeared to have depth: (d) the hollow was at least 1 metre above the ground and the centre of the tree was located within the sampled quadrat.
- **Number of large trees and stem size diversity** (1000 metre squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 metres from the ground) of all living trees (greater than 5 centimetre DBH) within each 50 metre x 20 metre plot. For multi-stemmed living trees, only the largest stem was included in the count. Number of large trees was determined by comparing living tree stem DBH against the PCTs benchmarks.
- **Total length of fallen logs** (1000 metre squared quadrat): This was the cumulative total of logs within each 50 metre x 20 metre plot with a diameter of at least 10 centimetres and a length of at least 0.5 metres.
- **Litter cover:** This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter less than 10 centimetres which is detached from a living plant) from within 5 (1 metre x 1 metre) sub-plots spaced evenly either side of the 50-metre central transect.
- **Evaluation of regeneration:** This was estimated as the presence/absence of overstorey species present at the site that was regenerating (i.e. saplings with a diameter at breast height less than or equal to 5 centimetres).

Prior to establishing plot survey locations, vegetation stratification was undertaken to provide a representative vegetation zone for sampling. Stratification involved marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the subject land and establishing the required number of plots at some of these waypoints.

Where a regularly sized 50 metre x 20 metre plot could not be fit into vegetation due to size constraints (e.g. narrow roadside strip of vegetation, or narrow riparian zone) the plot size and shape was modified in shape keeping the required area of the quadrats (1000 metre squared quadrat and nested 400 metre squared quadrat) intact. This was only done where the shape of the vegetation would not allow the use of a 50 metre x 20 metre plot.

2.2.4.2 Vegetation integrity score calculations

As outlined in BAM section 4.3.3, vegetation integrity is a metric-based assessment used to measure the condition of native vegetation against a benchmark, based on survey data collected by the assessor. Within each vegetation zone in the subject land, a quantitative measure of the composition, structure and function attributes is obtained from the survey. The composition, structure and relevant function attributes for each vegetation zone are then assessed against the benchmark data for the relevant PCT. The benchmark data used in the BDAR were the Version 1.2 benchmarks as of 31 January 2023. The default benchmarks for PCTs held within the BAM-C were not modified.

The plot survey data was used to determine the vegetation integrity scores for a vegetation zone. Equations 16–24 from Appendix H of the BAM (housed within the BAM-C) were used to determine the current vegetation integrity score for each vegetation zone.

2.2.4.3 Plot analysis of candidate PCTs using the Plot to PCT Assignment Tool

The Plot to PCT Assignment Tool is a web application for identifying PCTs in eastern NSW. The tool provides a standardised repeatable method for identifying quantitative plant community types using the floristic survey methods required under the BAM (Environment and Heritage 2025).

New standard floristic survey sites can be evaluated against quantitative approved plant community types for the coast and tablelands bioregions of eastern NSW, using a combination of floristic, environmental and spatial attributes (Environment and Heritage 2025).

BAM vegetation integrity plot data was formatted to allow for a cleaner upload to the Plot to PCT Assignment Tool, where it provided detailed centroid distance information on the 5 most closely matched plant community types. These are further assessed and justified for each PCT in section 4.2.

2.2.5 Random meander surveys

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993). This involves walking in a random meander throughout the subject land recording dominant and key plant species (e.g. threatened species, noxious weeds) boundaries between various vegetation communities and condition of vegetation. The time spent in each vegetation community was generally proportional to the size of the community and its species richness. This survey technique was used to verify vegetation boundaries and stratification from the desktop analysis.

2.2.6 Scattered tree assessment

The streamlined assessment module ‘scattered trees assessment’ as outlined in Appendix B of the BAM has been utilised to assess the impact of clearing scattered trees. As outlined in the BAM, an assessment of the impact of clearing scattered trees can be made using this module where:

a the impacts of clearing or development proposals are for vegetation that meets the definition of scattered trees, and
b the scattered tree is not a threatened species itself nor does it have any record of candidate species credit species (flora or fauna) incidentally using it, and
c the impact is unlikely to be serious or irreversible.

Where only part of the subject land contains scattered trees, this module may be used to assess that part of a development or clearing proposal, and the standard BAM used to assess impacts on the remaining areas. The scattered tree module is used in this BDAR only to assess the part of the project that contains scattered trees.

The mapped scattered trees (see Figure 14.10) are not threatened species nor do the trees have any records of candidate species credit species (flora or fauna) incidentally using them.

Importantly, serious and irreversible impact (SAII) species including Swift Parrot and Regent Honeyeater are excluded from the scattered tree assessments based on the absence of habitat constraints (i.e. the scattered trees are not in areas of mapped important habitat). As such, there is no impact to these SAII species credit species and the scattered tree module can be used.

Scattered trees were first identified by using the land categorisation mapping (see section 4.1 and Appendix B (Determination of excluded impacts) to locate areas of category 1– exempt land that contained isolated trees. These isolated trees conform to the presence of category 2 – regulated land and surrounded by category 1 – exempt land on the Native Vegetation Regulatory Map (i.e. the tree is category 2 land while the surrounding paddock is category 1 land). This first step restricted the mapping of scattered trees and application of the scattered tree module only to those areas of trees within category 1 – exempt land that were not otherwise assigned to a vegetation zone.

Trees were only considered for inclusion in the scattered tree assessment if they had a DBH of greater than or equal to 5 centimetres. The trees were mapped as scattered trees if they were individual trees or a group of 3 or fewer trees located more than 50 metres away from any living tree that is greater than or equal to 5 centimetres DBH.

Assessment of ground cover is an important component of defining scattered trees. The BAM outlines that the land between the scattered trees must be comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground. This definition of ground cover is not able to be implemented in practice. The ground cover between trees on agricultural land is invariably a mixture of cultivated native species (i.e. pasture grasses), exotic species, human-made surfaces, and bare ground. The ground cover beneath the scattered trees assessed in the BDAR was dominated by exotic species.

The BAM states that the assessment of ground cover should be made during the time of year when the proportion of native ground cover on the subject land is likely to be at its maximum compared to that of exotic ground cover. Due to the size of the subject land and extent of survey required combined with property access limitations, the survey was staged across seasons, and it was not possible to assess ground cover at the optimal time of year for every scattered tree within the subject land. Characterisation of ground layer was made using a combination of qualitative survey techniques including rapid data points and photographic documentation. Quantitative data from BAM vegetation integrity plots done in paddocks near scattered trees was also used to inform the assessment of ground cover where possible. However, it is evident from a review of aerial photography that the areas mapped as scattered trees are on agricultural land.

In undertaking the scattered tree assessment, the following information is required as outlined in Appendix B.2 of the BAM:

- a map that identifies the scattered trees proposed to be cleared (refer to Figure 14.10)
- identify the genus and species of each tree
- assign each tree or group of trees to be cleared into a class as per:
  - class 1: trees that are <20 centimetres DBH and without hollows
  - class 2: trees that are ≥20 centimetres DBH and less than the large tree benchmark for the most likely plant community type or trees that are <20 centimetres DBH that contain at least 1 hollow
  - class 3: trees that are greater than or equal to the large tree benchmark for the most likely plant community type
- record any sightings (e.g. in hollows) or evidence (e.g. scats) of threatened species (flora or fauna) using the scattered trees.

Due to the large-scale of the project, and access limitations in many areas of the subject land, there were some areas of the subject land where scattered trees could not be field verified. As such, the genus and species of each tree could not be verified. In these locations, aerial imagery was used to identify the location of scattered trees and the trees were mapped remotely. To address these limitations, the nearest or most likely PCT (given landscape position, geology, soil type, adjacent vegetation that could be field verified), was assigned to each tree along with the corresponding dominant tree genus or species (unknown species were entered into the BAM-C as *Eucalyptus* sp.). Importantly, none of the scattered trees mapped in this BDAR are threatened species.

In determining the offset requirement for scattered tree impacts, the BAM states that the assessor must visually assess every class 2 and class 3 scattered tree in the field to determine whether it is a hollow bearing tree. As this was not possible given the constraints, class 3 and hollows were assigned to each tree that was unable to be surveyed in the field. This cautious approach enables that larger class 3 and hollow-bearing trees rare not missed by the assessment and for the offset requirement for scattered trees to take into account the highest values.

As the field survey was not able to account for every scattered tree, there was no way to record any sightings (e.g. in hollows) or evidence (e.g. scats) of threatened species (flora or fauna) using the scattered trees. The assessment has therefore been made based on available data and the characteristics of the candidate species returned from the BAM-C for each scattered tree assessment (see section 4.6 for more discussion on candidate species and scattered trees).

2.2.7 Planted native vegetation assessment

The streamlined assessment module 'Planted native vegetation' as outlined in Appendix D of the BAM has not been used for this assessment as all planted native vegetation has been assigned to an appropriate PCT and assessment as part of chapters 4 and 5 of BAM .

2.2.8 Remote assessment of biodiversity values

Due to some limited access restrictions within the projects subject land, EnergyCo have requested approval for the use of the recently released *Remote assessment of biodiversity values: Biodiversity Assessment Method guide* (DCCEEW, 2025) (the guide).

The guide is restricted to CSSI projects for application of BAM in situations where access to land on which impacts are likely to occur is not possible. The guide allows for the remote assessment of biodiversity values using a combination of existing data, tools, information and surrogate sites, where appropriate.

EnergyCo's request on 8 May 2025 for application of the guide across limited State Forest and private land holdings for a select number of threatened flora species was approved by CPHR on 14 May 2025.

The application of the guide was restricted to six private landholdings and four minor areas of the State Forest that have restricted access for targeted surveys within the subject land (refer to Figure 14.5a and Figure 14.5b). These sites include:

- Watagan/Olney State Forest: Survey has been unable to be conducted within small areas due to steep topographic constraints, cliffs etc or heavy overgrowth of Native Raspberry (*Rubus rosifolius*) and other vine species following disturbance, which have made the site impenetrable for survey.
- Dawson Property: no flora surveys have been undertaken within this property due to access limitations during survey periods
- Blansjaar Property: no survey has been undertaken within this property due to access restrictions over the course of the entire project.
- Aksoave Pty Ltd and Ticalc Pty Ltd: no survey has been undertaken within this property due to access restrictions over the course of the entire project.
- Millfield Mill (near the junction of Wollombi Rd and Hayes Rd): no survey has been undertaken within this property due to access restrictions over the course of the entire project.
- Bulga Mine (northern private lease): existing access agreements have not previously included a northern landholding. No survey to date has been undertaken within this restricted site.

To assess the impacts of the project within these restricted access areas, surrogate survey information from accessible areas were used to inform the assessment. Surrogate sites allow for the assessment of biodiversity in accordance with the BAM through the collection of on-ground data considered representative of the restricted access area.

The application of the guide, includes and assessment of environmental characteristics of the restricted areas through available relevant desktop resources and provides a comparison with the proposed surrogate survey information including:

- similarity in PCTs in the same broad condition state as well as patch size and connectivity to native vegetation for fauna species (see data below)
- similarity in land use history, soils, geology, Mitchell landscape, elevation
- records of the species within the local area.

The assessment also outlines the list of candidate species proposed for assessment remotely and why this approach is appropriate to determine presence, based on ecology and life history traits.

To assist in assessing the suitability of the proposed surrogate survey information used to inform assumptions with regard to candidate species in the assessment area, the following information is provided:

- proximity to inaccessible area
- survey approach used in the surrogate site to determine the species presence in accordance with section 5.3 of the BAM
- limitations in relation to the application of the surrogate data to estimate presence of the species in the inaccessible areas
- all spatial data with reference to Appendix D of the BAM Stage 2 Ops Manual.

The assessment of these restricted access properties in accordance with this guide is provided within Appendix Q.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

Existing information was used to identify habitat constraints and microhabitats for threatened species within the subject land. A review of habitat constraints, geographic limitations and microhabitats for candidate threatened flora (species credit) species as listed within the NSW Threatened Biodiversity Data Collection (TBDC) was undertaken prior to survey.

A number of existing BDARs and other biodiversity reports were reviewed to obtain existing information on biodiversity in the locality with specific focus placed on areas assessed in previous BDARs that overlap with the Project. The reports reviewed included:

- *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022)
- *Mt Pleasant Optimisation Project – Appendix E – Biodiversity Development Assessment Report* (Hunter Eco 2021)
- *Mangoola Coal Continued Operations Project – Biodiversity Assessment Report* (Umwelt 2019)
- *Ecology Report for the Continuation of Rix's Creek Mine, Singleton LGA* (Bell 2015)
- *Warkworth Coal Mine Continuation Project – Biodiversity Assessment Report* (Cumberland Ecology 2014a)
- *Bengalla Mine Continuation – Biodiversity Assessment Report* (Cumberland Ecology 2014b)
- *Bulga Coal Mine Optimisation – Ecological Impact Assessment* (Umwelt 2013).

2.3.2 Botanical expertise of field teams

Targeted field surveys for threatened flora species were led by experienced botanists with direct familiarity with the candidate species within the region and responsible for numerous records and population verified with the Royal Botanic Gardens Herbarium in Sydney. The survey team leads provided pre-survey guidance and preparation to survey team and where possible reference population checks prior to undertaking surveys. Additional consultation was also undertaken with CPHR and recognised botanical experts on species specific information. A summary of the specialist botany leads experience is provided below in Table 2.3.

Table 2.3 Specialist botany experience

Name	Qualifications	Years of field experience	Candidate species contributions to Royal Botanic Gardens Herbarium collection and/or species populations	
Alex Cockerill	BAAS17020 Bachelor of Science (Honours 1)	25+	*Acacia bynoeana* *Acacia pendula – endangered population* *Acacia pubescens* *Androcalva rosea* *Syn. Commersonia rosea* *Angophora inopina* *Asperula asthenes* *Callistemon linearifolius* *Cryptostylis hunteriana* *Cymbidium canaliculatum* *Cynanchum elegans* *Darwinia biflora* *Darwinia glaucophylla* *Dillwynia tenuifolia* *Diuris preacox* *Diuris tricolor* *Epacris purpurascens var. purpurascens* *Eucalyptus cryptica Syn. Eucalyptus sp. Cattai* *Eucalyptus camfieldii* *Eucalyptus fracta*	*Eucalyptus parramattensis subsp. decadens* *Grevillea parviflora subsp. parviflora* *Grevillea parviflora subsp. suplicans* *Hibbertia procumbens* *Hibbertia puberula* *Hibbertia suparans* *Melaleuca biconvexa* *Micromyrtus blakelyi* *Ozothamnus tesselatus* *Pimelea curviflora var. curviflora* *Pomaderris queenslandica* *Prostanthera cineolifera* *Prostanthera junonis* *Rhodomyrtus psidioides* *Rutidosis heterogama* *Senna acclinis* *Syzygium paniculatum* *Tetratheca glandulosa* *Tetratheca juncea*
Mark Stables	BAAS18097 Bachelor of Science (Honours)	25+		
Deborah Landenberger	BAAS18187 Bachelor of Science (Honours)	~20		
Lukas Clews	BAAS17060 Master of Scientific Studies Diploma of Conservation and Land Management Graduate Certificate in Applied Science Bachelor of Science	~20		
Paul Rossington	Master of Wildlife Management, Habitat Program Bachelor of Science Biodiversity Assessment Method Accredited Assessor	~20		
Eugene Dodd	Master of Research Bachelor of Science	15+		

2.3.3 Field surveys

Targeted surveys were undertaken for the candidate flora species credit species (including EPBC Act listed species) within the subject land. The method employed was a combination of parallel field traverses and two-phase grid surveys.

Targeted threatened flora surveys were planned with a phased approach:

- Survey was designed to maximise the likelihood of detection of targeted threatened plant species by grouping those species considered likely to be reliably detected through survey according to optimal months of survey and their specific associated habitat.
- Field survey techniques were assigned to areas of associated habitat based on number of associated candidate species, likelihood to support candidate species, condition and presence of associated microhabitats.

The following field survey techniques were used to undertake targeted seasonal surveys in general accordance with the BAM guidance *Surveying threatened plants and their habitats: NSW guide for the Biodiversity Assessment Method* (DPIE 2020):

- two-phase grid-based systematic survey
- parallel field traverses.

A detailed description of these methods is provided below in section 2.3.3.1.

It is acknowledged the BAM restricts the application of the two-phase grid-based systematic survey to species with large areas of specific associated habitats greater than 50 ha, while species with smaller species of habitat are required to adopt parallel field traverses. Twelve candidate flora species were identified with associated habitats less than 50 ha in size. The majority of these species were associated with roadside habitats or unique micro-habitats (rock platforms etc.) that were subject to parallel transects in accordance with the BAM requirements. Five additional species of tree were considered to be adequately assessed through the application of the modified two-phase grid- systematic survey outlined in section 2.3.3.1 below. One residual species, *Thelymitra adorata* will require further targeted surveys in accordance with parallel transects in the RTS stage of assessment. A summary of the species with habitats less than 50 ha and the adopted approach to survey is provided in Table 2.4.

Table 2.4 Candidate species with small areas of habitat (<50 ha and adopted survey approach)

Candidate threatened flora species (scientific name)	Associated habitat (study area)	Survey approach adopted
Androcalva rosea	3.84	Micro-habitats (rock platforms) targeted with transect surveys
Angophora inopina	43.28	Modified 2-phase grid- with transects
Cryptostylis hunteriana	2.68	Habitat restricted to roadsides and completed with 5 m parrel transects
Dendrobium tetragonum var. melaleucaphilum	2.02	Habitat restricted to roadsides and completed with 5–10 m parrel transects
Eucalyptus camaldulensis – endangered population	25.98	Modified 2-phase grid- with transects
Eucalyptus camfieldii	1.61	Modified 2-phase grid- with transects
Eucalyptus castrensis	18.57	Modified 2-phase grid- with transects
Eucalyptus parramattensis subsp. decadens	40.59	Modified 2-phase grid- with transects
Genoplesium branwhiteorum	0.67	Habitat restricted to roadsides and completed with 5 m parrel transects

Candidate threatened flora species (scientific name)	Associated habitat (study area)	Survey approach adopted
Genoplesium insigne	0.67	Habitat restricted to roadsides and completed with 5 m parrel transects
Hibbertia puberula	1.91	Habitat restricted to roadsides and completed with 5 m parrel transects
Thelymitra adorata	1.61	2-phase grid-completed with further parallel transects to be completed for RTS

Targeted threatened flora surveys using these methods were not undertaken for non-native vegetation areas of the subject land mapped as the following:

- Category 1 – exempt land
- Miscellaneous ecosystem – PCT 0
- Other excluded land.

Section 5.2.1 outlines the threatened species survey effort in detail. The location of targeted threatened flora survey effort is shown in Figure 14.7.

2.3.3.1 Two-phase grid-based systematic survey

It is recognised that the parallel field traverses survey method is impractical for large scale project like HTP, which has an assessment area of around 1,266 hectares. The 2-phase grid-based systematic survey method has been developed for large areas of suitable potential threatened species habitat that generally exceed 50 hectares in area. Due to the linear nature of the subject land and the mostly contiguous mosaic of native vegetation zones over three separate IBRA subregions, the two-phase grid methods was deemed the most effective way to cover suitable habitats for predicted candidate species.

Phase 1

Phase 1 of the method involves establishing a grid spaced at 100 square metres that is nested within a 1 square kilometre grid. Surveys are then conducted at each survey location (100 metre grid intersect or greater if open forest structure occurred), where a 40 metre diameter search area is undertaken (1256 square metre circular area). If a target threatened species is located, finer-scale grid surveys (phase 2) is used to locate population extent, which allows a species polygon to be defined. This subsequent phase enables a greater intensity of survey effort in locations where the target threatened species occurs (DPIE 2020).

Given the linear nature of the subject land, a modified 2-phase grid-based systematic survey method was adopted. This modified method established a combination of linear parallel field traverses between each 100 m grid intersect point along the length of the 140 wide biodiversity study area. Within the survey corridor, a linear 100 metre survey effort line was established where a 40 metre diameter search area is undertaken (1256 square metre circular area) at each 100 metre survey location along the length of the corridor.

This provided additional sampling survey effort and threatened species detection. In non-linear site-based locations a regular 100 metre grid pattern was used.

The survey grid intersect locations were pre-loaded onto a handheld GPS units and tracks were recorded to enable an accurate approach to the survey effort. A small number of tracks (12) or approximately 3% of the targeted survey effort were not recorded either resulting from damaged, stollen or malfunctioning equipment.

To ensure a conservative approach was adopted for the assessment of targeted threatened flora coverage, survey gaps of greater than one grid point (200 metre gap) were excluded from the survey area and assumed presence and species polygons were applied to these areas. These survey gaps, while limited represented minor changes to design and topographical or site-specific constraints that limited survey effort.

Phase 2

When a target species was located, finer-scale grid surveys (parallel traverses) were used to locate population extent and develop the species polygon. The extent of the area covered by the finer-scale grid was determined on site directly after locating a target species. The habitat type, vegetation type and condition, and landscape attributes surrounding the locations where the target species was first detected were considered. Timing and land access constraints also played a large role in the extent of the area covered by the finer-scale grid.

If a target threatened species was located, a finer-scale grid survey (phase 2) was undertaken to locate population extent and enable a species polygon to be defined. Where a threatened species was recorded and the phase 2 grid survey was impractical due to topographical or site specific constraints, a conservative approach was applied and a species polygon was created that covered the entire suitable habitat patch. This was also undertaken for species that are assessed by an area measure unit and ensures the largest area habitat polygon was applied.

Finer-scale grid surveys were undertaken for three specific species recorded within the subject land *Diuris tricolor, Prostanthera cineolifera, Melaleuca groveana* and *Rhodamnia rubescens* as outlined below.

Diuris tricolor

Diuris tricolor was known to occur near the Bayswater Power Station area, in the Muswellbrook LGA. This was identified during targeted surveys on the 19 September 2024. This area was surveyed previously in October 2023; however no specimens were identified due to poor flowering conditions for the species. Finer-scale grid surveys separated by 5–10 m transects were undertaken immediately after identification to make sure all active specimens were recorded. This survey targeted the entire vegetation zone that the specimen was identified in, identifying a total of 13 *Diuris tricolor* specimens.

These specimens were all identified within the Muswellbrook LGA, which qualified them to be included as part of the endangered population in the Muswellbrook LGA. The project design was modified following the recording of these specimens, avoiding any potential impact to this species. No further specimens were identified during targeted surveys.

Melaleuca groveana

Melaleuca groveana was known to occur in the Corrabare North Flora Reserve and part of the adjoining Corrabare State Forest. This was identified during the initial review of existing information (i.e. Bell and Key 2024) and BioNet records. *Melaleuca groveana* was only recorded within Corrabare State Forest, with no individuals identified elsewhere in the biodiversity study area.

Corrabare State Forest was surveyed at a finer-scale grid separated by 5–10 m transects. Surveys were undertaken within the subject land in Corrabare State Forest on the 8 August 2024, with an aim to accurately map the extent of the *Melaleuca groveana* population. Approximately 13 kilometres (based off GPS tracks) was covered by a team of 2 ecologists.

The survey recorded 378 *Melaleuca groveana* plants from the area surveyed.

Melaleuca groveana has no seasonal survey restrictions as outlined in the TBDC. The assessors were trained in the field to distinguish between *Melaleuca groveana* and other *Melaleuca* species likely to occur in the area, including *Melaleuca deanei*.

Rhodamnia rubescens

Rhodamnia rubescens was known to occur throughout all the State forests within the subject land. This was identified during the review of existing information and BioNet records.

Due to access constraints with some private landowners, only areas within the State forests (Olney, Watagan, Corrabare and Pokolbin), Corrabare North Flora Reserve and some private lands were surveyed at a finer-scale grid. However, due to environmental obstacles such as cliffs and heavy *Rubus* spp. and *Cissus* spp. vine tickets, some finer-scale grid surveys were restricted to accessible areas.

Finer scale grid surveys were undertaken within the subject land over the course of 2024 and 2025, primarily around the August-September period, when some specimens were flowering and/or fruiting.

When *Rhodamnia rubescens* plant/s were identified, the quantity and characteristics of the plant/s were recorded. This included the presence of Myrtle rust (*Austropuccinia psidii*), plant height, and whether there was any reproductive material (flowers or fruits) on the plant. This data was collected to assess where the more viable and resilient populations of the species were. This data will hopefully be useful when determining where to undertake seed collection prior to clearing in the subject land.

The survey recorded 2511 individuals of *Rhodamnia rubescens* plants within or adjacent to the subject land, with a majority occurring within the Olney, Watagan and Corrabare State Forests. Several individuals that were recorded had fruit forming, however all had Myrtle rust present.

2.3.3.2 Parallel field traverses

Parallel field traverses were conducted along accessible roads and tracks that will potentially be utilised to access the subject land are expected to be constructed/upgraded prior to main construction works. This survey methodology incorporated linear parallel field traverses within 10 metres of the road/track edge, targeting species based on seasonality and microhabitats. These surveys have so far identified sections of *Brachyscome brownii, Prostanthera cineolifera, Melaleuca groveana, Rhodamnia rubescens* and *Rhodomyrtus psidioides* within 10 metres of these road/track edges.

Diuris tricolor

Diuris tricolor was known to occur near the Bayswater Power Station area, in the Muswellbrook LGA. This was identified during targeted surveys on the 19 September 2024. This area was surveyed previously in October 2023; however no specimens were identified due to poor flowering conditions for the species. Finer-scale grid surveys separated by 5–10 m transects were undertaken immediately after identification to make sure all active specimens were recorded. This survey targeted the entire vegetation zone that the specimen was identified in, identifying a total of 13 *Diuris tricolor* specimens.

These specimens were all identified within the Muswellbrook LGA, which qualified them to be included as part of the endangered population in the Muswellbrook LGA. The project design was modified following the recording of these specimens, avoiding any potential impact to this species. No further specimens were identified during targeted surveys.

Melaleuca groveana

Melaleuca groveana was known to occur in the Corrabare North Flora Reserve and part of the adjoining Corrabare State Forest. This was identified during the initial review of existing information (i.e. Bell and Key 2024) and BioNet records. *Melaleuca groveana* was only recorded within Corrabare State Forest, with no individuals identified elsewhere in the biodiversity study area.

Corrabare State Forest was surveyed at a finer-scale grid separated by 5–10 m transects. Surveys were undertaken within the subject land in Corrabare State Forest on the 8 August 2024, with an aim to accurately map the extent of the *Melaleuca groveana* population. Approximately 13 kilometres (based off GPS tracks) was covered by a team of 2 ecologists.

The survey recorded 378 *Melaleuca groveana* plants from the area surveyed.

Melaleuca groveana has no seasonal survey restrictions as outlined in the TBDC. The assessors were trained in the field to distinguish between *Melaleuca groveana* and other *Melaleuca* species likely to occur in the area, including *Melaleuca deanei*.

Rhodamnia rubescens

Rhodamnia rubescens was known to occur throughout all the State forests within the subject land. This was identified during the review of existing information and BioNet records.

Due to access constraints with some private landowners, only areas within the State forests (Olney, Watagan, Corrabare and Pokolbin), Corrabare North Flora Reserve and some private lands were surveyed at a finer-scale grid. However, due to environmental obstacles such as cliffs and heavy *Rubus* spp. and *Cissus* spp. vine tickets, some finer-scale grid surveys were restricted to accessible areas.

Finer scale grid surveys were undertaken within the subject land over the course of 2024 and 2025, primarily around the August-September period, when some specimens were flowering and/or fruiting.

When *Rhodamnia rubescens* plant/s were identified, the quantity and characteristics of the plant/s were recorded. This included the presence of Myrtle rust (*Austropuccinia psidii*), plant height, and whether there was any reproductive material (flowers or fruits) on the plant. This data was collected to assess where the more viable and resilient populations of the species were. This data will hopefully be useful when determining where to undertake seed collection prior to clearing in the subject land.

The survey recorded 2511 individuals of *Rhodamnia rubescens* plants within or adjacent to the subject land, with a majority occurring within the Olney, Watagan and Corrabare State Forests. Several individuals that were recorded had fruit forming, however all had Myrtle rust present.

2.3.3.3 Other survey methods

Due to the specific niches and habits of some of the candidate species, specialised methodologies were applied to improve the potential of detecting the species presence.

Rhizanthella slateri

Rhizanthella slateri (Eastern Australian Underground Orchid) is a highly cryptic orchid that grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. For this cryptic species to be surveyed for within the subject land, the leaf litter and/or soil had to be disturbed. To achieve this, ecologists were equipped with hand rakes to clear a square-metre of leaf litter at least once within each of the 40 metre diameter search areas when undertaking the 2-phase grid-based surveys. Due to its habitat requirements being poorly understood and not being associated with any particular vegetation type (in the TBDC), this survey method was undertaken throughout all the forested areas of the subject land. This method was as advised by Paul Hillier (pers comm) from CPHR within Saving our Species program for this species.



Photo 2.1 A *Rhizanthella slateri* survey being undertaken in Corrabare State Forest (12/08/2024)



Photo 2.2 Example of a *Rhizanthella slateri* surveyed plot in Corrabare State Forest (08/08/2024)

2.3.3.4 Herbarium vouchering of recorded threatened species

Where a species could not be positively identified in the field and was suspected of being a threatened species, a voucher specimen was collected and preserved for later identification. These samples were sent to the Royal Botanic Gardens in Sydney and/or the Australian National Botanic Gardens for confirmation of identification. Samples of *Eucalyptus fracta, Melaleuca groveana, Prostanthera cinolifera, Pterostylis gibbosa, Rhodomyrtus psidioides* and *Senna acclinis* were sent to a herbarium for identification. Correspondence from the Royal Botanic Gardens relating to species identifications is provided in Appendix F (Herbarium correspondence). All plant samples were collected under the NSW scientific licence number SL100630.

The subject land for the project is large and combined with other constraints such as access availability to private land, multiple replicate visits to survey for species in different stratum (i.e. individual surveys for ground layer species vs shrub layer species vs tree canopy species) was not achievable. The survey methodology employed means that detailed surveys occur at all layers of stratum at a single time done by multiple ecologists.

2.3.3.5 Reference population checks

Where the subject land contained or was located near records of threatened species on BioNet, the locations of these records were visited to verify the validity of the records and to determine whether the species were actively flowering when this was a requirement. The following reference population checks were completed:

Brachyscome brownii

While there were no BioNet records of *Brachyscome brownii* near the subject land, there were 2 records from Australia's Virtual Herbarium from 1906 and 1925, which were recorded near the subject land in Pokolbin. These records were difficult to locate due to their spatial uncertainty of 1.5 and 2.0 kilometres and changes in the landscape since they were last recorded. Nearby roads and tracks within the subject land were surveyed for this species, with a large population located during targeted surveys in February 2025.

Eucalyptus glaucina

Several BioNet records of *Eucalyptus glaucina* occur near the subject land. A record of 3 individuals within Bulga Mine from 2001 was visited and assessed on the 6 September 2024. The record had a spatial accuracy of 10 metres, however no potential specimens of *Eucalyptus glaucina* were identified within this area.

Genoplesium insigne

A reference population of *Genoplesium insigne* located within a transmission easement near Cooranbong was used to determine if the species was actively flowering. This was checked and identified to be actively flowering on the 11th of October 2024.

Melaleuca deanei and Melaleuca groveana

One BioNet record of *Melaleuca deanei* was present along Crawfords Road in Corrabare State Forest. This record is from 2021. The notes associated with this record are limited but indicate that they are floristics records from systematic flora surveys. The spatial accuracy of the record is noted as 10 metres. This record is not backed by herbarium specimens.

The location of this record was visited and surveyed, with only specimens of *Melaleuca groveana* identified within the records respective area. It is possible that this record is the result of misidentification, with other records of *Melaleuca deanei* having a northern extent near St Albans.

Prostanthera cineolifera

Several BioNet records for *Prostanthera cineolifera* were checked along Bees Nest Ridge Road in Pokolbin State Forest in 13th of September 2023 to confirm presence and was identified to be actively flowering. A patch of *Prostanthera cineolifera* was later identified along the Brocken Back Trail, which was utilized as a reference population due to its closer proximity to the subject land. This reference population was visited and identified to be flowering on the 3rd of September 2024.

Tetratheca juncea

Records near the subject land were checked to determine presence and flowering activity in the locality. A record from 2004 along Alton Road in Olney State Forest was checked and identified to be actively flowering on the 4th of September 2023. Another record from 2005 along Roller Road in the northern end of Jilliby SCA was checked on the 1st of November 2023, with no specimens identified within the recorded area. The species was recorded flowering on the 29th of August 2023 and 9th of October 2024 in the existing TransGrid powerline easements near Cooranbong.

2.3.3.6 Orchid flowering periods

All threatened species of orchid on the project required confirmation of active flowering for their targeted survey to be valid and/or for positive identification of the species. To support these efforts, records in the BioNet Atlas were assessed to determine when flowering individuals were recorded during the projects survey timeframe, 31st May 2023 to present. The BioNet records have been summarised in Table 2.5 to outline which months each of these threatened orchids were actively flowering in the locality.

Table 2.5 Orchid flowering records from BioNet

Species	Survey months (TBDC)	BioNet recorded years	BioNet recorded months
Corybas dowlingii	June-July	2023	June
		2024	June
Cryptostylis hunteriana	November-January	2023	November
		2024	October
Cymbidium canaliculatum – endangered population	All Year	2023	July October November
		2024	May November
		2025	March
Diuris tricolor	September-October	2024	September
Genoplesium branwhiteorum	November-April	2024	January March December
		2025	January February March
Genoplesium insigne	September-November	2023	August September October
		2024	September October (survey record)
Prasophyllum petilum / Prasophyllum sp. Wybong	September-December	2024	September
Pterostylis chaetophora	September-November	2023	August October
		2024	October
Pterostylis gibbosa	September-October	2024	September (survey record)
Thelymitra adorata	September-October	2023	September October
		2024	September

2.3.4 *Summary of targeted threatened flora survey effort*

A summary of targeted threatened flora survey effort within the subject land is presented in Table 2.6. Around 4,919 kilometres was covered during the targeted flora species surveys. The bulk of the targeted survey was undertaken in spring, followed by summer, autumn and winter coinciding with the survey months for target species. In terms of the survey sample area against the required guideline effort, between 137 and 182% of sample areas coverage was achieved (see Table 2.7). Table 2.8 shows the percentage of the subject land that was able to be covered by the surveys.

Table 2.6 Survey of targeted flora survey effort per IBRA subregion

IBRA subregion	Transect length (km)				Total km
	Spring	Summer	Autumn	Winter	
Wyong	996.82	128.15	1.32	805.71	**1,932.00**
Yengo	601.42	343.44	71.97	290.74	**1,307.56**
Hunter	928.27	378.91	123.51	248.75	**1,679.43**
Total km	**2,526.51**	**850.50**	**196.79**	**1,345.20**	**4,918.99**

Table 2.7 Summary of two-phase grid survey effort against guideline effort required

Two-phase grid guideline effort	Two-phase grid survey area covered	Percentage of modified Two-phase grid sample area requirement
Total sample area of two-phase grid intersect within the subject land native vegetation – 277.47 ha	June/July – 127.74 ha	46%
	September/October – 382.18 ha	137%
	Spring – 398.96 ha	143%
	All seasons – 507.48 ha	182%

Table 2.8 Summary of targeted threatened flora survey effort coverage of native vegetation within the subject land

Survey method	Approximate area of native vegetation covered (ha)[1]	% of total area
Areas surveyed	683.92	83.84%
Areas not surveyed	85.41	10.47%
No access available	46.18	5.66%
No impact	0.21	0.03%

(1) Native vegetation area includes all disturbance areas for all vegetation zones

2.4 Threatened fauna survey methods

2.4.1 Review of existing information

Existing information was used to identify habitat constraints and microhabitats for threatened fauna species within the subject land. A review of habitat constraints, geographic limitations and microhabitats for candidate threatened fauna (species credit) species as listed within the TBDC was undertaken prior to survey.

Several previous BDARs and other biodiversity reports were reviewed to obtain existing information on biodiversity in the locality with specific focus placed on areas assessed in previous BDARs that overlap with the biodiversity study area The reports reviewed included:

- *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (Umwelt 2022)
- *Mt Pleasant Optimisation Project – Appendix E – Biodiversity Development Assessment Report* (Hunter Eco 2021)
- *Mangoola Coal Continued Operations Project – Biodiversity Assessment Report* (Umwelt 2019)
- *Ecology Report for the Continuation of Rix's Creek Mine, Singleton LGA* (Bell 2015)
- *Warkworth Coal Mine Continuation Project – Biodiversity Assessment Report* (Cumberland Ecology 2014a)
- *Bengalla Mine Continuation – Biodiversity Assessment Report* (Cumberland Ecology 2014b)
- *Bulga Coal Mine Optimisation – Ecological Impact Assessment* (Umwelt 2013).

2.4.2 Field surveys

Targeted seasonal surveys were completed for threatened fauna species, species credit species and EPBC Act listed species within potential habitat within the subject land. Threatened fauna surveys completed within the subject land were carried out as described below and where applicable, considering the methodology detailed in the:

- *NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC 2004)
- *Survey Guidelines for Australia's Threatened Mammals* (DSEWPC 2011)
- *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DDPE 2022)
- *NSW Survey Guide for Threatened Frogs* (DPIE 2020)
- *'Species credit' Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method* (OEH 2018)
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010)
- *Threatened Reptiles Biodiversity Assessment Method Survey Guide* (DPE 2022)
- BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a).

This section outlines the fauna survey effort completed for candidate species which were predicted to have a moderate to high likelihood of occurrence within the disturbance area based on the BAM-C plus database searches and habitat assessments.

2.4.3 Zoological expertise of field teams

Targeted field surveys for threatened fauna species were led by experienced ecologists with direct familiarity with the candidate species within the region. The survey team leads provided pre-survey guidance and preparation to survey team and where possible reference population checks prior to undertaking surveys. Additional consultation was also undertaken with CPHR and recognised zoology experts on species specific information. A summary of the specialist zoology leads experience is provided below in Table 2.9.

Table 2.9 Specialist zoology experience

Name	Qualifications	Years of field experience	Candidate species experience
Allan Richardson	Bachelor of Environmental Science (Honours)	25 +	Birds: — Regent Honeyeater (*Anthochaera phrygia*) — Bush Stone-curlew (*Burhinus grallarius*) — Gang-gang Cockatoo (*Callocephalon fimbriatum*) — South-eastern Glossy Black-cockatoo (*Calyptorhynchus lathami lathami*) — White-bellied Sea-Eagle (*Haliaeetus leucogaster*) — Little Eagle (*Hieraaetus morphnoides*) — Swift Parrot (*Lathamus discolor*) — Square-tailed Kite (*Lophoictinia isura*) — Cotton Pygmy-Goose (*Nettapus coromandelianus*) — Barking Owl (*Ninox connivens*) — Powerful Owl (*Ninox strenua*) — Eastern Osprey (*Pandion cristatus*) — Masked Owl (*Tyto novaehollandiae*) — Sooty Owl (*Tyto tenebricosa*)
Rodney Van der Ree	Bachelor of Science (Hons 1) Doctor of Philosophy	25 +	Arboreal Mammals: — Brush-tailed Phascogale (*Phascogale tapoatafa*) — Southern Greater Glider (*Petauroides volans*) — Squirrel Glider (*Petaurus norfolkensis*)
Stephen Mahony (Nightvision Ecology)	Bachelor of Science (Biology)	10 +	Frogs: — Giant Burrowing Frog (*Heleioporus australiacus*) — Green and Golden Bell Frog (*Litoria aurea*) — Booroolong Frog (*Litoria booroolongensis*) — Green-thighed Frog (*Litoria brevipalmata*) — Littlejohn's Tree Frog (*Litoria littlejohni*) — Stuttering Frog (*Mixophyes balbus*) — Giant Barred Frog (*Mixophyes iteratus*) — Red-crowned Toadlet (*Pseudophryne australis*) Reptiles: — Pink-tailed Legless Lizard (*Aprasia parapulchella*) — Striped Legless Lizard (*Delma impar*) — Hunter Valley Delma (*Delma vescolineata*) — Pale-headed Snake (*Hoplocephalus bitorquatus*) — Broad-headed Snake (*Hoplocephalus bungaroides*) — Stephens' Banded Snake (*Hoplocephalus stephensii*)

Name	Qualifications	Years of field experience	Candidate species experience
Corey Mead (Treehouse Fauna Services)	Bachelor of Applied Science – Coastal Management	20 +	Bats: — Large-eared Pied Bat (*Chalinolobus dwyeri*) — Little Bent-winged Bat (*Miniopterus australis*) — Large Bent-winged Bat (*Miniopterus orianae oceanensis*) — Southern Myotis (*Myotis macropus*) — Grey-headed Flying-fox (*Pteropus poliocephalus*) — Eastern Cave Bat (*Vespadelus troughtoni*) Other Mammals: — Brush-tailed Rock Wallaby (*Petrogale penicillata*) — Koala (*Phascolarctos cinereus*) Frogs: — Giant Burrowing Frog (*Heleioporus australiacus*) — Green and Golden Bell Frog (*Litoria aurea*) — Booroolong Frog (*Litoria booroolongensis*) — Green-thighed Frog (*Litoria brevipalmata*) — Littlejohn's Tree Frog (*Litoria littlejohni*) — Stuttering Frog (*Mixophyes balbus*) — Giant Barred Frog (*Mixophyes iteratus*) — Red-crowned Toadlet (*Pseudophryne australis*) Reptiles: — Pink-tailed Legless Lizard (*Aprasia parapulchella*) — Striped Legless Lizard (*Delma impar*) — Pale-headed Snake (*Hoplocephalus bitorquatus*) — Broad-headed Snake (*Hoplocephalus bungaroides*) — Stephens' Banded Snake (*Hoplocephalus stephensii*)
Lachlan McRae	PhD on the ecology and conservation of the threatened large-eared pied bat (*Chalinolobus dwyeri*) and eastern cave bat (*Vespadelus troughtoni*) (in progress) Bachelor of Environmental Science and Management (Honours)	10 +	Bats: — Large-eared Pied Bat (*Chalinolobus dwyeri*) — Little Bent-winged Bat (*Miniopterus australis*) — Large Bent-winged Bat (*Miniopterus orianae oceanensis*) — Southern Myotis (*Myotis macropus*) — Eastern Cave Bat (*Vespadelus troughtoni*)

2.4.3.1 Diurnal bird surveys

Formal 20 minute diurnal bird searches were completed within the biodiversity survey area. Diurnal bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes, or as area searches of 2 hectares for 20 minutes, as per the *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010). All birds were identified to the species level, either through direct observation or identification of calls. Diurnal bird surveys were completed during different times of the day, to account for variation in activity of different species throughout diurnal period. Birds were also recorded opportunistically during other on-site surveys.

Wherever threatened bird species were absent from the site, habitat assessments were conducted to determine the likelihood that the investigation area might support those species that are known to occur in the region. In the case of Regent Honeyeater and Swift Parrot, the important habitat mapping for this species was applied to the subject land and found to overlap. As a result, these species are assumed to be present within sections of the subject land (see section 2.4.3.2 for further discussion).

Opportunistic observation was used to identify any large stick nests in the canopy of large trees, with these stick nests consequently becoming the focus of further observational periods for threatened bird species (e.g. little eagle, square tailed kite and white-bellied sea-eagle). Where no bird was observed using the nest, the surrounding area beneath was searched for distinguishing features including feathers and/or prey remains.

One-hundred and twenty-one formal diurnal bird surveys were undertaken across the subject land between 2023 to 2024. The location of diurnal bird survey sites is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.2 Regent Honeyeater and Swift Parrot

Mapped important habitat for Regent Honeyeater and Swift Parrot occurs within multiple sections of the subject land (see Figure 14.22). Several areas within the subject land are considered key biodiversity areas (KBAs) for Regent Honeyeater and Swift Parrot, including the Singelton Military Area, part of the Watagans National Park, and several towns and patches of bushland surrounding area (DCCEEW 2024). As a result, both species are assumed present within the subject land and no survey is required by the TBDC (DEH 2024). The mapped important habitat has the potential to be either breeding or foraging habitat for Regent Honeyeater (DoE 2016) and potential foraging habitat for Swift Parrot in their non-breeding season (DCCEEW 2024).

General habitat assessments and standardised 20 minute diurnal bird surveys were conducted as part of the fauna surveys associated with the project (as outlined in section 2.4.3.1), including in areas where the mapped important habitat for these species occur, and neither Regent Honeyeater nor Swift Parrot were detected during survey.

2.4.3.3 Microchiropteran bat surveys

Microchiropteran bat surveys and analysis were undertaken using the guidelines of the Australasian Bat Society, with *Bat calls of New South Wales* (Pennay, Law et al. 2004) used as a reference collection for bat call identification.

Ultrasonic Anabat (Titley Electronics) and Song Meter Mini Bat 2 (Wildlife Acoustics) bat detection devices were used to record and identify the echolocation calls of microbats foraging across a number of native vegetation communities in the subject land. Passive monitoring at survey sites was achieved by setting anabat or Song Meter Mini Bat 2 bat detectors to record continuously overnight, typically for multiple nights at a time. A walkabout Anabat device was also utilised as a listening and reference detector during active monitoring of survey sites during nocturnal surveys.

Comprehensive analysis was completed on both passive and active ultrasonic detection surveys.

Although many microchiropteran bat species are detectable through use of anabat call detection methodologies, the vocal differences between some species are too subtle to reliably differentiate between the species when occurring in the same locality (e.g. Corben's Long-eared Bat and other *Nyctophilus* species). Therefore, targeted harp trapping was completed for capture and release of microchiropteran bats to facilitate conclusive species identifications. Site selection for the setting of harp traps included a number of rationales, such as targeting habitat areas where hollow-bearing trees or cave structures could provide potential roosting sites, and where suitable flyways were detected. Woodland, valley floors,

riparian areas and fertile parts of subject land were chosen to target certain species (e.g. Eastern Cave Bat and Large-eared Pied Bat), and sites close to cave exits for others (e.g. Little Bent-winged Bat) (OEH 2018).

The period for which a harp trap was set was dictated by the specific guidelines for each target species (as per *'Species credit' threatened bats and their habitats: NSW guide for the Biodiversity Assessment Method* (DPIE 2021)). Typically, harp traps were set for 4 consecutive nights, with surveys conducted in calm and hot, warm, or mild weather conditions to increase the likelihood of bat activity (OEH 2018). Captured bats were identified to species level, sexed, measured and weighed. Bats were released immediately after processing during dark conditions or held in a cool, dark and quiet location until release in the dark was possible. This included placing bats in sections of hollow trees out of the sun near the capture sites, so they could remain secure until their night activities resumed. On 2 occasions where the target species was captured early in the harp trapping, and individuals were identified as lactating females or dependent young, the trapping was terminated early to prevent recapture and the separation of females and offspring. Further discussion about cave-dwelling microchiropteran bat species associated with the subject land can be found in section 2.4.3.13.

Six microbat roost inspections, 32 nights of harp trapping, eight hours of active Anabat recording and 466 nights of passive Anabat recording were undertaken across the subject land. The location of microchiropteran bat survey sites is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.4 Koala spot assessments

Spot assessment technique (SAT) was undertaken within the subject land to identify the presence of koala usage within native vegetation in accordance with the *Koala* (*Phascolarctos cinereus*): *Biodiversity Assessment Method Survey Guide* (DPE 2022d). As well as identifying presence, the SAT also has the potential to identify local koala tree species preferences, by measuring the rate at which each species is utilised by koalas.

To initiate the SAT, a centre tree of any species was located and marked. Moving outward from the centre tree, a minimum of 29 surrounding trees were systematically searched for koala faecal pellets. A radial search area of 1 metre around the base of each tree was inspected for a minimum of 2 minutes/tree. Initial inspection of undisturbed ground cover was followed by disturbance of the ground cover as required.

If koala was recorded, then activity usage for each SAT was expressed as the percentage equivalent of the proportion of the surveyed trees within each SAT. The percentage was then compared to prescribed ranges for activity levels for koalas within NSW (Phillips and Callaghan 2011).

One hundred and forty-four Koala SAT's, 75 hours of spotlighting surveys and 158 Koala call-playbacks were undertaken across the subject land. The location of SAT sites is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.5 Koala thermal drone survey

Surveys utilising thermal camera equipped drones were conducted between 26 August 2024 and 7 September 2024, 9 October and 11 October, as well as 14 October and 18 October. The surveys were in accordance with the methodology described in *Koala* (*Phascolarctos cinereus*): *Biodiversity Assessment Method Survey Guide* (DPE 2022d) to all areas of the alignment accessible within Olney, Watagan, Corrabare and Pokolbin State forests, including the Lovell and Cedar Creek properties. Surveys occurred at night between 9 pm and 6 am where daily minimum temperatures were expected to be ≤18°C. A DJI Matrice 30T drone was used for the surveys.

The drone was flown along a pre-programmed flight path in a lawn mower pattern which consisted of parallel linear transects spaced 50 metres apart at a constant height of 65 metres and a maximum speed of 8m/s. For sites where koala was not detected, a repeat survey was conducted the following night, such that all sites were surveyed twice.

Where thermal signatures were identified, an attached CZI LP12 searchlight was toggled on, and camera mode switched to zoom to allow for visual identification of animal from colour footage. Both thermal and zoom video footage are simultaneously recorded and stored for each detection. If necessary to gain a better view of a detection the drone was lowered to a distance >20 metres from the detection to reduce disturbance. The location of koala drone surveys is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.6 Herpetofauna active searches

Herpetofauna active searches were undertaken both diurnally and nocturnally, as both focused and opportunistic surveys. Diurnal reptile searches followed *Threatened Reptiles Biodiversity Assessment Method Survey Guide* (DPE 2022c) and involved walking slowly (2 kilometres/h) through suitable habitat, searching visually for active individuals while stopping, and waiting quietly at intervals (10 min) to observe moving and basking individuals. Searches for non-active individuals involved turning over suitable ground shelter including appropriately sized rocks (e.g. pink-tailed legless lizard, striped legless lizard and the newly described Hunter Valley delma (*Delma vescolineata*)) as well as crevice inspection with a torch. Species-specific survey requirements included searches for non-active individuals while the temperature was below 25°C, with the flipping of a minimum of 200 rocks per 5 hectares of suitable habitat (e.g. for Pink-tailed Legless Lizard). Sun-exposed sandstone rocks, as well as other suitable cover atop sandstone outcrops were searched for broad-headed snake, alongside sandstone crevice checks with a torch. Other searched shelter materials included fallen timber and sheets of iron, as well as the gentle raking of loose surface material and peeling of decorticating bark, with all material returned to original position where possible.

Nocturnal amphibian and reptile surveys followed *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020b) and *Threatened Reptiles Biodiversity Assessment Method Survey Guide* (DPE 2022c). Surveys involved spotlight search for eyeshine or observable movement, and nocturnal road surveys to detect active reptiles. Spotlighting surveys were completed over 500 metre transects in identified breeding habitat impacted by the project. The surveys commenced on ridgetops and worked downstream along, around, or through suitable waterbodies or other suitable habitat, for a minimum of 120 minutes per night and repeated for a minimum of 4 consecutive nights. Nocturnal road surveys were conducted along roads and access tracks in suitable habitat for *Hoplocephalus stephensii*, with minimum survey effort defined as 120 minutes per person, for 4 nights.

Following consultation with CPHR, the survey for target species combined *Litoria littlejohni* surveys with *Mixophyes spp.* and *Heleioporus sp*. Specifically, these surveys sampled all impacted watercourses and acknowledging differences between the species preferred habitats by commencing active searches on the ridges and then moved downslope to the highest order creeks (first to fourth order). Where appropriate tadpole surveys were also undertaken for targeted species such as *Litoria littlejohni*. Additional surveys for Red-crowned Toadlets and *Heleioporus s*p were undertaken in areas of impacted suitable ephemeral habitats upslope of drainage lines.

Areas smaller than 500 metres were searched in accordance with guidelines, and any documented species-specific guidelines were also adhered to (DPIE 2020). Searches were focused on species-specific habitat features including large live trees with hollows and shedding bark which are potentially used for nocturnal foraging (e.g. broad-headed snake and pale-headed snake) (DPE 2022c) or around specific waterbodies including slow flowing streams or pools (e.g. Giant Burrowing Frog). As the target amphibian species demonstrate reduced detectability aurally, aural recognition of calls was combined with observation within aural-visual surveys. Identification was therefore either aural (amphibians) or visual with the collection and identification of specimens where necessary.

Ninety-six hours of active herpetofauna searches, 276 person-hours of spotlighting surveys and 448 person-hours of frog surveys have been undertaken across the subject land. The location of active herpetofauna searches is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.7 Herpetofauna artificial habitat surveys

Artificial cover, in the form of roof tiles, was used for targeted herpetofauna searches for Hunter Valley delma (*Delma vescolineata*) and Striped Legless Lizard (*Delma impar*). Hunter Valley delma is a newly described species, and as such it has not yet been recognised by NSW legislation and is lacking species-specific survey guidelines. The current TBDC advice is that *Delma vescolineata* be identified and assessed as *Delma impar* until a formal assessment of Hunter Valley delma is available (DEH 2024).

These surveys include the placement of tile grids of 10 x 5 tiles (5 metres spacing between tiles) 3 months prior to survey inspections, within areas of suitable habitat. Tile grids need to be in place at least 1 month prior to survey (DEH 2024) and then checked weekly for 8 weeks, or daily for 10 days (DPE 2022c). Tile checks involved turning each tile over, at temperatures less than 28°C, to allow visual observation (and capture where required) of the species, as well as the collection of any sloughed/shed skin for potential identification. A shorter survey period for this species was observed at several sites in association with the subject land, as the species was identified early on in multiple artificial habitat grids, and excessive checking of tiles can cause site abandonment (DEH 2024).

Ten artificial habitat grids were laid out across the subject land to find the target species *Delma vescolineata* and *Delma impar.* Each tile grid was checked weekly, and where the target species was positively identified, the survey ceased early to avoid unnecessary disturbance. The location of artificial habitat grids is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.8 Spotlighting and stag watches

Spotlighting was used to target threatened nocturnal arboreal, flying, and ground-dwelling species. Spotlighting was completed after dusk, generally following targeted stag watches or nocturnal call playback sessions and was undertaken for at least 1 hour at each survey spot. Surveys were completed on foot using high-powered headlamps and hand torches. Sighted animals were identified to the species level.

Stag watches were undertaken at dusk in areas where hollow-bearing trees were identified within the subject land. The aim of dusk stag watches was to identify hollow dwelling fauna including large forest owls (e.g. Barking Owl, Masked Owl, Sooty Owl and Powerful Owl), Microchiropteran bats (e.g. Corben's Long-eared Bat) and mammals (e.g. Greater Glider, Squirrel Glider) that were utilising any hollow-bearing trees within the subject land for denning and breeding purposes. Following stag watches, spotlighting transects were also undertaken near known hollow-bearing trees.

Seventy-five spotlighting surveys and 11 stag watches were undertaken across the subject land. The location of spotlighting and stag watch survey sites is shown Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.9 Call playback

Nocturnal call playback was undertaken, within appropriate habitat, to survey for nocturnal birds (e.g. large forest owls and bush stone-curlew), and arboreal mammals (e.g. Koala and Squirrel Glider). Surveys followed the recommended guidelines in *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC 2004). For each survey, an initial listening period of 10 to 15 minutes was undertaken. The calls of the target species were then played intermittently for 5 minutes followed by another 10 minute listening period. Upon completion of the second listening period, 10 minutes of spotlighting surveys in the vicinity were undertaken to determine if any specimens were attracted by the calls, without vocalising in return. Calls from Stewart and Pennay were broadcast using a portable media player and megaphone or speaker.

The survey guidelines for large forest owls (Powerful Owl, Masked Owl, Barking Owl, and Sooty Owl) have changed multiple times over the course of the surveys associated with this project since 2023. Initial surveys focused on areas of high-density potential breeding habitat with consideration of the previous species survey guidance in *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC 2004). The revised current guidelines for the large forest owls increased the required number of replication call playback at a site from 4 to 6 nights and changed the survey period for these species from winter to all year, outlined in Table 2.10.

Table 2.10 Changes in the timing of large forest owl survey periods during 2024

Scientific name	Common name	Initial months of survey	Updated months of survey (March 2024)	Current months of survey (October 2024)
Ninox connivens	Barking Owl	May – December	January – August	January – December
Tyto novaehollandiae	Masked Owl	May – August	January – August	January – December
Ninox strenua	Powerful Owl	May – August	January – August	January – December
Tyto tenebricosa	Sooty Owl	April – August	January – August	January – December

As a result of these changes, additional surveys were added to bring the majority of the large forest owl survey sites up to 6 nights of survey (see Figure 14.7e).

In accordance with the current guidelines, in areas greater than 1000 hectares of habitat, call playback may be spaced approximately every 1500 metres to evenly cover suitable habitat for large forest owls (DEH 2024). The projects even coverage for large forest owl surveys within the subject land can be seen in Figure 14.7e.

The survey methodology implemented has exceeded the minimum sampling density within the TBDC by:

- exceeding the minimum sampling threshold of 10 station per 1000 hectare by undertaking 47 separate survey stations, including at least 19 stations with a minimum of 6 nights and a further 30 locations at fewer than the 6 nights minimum survey requirements
- distributing evenly to cover the majority of suitable habitat
- exceeding the minimum guideline of sampling area ratio of 1:225 hectares, having sampled at a 1:70 ha at 6 nights and 1:25 hectares across all stations
- completing a total of >250 individual nights of surveys across all stations.

Gaps in coverage exist in Hunter Valley Operations (HVO) owned land where reliance on recent survey effort for the HVO continuation project included large forest owl surveys undertaken across the HVO property, in which no large forest owls were detected despite targeted survey for Powerful Owl, Barking Owl and Masked Owl (Umwelt 2022).

The location of call playback survey sites is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.10 Remote camera

Remote motion sensing infra-red and white-flash cameras were used as a survey method, in place of terrestrial and arboreal traps, due to increased potential for fauna to be attracted to baited traps with a high likelihood of the specimen being photographed (unharmed), as compared to the less successful and more dangerous traditional trapping methods. Should a cryptic animal species appear similar to a target species, but not be clearly identified by camera, the species could then be further targeted with traps at the specific locations where they had been recorded.

Remote camera traps were set in trees and large shrubs (at minimum heights of 1.5–2 metres) with a suitable baited food source used to entice target species e.g. bait containing either raw chicken necks and sardines (e.g. Brush-tailed Phascogale) or a mix of rolled oats, peanut butter, honey and vanilla essence (e.g. Eastern Pygmy-possum, Greater Glider and Squirrel Glider) within the appropriate microhabitat. The tree on which bait canisters were placed (on arboreal camera trap lines), were also sprayed with a honey and water mixture to further entice fauna to the baited tree to trigger the camera traps. Baits, and the honey-water spray (where applicable), were refreshed at the half-way point of camera trap deployment.

Baited cameras at lower heights were also used to target terrestrial species occurring within specific target sites (e.g. Brush-tailed Rock-wallaby – see section 2.4.3.13 for additional discussion).

Baited white-flash cameras were also utilised in terrestrial lines as a preliminary survey to target Common Planigale (*Planigale maculata*). These cameras were fitted with a lens from standard magnifying spectacles (to reduce the focal length of the camera) and deployed low to the ground. The reduced focal length improves image quality and results in a closer capture of the target, an approach that was identified in research by Meek and Cook (2022) and was employed on HTP to assist in common planigale detection.

Remote camera surveys were undertaken with a total of 34 terrestrial sites and 31 arboreal sites, resulting in 10,622 trap nights across the subject land. The location of remote camera survey sites is shown in Figure 14.7 with survey periods outlined in Table 2.17.

2.4.3.11 Scat searches

Detailed scat searches were undertaken through all suitable habitat for Brush-tailed Rock-wallaby (*Petrogale penicillata*). Scat searches focused on areas of suitable habitat (rocky areas including rocky escarpments, gorges, outcrops or cliffs) within associated PCTs. Potential scats were collected for more detailed investigation.

A total of 40 person-hours of targeted scat searches were undertaken for Brush-tailed Rock-wallaby across the subject land.

2.4.3.12 Opportunistic sightings

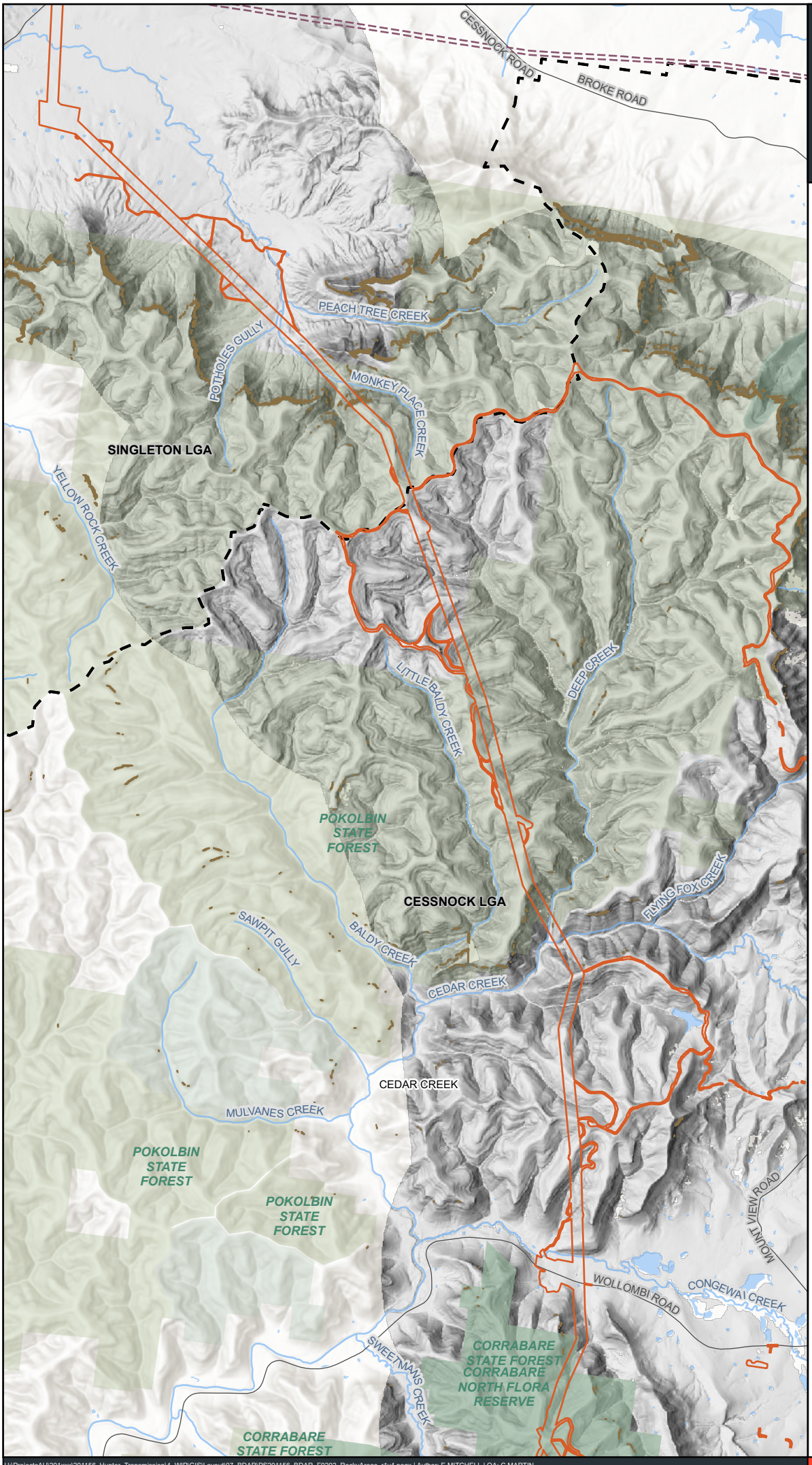
Opportunistic fauna sightings were recorded including birds, mammals, frogs, and reptiles throughout all survey periods. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc., were also noted. This provided indirect information on animal presence and activity.

2.4.3.13 Rocky dependent fauna habitat identification

All field based rocky habitat surveys for target rock and cave dependent fauna species credit species were based on desktop analysis of hillshade mapping of the mountainous terrain. Target species included Brush-tailed Rock-wallaby, Broad-headed Snake, Little Bent-winged Bat, Large Bent-winged Bat, Large-eared Pied Bat and Eastern Cave Bat. The surveys also investigated roosting and supplementary potential nesting habitat for Sooty Owl, and to a lesser extent Masked Owl.

Hillshade mapping uses LiDAR point data filtered to ground classification and interpolated to 2 metres resolution (for full extent) or 50 centimetres resolution (for focus areas) to create a digital terrain model (DTM). The sun can be set at select Azimuth angled levels in the sky to accentuate the shaded terrain. A hillshade mapping outcome is fundamentally stripping the landscape of vegetation and depicting it in a greyscale, likened to a lunar terrain view. An example of a hillshade snapshot within the biodiversity study area is shown in Figure 2.2. This layer is also incorporated into field GPS software to investigate the appropriate rock areas in the field, particularly the steepest edges likely to support caves and shelters.

The hillshade layer provided on Figure 2.2 at 2 metres resolution was also provided on a web-mapping application for field staff to individually assess the surface topography in detail by desktop analysis prior to field based investigations.



Hunter Transmission Project
Biodiversity Development Assessment Report

Figure 2.2
Rocky areas overview
Pokolbin State Forest
Page 1 of 3

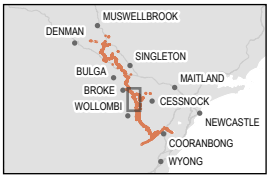
Legend

- Biodiversity study area

Existing environment

- Road
- 330 kV transmission line
- Named watercourse
- Waterbody
- NPWS reserve
- Flora reserve
- State forest
- Local government area
- Slope ≥50°

Note: This figure (comprising of 3 pages) only accounts for the mountainous portion of the subject area, for habitat considerations to rocky area dependent subject fauna species.



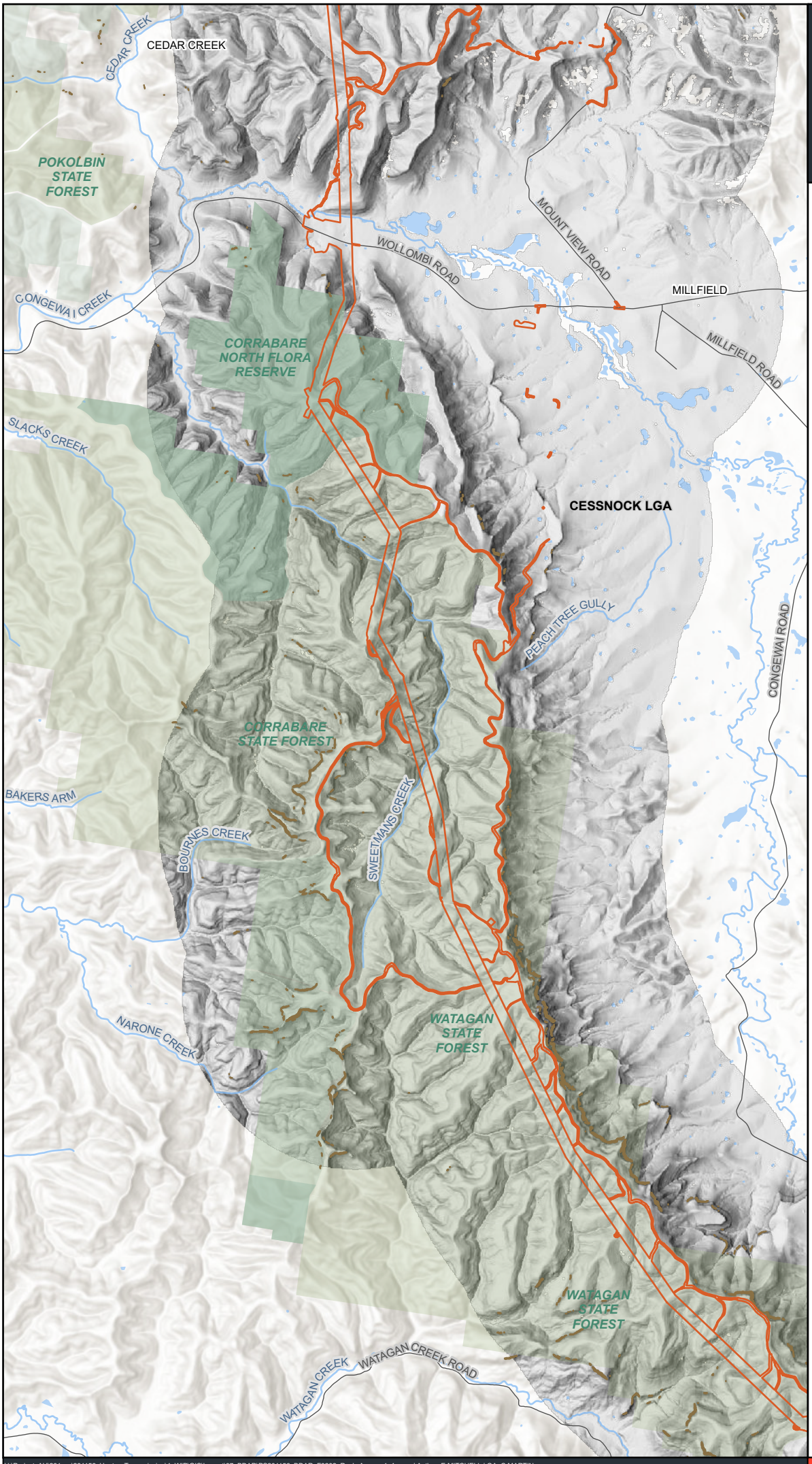
0 1 2
Kilometres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A4

GDA 2020 1:65,000 Date: 14/07/2025

Data sources: EMM, Beca, Geoscience Australia, NSW State Government, WSP
World Hillshade: Esri, Geoscience Australia, NASA, NGA, USGS

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Hunter Transmission Project Biodiversity Development Assessment Report

Figure 2.2
Rocky areas overview
Corrabare State Forest
Page 2 of 3

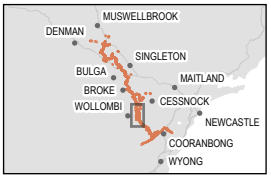
Legend

- Biodiversity study area

Existing environment

- Road
- Named watercourse
- Waterbody
- NPWS reserve
- Flora reserve
- State forest
- Local government area
- Slope ≥50°

Note: This figure (comprising of 3 pages) only accounts for the mountainous portion of the subject area, for habitat considerations to rocky area dependent subject fauna species.



0 1 2
Kilometres

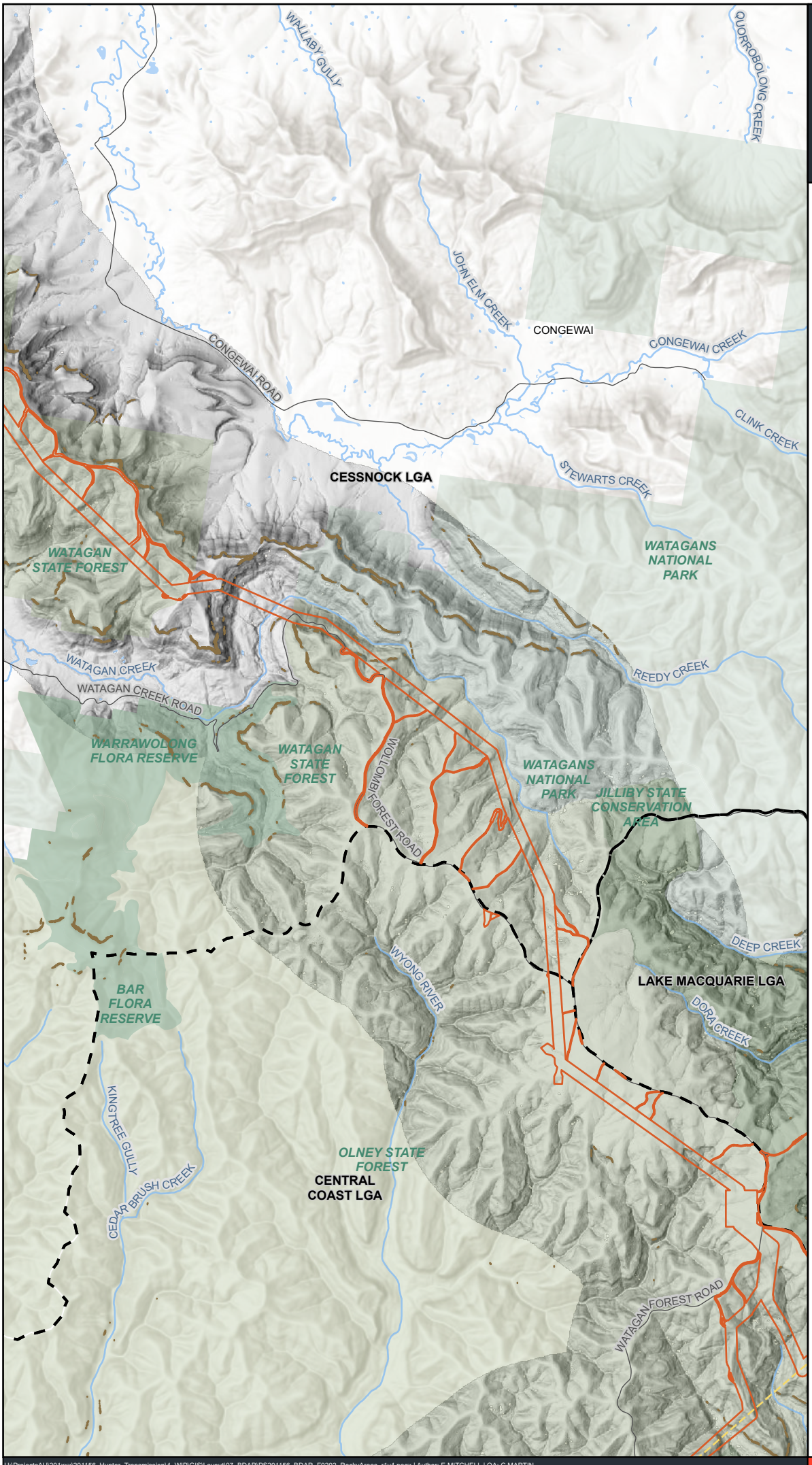
Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A4

GDA 2020

1:65,000 Date: 14/07/2025

Data sources: EMM, Beca, Geoscience Australia, NSW State Government, WSP
World Hillshade: Esri, Geoscience Australia, NASA, NGA, USGS

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Hunter Transmission Project
Biodiversity Development Assessment Report

Figure 2.2
Rocky areas overview
Watagans State Forest
Page 3 of 3

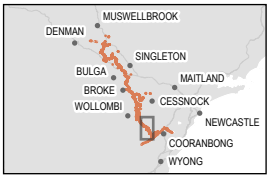
Legend

- Biodiversity study area

Existing environment

- Road
- 500 kV transmission line
- Named watercourse
- Waterbody
- NPWS reserve
- State conservation area
- Flora reserve
- State forest
- Local government area
- Slope ≥50°

Note: This figure (comprising of 3 pages) only accounts for the mountainous portion of the subject area, for habitat considerations to rocky area dependent subject fauna species.



0 1 2
Kilometres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A4

GDA 2020 1:65,000 Date: 14/07/2025

Data sources: EMM, Beca, Geoscience Australia, NSW State Government, WSP
World Hillshade: Esri, Geoscience Australia, NASA, NGA, USGS

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Rocky area dependent subject fauna species that incorporated prior investigations and field based navigational use of the hillshade layer are described below:

Broad-headed Snake

BAM guidelines

Undertake habitat surveys in suitable habitat. This involves:

- turning over sun-exposed sandstone rocks lying on rock substrates
- turning over logs and bark, located on top of sandstone outcrops
- inspecting crevices within the outcrops using a torch.

Care is required when returning rocks to their original position. Conduct habitat surveys in dry weather only, to minimise damage to sandstone and for the safety of surveyors. Surveys involving turning rocks should not be undertaken on hot days when individuals will retreat into deep crevices and hollows for protection (Webb and Shine 1998).

Undertake spotlight surveys in summer over 4 consecutive nights. In these conditions, the target species may have moved from the rock outcrops into adjacent areas of eucalypts (Webb and Shine 1997a,b). Conduct surveys along 500 metre transects, focusing on large trees with multiple hollows within 500 metre of adjacent sandstone outcrops. Observe for foraging snakes on the trunks, in hollows and on the ground. Additional survey effort may be required where rock outcrops are extensive and/or hollow bearing trees numerous. This must be documented and justified in the biodiversity assessment report.

EPBC guidelines

Most records for this species have been obtained by searching suitable sheltering sites (under rocks or in crevices) on westerly-facing sandstone cliffs by day during winter (Webb and Shine 1997b). The effect of disturbance to sandstone exfoliations by active searching that involves lifting are not yet clear, but it is generally perceived that breakage or inappropriate replacement of rocks could affect their suitability as sheltering sites. For these reasons, searching appropriate sheltering sites with torches during winter to detect the presence of the species in an area is recommended. Searching rock outcrops by day will only sample a subset of rocky sheltering sites; in particular deep crevices will not be thoroughly examined.

Project approach

The *Threatened Reptiles BAM Survey Guide* states that suitable habitat for the Broad-head Snake are rocky areas, including escarpments, outcrops and pagodas within the Sydney Sandstone geologies within PCTs associated with the species in the TBDC.

Any recordings within the subject land would be regarded as an extension of the species currently known range. PCTs within the subject land were verified prior to fauna fieldwork commencing. The PCTs identified within the subject land that are associated with Broad-headed Snake include 3041, 3489, 3599, 3617, 3620 and 3621.

The extent of the subject land where associated PCTs for Broad-headed Snake were analysed for topography containing the microhabitat conditions for the species. Hillshade images of each of these PCT locations were then used to assist in assessing the alignment for significant features in the terrain where rocky outcrops were present, either within the PCT itself or within 100 metres.

Where habitat, containing rocky habitats were identified, then these areas were each subject to commencement of target surveys in accordance with the required effort under BAM.

An area towards the northern end of Crumps Road in Corrabare State Forest was a focus point for the surveys and proved to be the most suitable habitat present for the Broad-headed Snake within the alignment. Multiple less suitable sites with associated PCTs were also surveyed during late September for due diligence. Some areas with associated vegetation were discounted from survey upon on ground assessment due to lack of suitable rocky features described to provide the microhabitat requirements needed for this species.

Locations where large rock habitat was embedded in the ground and no exfoliated rock on rock habitat occurred were ruled out for use, these generally also being more vegetated southern facing slopes where rock exposure to heating from the sun, particularly in non-summer months, was somewhat limited.

One location North of Wollombi Road and Congewai Creek that was opportunistically found to contain rocky habitat outside of associated PCT areas, was surveyed by rock turning habitat searches. Other similar potentially suitable habitat locations were seen during cave and rock habitat searches for microbats and Brush-tailed Rock-wallaby. Liftable flat rocks observed on underlying rock were also opportunistically turned when encountered, however not to the extent of a full single search area effort.

Eighty-three active herpetofauna searches and 191 spotlighting surveys have been undertaken across the subject land. The location of active herpetofauna searches is shown in Figure 14.7b.

Brush-tailed Rock-wallaby

BAM guidelines

There are no BAM guidelines, but the default is for use of the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC 2004) which only refer to sand plots, track searches and searches for scats.

EPBC survey guidelines

On the basis of previous surveys, the following survey techniques are recommended to detect the presence of the Brush-tailed Rock-wallaby in areas up to 5 hectares in size:

- daytime searches for potentially suitable habitat resources, such as shelters sites (caves, rock boulders and rock ledges) in suitable boulder pile, escarpment and cliff-line habitats (description of the survey technique and recommended effort is outlined in section 3.3.11 of the guidelines)
- daytime searches for signs of activity, including tracks, scats and rock shelters worn smooth from resting (description of the survey technique and recommended effort is outlined in section 3.3.11 of the guidelines)
- possibly the collection of predator scats, owl casts or remains, targeting predatory bird and mammal nests and dens (description of the survey technique and recommended effort is outlined in section 3.2.3 of the guidelines)
- baited camera traps may be of use in confirming the presence and identity of rock wallabies (description of the survey technique and recommended effort is outlined in section 3.3.6 of the guidelines)
- baited camera traps may be of use in confirming the presence and identity of rock wallabies (description of the survey technique and recommended effort is outlined in section 3.3.6 of the guidelines)
- observations for rock wallabies basking during the day, or becoming active at dusk, using binoculars from a location on the ground beneath suitable habitat or possibly from a helicopter according to the suggested survey technique and effort provided in section 3.3.11 of the guidelines (minimising disturbance to animals to make sure wallabies do not fall).

Project approach

The habitat constraint for Brush-tailed Rock-wallaby stated in the TBDC are rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines. The National Recovery Plan (Menkhorst and Hynes 2010) states that habitat includes refuge habitat, feeding habitat, and routes in between. Refuge habitat includes rock faces or outcrops with large tumbled boulders, ledges and caves (often with vegetation cover) that provide shelter and some protection from predators. Preferred rocky habitat consists of 3 major types (Short 1982):

- loose piles of large boulders containing a maze of subterranean holes and passageways
- cliffs with many mid-level ledges and with some caves and/or ledges covered by overhangs
- isolated rock stacks, usually sheer-sided and often girdled with fallen boulders.

Rock refuges are usually on a steep slope (e.g. cliff lines, river banks, gorges, outcrops from hillsides, plateau edges). Extent of occupied refuge habitat may not be large, with some colonies persisting in refuge habitat that is less than 50 metres long and 20 metres high, although some large colonies occupy refuge habitat that is continuous for many hundreds of metres along cliff lines (Short 1982; Bayne 1994; Murray 2002; Waldegrave-Knight 2002; P. Jarman pers. obs. 2007). Most refuge sites have areas that receive sunlight for much of the day. Preferred refuge sites in East Gippsland had more than 1 entrance, several ledges, a northerly or easterly aspect, and occurred within a large area of rocky slope where the general slope was greater than 45° (Waldegrave-Knight 2002). With this considered, 'refuge' habitat is key to supporting colonies.

The adopted survey methodology for the project incorporated a 3-stage approach to identify presence and inform colony activity and use.

1 Stage 1 identified through desktop analysis areas of cliff, cave and rocky habitats. This analysis combined spatial analysis using hillshade, LIDAR and topographical analysis.
2 Stage 2 Systematic fecal pellet surveys by ecologists experienced with the species in areas of identified potentially suitable habitats in Stage 1.
3 Stage 3 placement of time lapse cameras traps in areas of identified occupied use, fecal pellet and/or high potential habitats to confirm presence and colony activity type.

The results of the 3-stage survey is provided in Figure 14.7d.

Stage 1 – Desktop analysis

Mapping was undertaken that identified:

- locations where the land is subject to >50° slopes created using the 5 metre slope data from the NSW Elevation Data Service. Downloaded metadata tiles are overlaid on the subject land and isolated to only show >50°, then converted to polygons. Riverbank or mining surface slopes were removed from the complete alignment. This was sourced to provide the first major consideration when prioritising search and camera trapping survey areas
- where associated PCTs were located (not however considered as a priority, in order to prevent limiting the investigation for the species presence where PCTs were not represented across otherwise good rocky habitats)
- a zoom in snapshot aerial hillshade image of each of the locations where habitat was found to be either 1) filtered to indicated >50° slope for the majority of associated rocky escarpments, gorges present, steep slopes, larger boulder piles, rock outcrops or cliff lines, or 2) otherwise where closer hillshade investigations found more discrete rocky boulders and clusters likely to support potential refuge habitat
- previous records sourced off BioNet, use simply as a guide for identifying potential trends
- with permission, previous records of the species in a portion of subject land within the Watagan State Forest (Corey Mead pers com 2024).

Stage 2 – Habitat verification and fecal pellet surveys

Fecal pellet searches were also undertaken by an experienced fauna ecologist at camera transects that recorded Brush-tailed Rock-wallaby on camera at the initial high potential survey locations. These were confirmed as belonging to Brush-tailed Rock-Wallaby and then used as a reference collection for any other scats collected elsewhere in rocky habitats.

On ground searches for individuals and signs of activity were also undertaken at other identified rocky areas in between those selected for camera survey to supplement Brush-tailed Rock-wallaby surveys. These were undertaken by the same experienced Brush-tailed Rock-wallaby ecologist whilst also searching for microbat roosting habitat in these steep rocky areas.

Consideration was afforded of other signs of activity such as prints in sandy based caves/overhangs, somewhat distinct runways between rock shelters, urine scent in high use shelters and scats placed at distinctive locations on rock edges providing outlook vantage points.

Stage 3 – Camera deployment

The refuge locations along the subject area within 200 metres proximity to proposed transmission line towers were collectively identified in order of potential. Both the most northern extents of Pokolbin State Forest and Watagan State Forest were identified as the locations most likely to support colonies, being the most heavily eroded and exposed escarpments and also being proximate to other historical adjacent records, particularly to the west of these.

These 2 abovementioned sites were first prioritised for surveillance camera deployments. Then cameras were also deployed at equally spaced intervals in areas identified in Stage 2 as supporting potential use (confirmed fecal pellet etc).

Camera placement accounted for approximately every 2–5 proposed transmission line towers along the entire mountainous portion of the subject area, on vantage points located close to most potential heavier rocky areas.

Cameras in rock areas were set in transects of 6–10 traps that ran mostly along the identified rock area habitat (in good habitat areas) as well as down the mountain slope from (or through) rocky areas. Individual traps were placed between 50–150 metres apart pending habitat. A baited cannister of peanut butter, rolled oats and honey was placed on the ground approximately 2–3 metres in front of each camera as a lure. Cameras had default factory settings of focal depth between 2.5 metres and infinity.

Surveillance cameras used were Reconyx HP2X second generation (Hyperfire 2) set to take a series of 10 images for each trigger event. There was no restricted schedule or delay period set. Internal batteries were used and cameras were deployed for a minimum of 3 weeks (4 weeks for some) at key points in the landscape where clear runways, scats at rock outlook vantage points and/or mountain pass trails existed to get the highest potential for activity.

Active habitat searches and eleven sites with a total of 10,632 trap nights remote camera surveys were undertaken at across the biodiversity study area. The location of remote camera survey sites is shown in Figure 14.7. Surveys have been undertaken across the biodiversity study area. The location of active searches is shown in Figure 14.7c.

Subterranean Microbats – Eastern Cave Bat, Large Bent-winged Bat, Large-eared Pied Bat and Little Bent-winged Bat

BAM guidelines

The BAM guidelines for surveying threatened bat species are out lined in *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021). The relevant survey effort for each candidate species is as outlined in Table 2.11 to Table 2.14.

Table 2.11 BAM survey guidelines for Eastern Cave Bat

Site	**Per ≤50 hectares of potential habitat**		
Survey method	**Survey period**	**Total effort**	**Min. no. of nights**
Harp trap or mist net	November – end of Jan.	16	4
Roost searches (artificial structures)	November – end of Jan.	1 per structure	N/A
Acoustic detection	November – end of Jan.	16	4
Radio tracking/roost search	November – end of Jan.	As required	N/A

Table 2.12 BAM survey guidelines for Large Bent-winged Bat

Site	**Per cave/mine/tunnel**		
Survey method	**Survey period**	**Total effort**	**Min. no. of nights**
Harp trap	December – February	8	4

Table 2.13 BAM survey guidelines for Large-eared Pied Bat

Site	Per ≤50 hectares of potential habitat		
Survey method	**Survey period**	**Total effort**	**Min. no. of nights**
Harp trap or mist net	Mid Nov – end of Jan	16	4
Passive acoustic detection	Mid Nov – end of Jan	16	4
Radio tracking or roost search	Mid Nov – end of Jan	As required	Supplementary

Table 2.14 BAM survey guidelines for Little Bent-winged Bat

Site	Per cave/mine/tunnel		
Survey method	**Survey period**	**Total effort**	**Min. no. of nights**
Harp trap	December – February	8	4

Project approach

These 4 microbat species credit species are all dependent on rocky areas for breeding habitat. Large-eared Pied Bat and Eastern Cave Bat are also relevant candidate SAII species for breeding habitat consideration. For all 4 species, breeding habitat must be identified under the BAM, and as guided by *''Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021) is defined as:

- within 100 metres of caves, scarps, cliffs, rock overhangs and disused mines (for Large-eared Pied Bat and Eastern Cave Bat); and
- caves, tunnels, mines or other structures known or suspected to be used (by Little Bent-winged Bat and Large Bent-winged Bat).

Preliminary investigations of the subject land, particularly in the lowland valley areas surrounding existing coal mines located north of the ranges, has revealed that no constructed tunnels or subterranean mines exist. Thus, for the 4 subterranean breeding microbats under consideration here, it is the remaining rocky mountainous areas that required detailed investigation for potential breeding use.

Furthermore, Bent-wing Bats maternity roosting caves are rare, with the literature identifying only 5 known breeding locations in Australia (Churchill 2008; Strahan and Van Dyck 2010). These species breed in large colonies within caves with very specific temperature and humidity regimes that are not present within the geology of the subject land.

The mountainous terrain in the southern half of the subject land is predominantly Narrabeen Group geology, and Hawkesbury Sandstone in the far southern extents. These are both comprised of underlying hardened quartzose sandstone layers amongst conglomerate, mudstone, siltstone and coal seams, which have become exposed from uplift and erosion. The hardened sandstone layers remain well exposed amongst the retreating finer sediments and these layers of similar ages are clearly evident and can be followed on the hillshade terrain mapping.

This hillshade mapping was critical in determining all locations where potential rocky area breeding locations for microbats exist. This complete mountainous extent of the subject area has been specifically applied to subterranean microbat habitat assessments.

The SAII buffer consideration from direct impact proposed transmission line tower locations is 100 metres, as this is the considered extent of breeding habitat from rocky areas for the species. Given the various rocky area formations throughout the subject land, careful selection of appropriate trapping locations (to determine breeding activity) within 100 metres of proposed transmission line tower placements was required. Most of these rocky areas through the biodiversity study area are, in-fact, not weathered enough to support suitable caves, overhangs and crevices for breeding potential. It is recognised that of these 4 microbat species, the smaller Eastern Cave Bat are known to occupy smaller and sometimes discrete crevices within shallow and often well-lit overhangs and caves.

Nonetheless, breeding caves and overhangs supporting Eastern Cave Bat breeding colonies typically contain between 50–240 individuals, these are not discrete and persist throughout the breeding period.

Both species are quite mobile with Eastern Cave Bat known to occupy smaller satellite roosts away from the maternity cave during the breeding period, and more notably Large-eared Pied Bat have recently been found to periodically relocate the breeding colony to different cave roosts along the breeding escarpment (pers com by PhD researcher on both species Lachlan McRae 2024). Use of smaller crevices by single individuals and small groups do occur, but these are however generally in the presence of more obvious and more suitable caves and overhangs. Particularly those supporting clustered maternity colonies.

Roosting and particularly breeding activity of small caves and overhangs is therefore well evident where these are accessible, indicated by the faecal (guano) droppings deposited below roosting points, even if individuals are not present at this time. Surveyors that spend countless hours searching for roosting along rocky escarpment habitat activity become familiar with preferences based on these observations.

It is recognised that not all potential roosting locations along an escarpment may be accessible or subject to inspections, but often all of them are. To further identify locations of potential breeding habitats for targeted Harp trapping, the habitat assessment process incorporated ultrasonic recording over a minimum of 3 consecutive nights as a precaution, in the locations where:

1. All potential roosting opportunities we not accessible for close inspections
2. Where only a small amount of roosting (likely resting/feeding) activity is observed; and/or
3. Where such activity was found to occur at least at 1 location where all potential roosting opportunities were thoroughly observed. Even when suspected of not being of importance.

In these locations, where there were more than 10 recorded passes of Large-eared Pied Bat and Eastern Cave Bat (which cannot be distinguished from the non-threatened Little Forest Bat in this part of the State) in a single night secondary harp trapping was deployed for presence of breeding individuals in accordance with the BAM guidelines or otherwise assumed to be breeding escarpments. Sites identified with no potential breeding habitat following thorough observations, were removed from further assessment and consideration of breeding habitat. And sites where considerable roosting activity was evident, observed or suspected, were trapped as a first priority.

This process commenced with a careful scan of the hillshade landscape within 100 metres of proposed transmission line towers for any potential rock escarpment edges that may contain roosting. All of these locations were visited for closer inspections prior to the breeding period. These inspections included a rigorous search of the full escarpment edge for any caves and overhangs, and subsequent thorough searches inside, where possible, of signs of roosting.

A total of 20 potential subterranean cave locations potentially suitable for breeding activity of microbats were identified through spatial analysis identified above (see Figure 14.7d). Each potential location was subject to field verification roost inspections to confirm likelihood and or the need for further targeted surveys for breeding activity. Where roost inspections confirmed presence, evidence and/or suitable potential for breeding, further surveys were undertaken either through ultrasonic sampling and or harp trapping. A summary of the results of surveys for potential breeding habitats is provided in Table 2.15.

Table 2.15 Summary of survey and breeding activity of microbats

Allocated Survey Site Number in Figure 14.7d	Coordinates (GDA20z56)		Ultrasonic	Trapping	Habitat comments	Trapping/ultrasonic results	Breeding species polygon
	Easting	Northing					
1	330618.2549	6371556.1348	x	✓	Various roosting opportunities recorded, including signs of diurnal roosting.	**Trapping results**: Breeding colony of *Chalinolobus dwyeri* recorded (17 individuals, including lactating females at cave entry).	*Chalinolobus dwyeri*
2	331065.2825	6370932.8569	✓	x	Small straight cliff edge with isolated small pockets not considered potential for diurnal roosting along escarpment.	**Ultrasonic results**: Limited activity – 4 definite *Chalinolobus dwyeri* passes and 8 possible *Vespadelus troughtoni* sequences on 20/12/24.	–
3	331408.1037	6369961.3663	✓	x	Some shallow overhangs in escarpment however considered unsuitable for diurnal roosting.	**Ultrasonic results**: Limited activity – 5 definite *Chalinolobus dwyeri* passes & 5 possible *Vespadelus troughtoni* sequences on 20/12/24.	–
4	331697.9529	6369139.9884	x	x	Shallow overhang present but no signs of use and no potential for diurnal roosting.	–	–
5	332159.7175	6367831.4346	✓	x	Complete escarpment could be viewed by binoculars from side vantage point. Considered unsuitable for diurnal roosting due to absence of caves or overhangs.	**Ultrasonic results**: Limited activity – 3 definite *Chalinolobus dwyeri* passes & 10 possible *Vespadelus troughtoni* passes (2 before 9 pm) on 18/11/24.	–

Allocated Survey Site Number in Figure 14.7d	Coordinates (GDA20z56)		Ultrasonic	Trapping	Habitat comments	Trapping/ultrasonic results	Breeding species polygon
	Easting	Northing					
6	332756.6799	6365518.9432	✓	✓	Several shallow overhangs present, 1 with diurnal roosting suitability and small signs of use but not considered likely to be used for breeding.	**Ultrasonic results**: 17 definite *Chalinolobus dwyeri* passes and 84 possible *Vespadelus troughtoni* passes on 18/11/24. **Trapping results**: No *Chalinolobus dwyeri* or *Vespadelus troughtoni* captures. Numerous *Vespadelus vulturnus* captures, suggesting that the possible *V. troughtoni* calls in this area may instead be *V. vulturnus*, which overlap in frequency and are almost impossible to distinguish by ultrasonic analysis alone.	–
7	333394.3815	6364368.9407	NA	NA	Private lands, no current access.	–	Assumed breeding for *Chalinolobus dwyeri.* Exclude breeding for other species due to absence of any breeding activity in trapping sites and/or limited activity.
8	333370.6995	6361523.8887	x	✓	Various roosting opportunities recorded, including signs of diurnal roosting. Potential and expected breeding.	**Trapping results**: Breeding colony of *Chalinolobus dwyeri* recorded (12 individuals including regressed females in rock flyway).	*Chalinolobus dwyeri*

Allocated Survey Site Number in Figure 14.7d	Coordinates (GDA20z56)		Ultrasonic	Trapping	Habitat comments	Trapping/ultrasonic results	Breeding species polygon
	Easting	Northing					
9	334016.7871	6356807.3561	x	x	Dense vine and scrub covered rock surface. No good overhangs suitable for diurnal roosting, all shallow and easily predated.	–	–
10	334157.5218	6354579.8542	x	✓	Large caves present – suitable for diurnal roosting.	**Trapping results**: 8 *Chalinolobus dwyeri* (1 sub-adult), 1 *Vespadelus troughtoni*, 6 *Scoteanax rueppellii* and 3 *Micronomus norfolkensis* captured.	*Chalinolobus dwyeri*
11	334542.5327	6353273.5672	✓	x	Densely vegetated escarpment, overhangs present, and small amount of guano observed, but all overhangs are open and considered unsuitable for diurnal roosting. Therefore, no likely breeding within 100 m of the location.	**Ultrasonic results**: 20 definite *Chalinolobus dwyeri* passes and 62 possible *Vespadelus troughtoni* passes on 13/12/24.	–
12	337981.5073	6346672.7398	✓	✓	One cave located with evidence of diurnal roosting but considered highly unlikely breeding. Remaining caves likely feeding spots as very open and well lit.	**Ultrasonic results**: 36 definite *Chalinolobus dwyeri* passes & 4 possible *Vespadelus troughtoni* passes on 13/12/24. **Trapping results**: 2 *Chalinolobus dwyeri* captured (1 regressed female), but no breeding is suspected within 100 m of proposed transmission line tower. 1 *Scoteanax rueppellii* capture.	*Chalinolobus dwyeri*

Allocated Survey Site Number in Figure 14.7d	Coordinates (GDA20z56)		Ultrasonic	Trapping	Habitat comments	Trapping/ultrasonic results	Breeding species polygon
	Easting	Northing					
13	339767.4699	6345649.8149	x	✓	Steep rocky edge benches down with one large well-lit overhang and a few deep vertical crevices. Is not expected to support any suitable breeding caves, however a single bat was flushed out of a crevice, suspected to be a Horseshoe Bat, prompting trapping.	**Trapping results**: No *Chalinolobus dwyeri* or *Vespadelus troughtoni* captures. 1 *Scoteanax rueppellii* captured.	–
14	340728.8548	6345229.6605	x	✓	Large rocky steep escarpments up to 50 m altitude above road. Large number of caves, mostly inaccessible but some with evidence of diurnal roosting.	**Trapping results**: 4 *Chalinolobus dwyeri* captured at cave entry (1 regressed female).	*Chalinolobus dwyeri*
15	341083.3597	6345154.5831	x	✓	Large rocky steep escarpments up to 50 m altitude above road. Large number of caves, mostly inaccessible but some with evidence of diurnal roosting.	**Trapping results**: 1 *Chalinolobus dwyeri* captured (sub-adult).	*Chalinolobus dwyeri*
	341372.1245	6344932.7460	x	✓	Large rocky steep escarpments up to 50 m altitude above and below road. Large number of caves, mostly inaccessible but some with evidence of diurnal roosting.	**Trapping results**: No *Chalinolobus dwyeri* or *Vespadelus troughtoni* captures.	-

Allocated Survey Site Number in Figure 14.7d	Coordinates (GDA20z56)		Ultrasonic	Trapping	Habitat comments	Trapping/ultrasonic results	Breeding species polygon
	Easting	Northing					
16	341897.2269	6344529.3479	✓	✓	Several caves along escarpment, some potentially suitable for diurnal roosting but relatively inaccessible due to steep cliff.	**Ultrasonic results**: 16 definite *Chalinolobus dwyeri* passes & 4 possible *Vespadelus troughtoni* passes on 13/12/24. **Trapping results**: No *Chalinolobus dwyeri* or *Vespadelus troughtoni* captures.	–
17	342418.5387	6344128.8618	x	x	No caves or overhangs along cliff face. Small shallow crevices unsuitable for diurnal roosts.	–	–
18	342821.1919	6343819.5325	✓	x	Cliff face inaccessible due to extremely dense cover by vegetation and vines.	**Ultrasonic results**: 6 definite *Chalinolobus dwyeri* passes on 14/12/24.	–
19	343220.1998	6343513.0037	✓	x	Cliff face inaccessible due to extremely dense cover by vegetation and vines.	**Ultrasonic results**: 3 possible *Vespadelus troughtoni* passes on 13/12/24.	–
20	343421.1416	6342854.6863	x	x	Large steep sandstone and conglomerated cliff face only with shallow shale long open undercuts at bottom 2 m, not suitable for roosting.	–	–

2.4.4 Summary of survey methods and effort

A summary of the survey effort undertaken in association with the project is outlined in Table 2.16.

Table 2.16 Summary of survey methods and effort

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Diurnal Birds (All species)	Point counts/ Area searches/ Transect searches	Point counts and area searches involve systematically searching a plot of a predetermined size for a predetermined period of time. Transect surveys involve recording birds while travelling a predetermined path between two fixed points over a known distance, or less commonly, travelling a path for a fixed period of time without regard for distance. The TBDC has species-specific guidelines for each of the diurnal bird species being assessed.	BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a).	Survey Guidelines for Australia's Threatened Birds (DEWHA 2010)	121 formal bird surveys were undertaken across the subject land (see Figure 14.7).	Yes – Sufficient survey was conducted to achieve good coverage of the subject land.	Extensive diurnal bird surveys were undertaken in suitable habitat in the subject land in all seasons. Formal bird surveys were conducted as areas searches of 2 ha for 20 minutes, or as 20 minute transects.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Diurnal Birds (Gang-gang Cockatoo, South-eastern Glossy Black-Cockatoo, diurnal raptors)	Targeted nest searches/hollow-bearing tree survey	The TBDC has species-specific guidelines for each of the diurnal bird species requiring targeted nest/hollow-bearing tree surveys. For Gang-gang Cockatoo and South-eastern Glossy Black-Cockatoo the TBDC guidelines states that surveyors should search for signs of breeding with the aim of identifying potential nest trees. Potential sites should then be monitored during the breeding season to confirm whether they are actual nest trees. For the diurnal raptors (Little Eagle, White-bellied Sea-Eagle, Square-tailed Kite, and Eastern Osprey) the TBDC guidelines require breeding habitat within suitable vegetation, and the presence of the raptor on or near the nest is required to confirm breeding.	BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a).	Survey Guidelines for Australia's Threatened Birds (DEWHA 2010)	Nest searches and hollow-bearing tree surveys were conducted throughout the subject land during targeted threatened flora and fauna surveys, with 457 potential habitat trees recorded.	Partial – Gang-gang Cockatoo and South-eastern Glossy Black-Cockatoo lacking targeted survey effort in n in the recommended survey period in some areas.	Potential habitat trees for hollow-dwelling species were recorded throughout the subject land and potential breeding sites were surveyed further in the species-specific recommended survey periods for signs of breeding activity, with only a single observation of nesting site recorded for Gang-gang Cockatoo (see section 5.2.2.1). Assumed species polygons have been created for species in areas of associated PCTs with suitable hollow-bearing trees that were unable to be surveyed in accordance with the TBDC guidelines for the species (see Table 5.21).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Nocturnal Birds (Powerful Owl, Masked Owl, Sooty Owl, Barking Owl, Bush Stone-curlew)	Call playback and spotlighting	Call playback can be undertaken in all months. Call playback must be conducted at night during calm and dry weather. Survey consists of the following: 1 An initial 10-minute listening period (if the target owl(s) is heard during this period, call playback is not required). 2 Evenly distribute call playback stations within areas of up to 1000 ha of suitable habitat, approximately 1000 m apart (i.e. 1000 m x 1000 m grid or every 100 ha). This equates to 10 stations for 1000 ha of suitable habitat. 3 Broadcast pre-recorded calls for no more than 15 seconds, followed by at least 30 seconds of listening time to detect responses. 4 Repeat the broadcast and listening period for 15 minutes for each owl species (unless detected prior to time limit), increasing in volume over the survey.	BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a). The TBDC guidelines apply to Powerful Owl, Masked Owl, Sooty Owl and Barking Owl (known collectively as the large forest owls).	Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report (Umwelt 2022) Survey Guidelines for Australia's Threatened Birds (DEWHA 2010)	19 locations have been surveyed 6 times (as per the updated TBDC guidelines for large forest owls), and a further 30 locations have less than 6 survey nights. Bush Stone-curlew was also surveyed at each of these locations.	Yes – Although the number of survey nights is not consistent throughout the subject land, the survey coverage exceeds the minimum sampling thresholds required. Additionally, 15 call playback surveys for the large forest owls were conducted by Umwelt in 2020-21 in association with the HVOCP (Umwelt 2022).	Call playback and spotlighting surveys were supplemented in the Hunter IBRA subregion by the survey effort recently undertaken in the area as part of the survey associated with the HVOCP (Umwelt 2022). These surveys included locations within the vicinity of the HTP subject land and did not result in the detection of any of the large forest owls. The HVOCP (Umwelt 2022) fauna survey effort has previously been accepted by CPHR as suitable. Bush Stone-curlew has a minimum survey effort of a single night of call playback survey, but no guidelines for the number of replicates required. As such the survey conducted has been deemed suitable.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
		5 Search for owls for 15 minutes within a 1 ha plot around each broadcast station at the end of the call playback session. 6 Record the direction of fly in and time to respond to playback of detected owls, to reduce multiple counts of the same owl at different sample stations. 7 If simultaneously surveying for multiple owl species (e.g. Masked Owl, Sooty Owl, Powerful Owl and Barking Owl), the playback sequence may include an escalating sequence of calls of these species punctuated with listening periods between each species' call. The Masked Owl calls should come at the end of the sequence so that if birds respond with a single shriek the response is not obscured by further playback (DSE,2011). 8 Repeatedly survey at these broadcast locations until an owl responds, or for at least 6 nights. Survey nights are best spread across multiple weeks.		NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004) The DEC (2004) survey guidelines have been applied for Bush Stone-curlew.			

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
		No specific TBDC guidelines exist for Bush Stone-curlew however the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004) suggests playing calls for 30 seconds, followed by 4.5 minutes of listening, repeating the cycle 3 times (for a total of 15 minutes of survey). DEC (2004) also states survey points should be 2-4 km apart, and should be conducted during the breeding period (June-December) to improve the likelihood of birds responding to calls.					

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Nocturnal Birds (Large forest owls)	Stag watch survey	Stag watching involves identifying potential roost hollows in habitat trees, and observing them for 30 minutes prior to sunset, and 60 minutes after sunset to determine whether owls are present.	BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a). The TBDC guidelines apply to Powerful Owl, Masked Owl, Sooty Owl and Barking Owl (known collectively as the large forest owls).	NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004)	11 stag-watch locations were identified for high potential nesting sites and surveyed within the subject land. Stag watches were typically combined with nocturnal call payback and spotlighting (for both nocturnal birds and mammals).	Yes – Stag watches were conducted where potential roosting habitat was identified.	The TBDC does not give specific guidelines for stag watching, however the guidelines proposed by DEC (2004) were applied where suitable habitat was identified and minimum survey effort was met.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Terrestrial Mammals (Parma Wallaby, Brush-tailed Rock Wallaby, Common Planigale, Long-nosed Potoroo)	Remote camera survey	Automatic camera systems are triggered by an animal passing in front of a sensor that detects movement, changes in light, or changes in ambient temperature. Some species-specific parameters exist as per the TBDC, but generally survey methodology involves setting cameras either at ground level (terrestrial) or in trees (arboreal) depending on the target species. Cameras should be set 2–5 m from the target area (to avoid out of focus images) in areas where vegetation and other surroundings are unlikely to result in false triggers. A bait or lure can be used to draw species into the camera. Typically cameras should be left in place for 14-days and deployed at a rate of 10 cameras/ha. For target species for which TBDC does not provide specific guidelines, the above approach has been used. The TBDC suggests remote camera surveys for Long-nosed Potoroo and Brush-tailed Rock-wallaby but does not outline specifics beyond a 14-day survey period.	BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a).	Survey Guidelines for Australia's Threatened Mammals (DSEWPC 2011) Using magnification lenses on camera traps to improve small mammal identification (Meek & Cook 2022) Conservation advice for Notamacropus parma (Parma wallaby) (DCCEEW 2022)	Remote camera survey was undertaken at 34 sites throughout the subject land, for a total of 5,187 trap nights.	Yes	Extensive remote camera surveys were conducted to achieve good coverage of the subject land for a range of species. The remote camera surveys undertaken across the subject land meet the DSEWPC (2022) requirements, and all of the terrestrial mammal target species were detected by remote camera survey. Camera deployment sites for Brush-tailed Rock-wallaby were selected in areas of suitable rocky habitat, following the approach outlined in section 2.4.3.13.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Although remote camera survey is not listed by the TBDC as an approved survey method for Parma Wallaby, the conservation advice (DCCEEW 2022) for the species references multiple remote camera surveys for this species in published studies, suggesting the method is an acceptable method of survey. The TBDC requires pitfall trapping as the survey method for Common Planigale, however rocky substrates in some areas of the subject land were deemed unsuitable for pitfall trapping, and the presence of unexploded ordinance in the Singleton Military Area resulted in restrictions around the digging required to set pitfall lines. Consultation with CPHR

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							resulted in a novel camera trapping technique to survey the species instead. Baited white-flash cameras were installed along a drift fence and fitted with a lens to reduce focal length (Meek & Cook 2022) and aid in detection (see section 2.4.3.10).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Terrestrial Mammals (Brush-tailed Rock Wallaby)	Scat searches	Scat searches are applicable for all species regardless of size (DSEWPC 2011). Scat searches should consist of 30 minutes of survey (DEC 2004) and scats can be identified by experienced investigators in the field, collected and identified later by appropriate experts, or genetically tested by an expert in the analysis of scats. Where scats are detected, locations should be recorded to facilitate additional survey methods targeting the species in the location.	No TBDC guidelines	NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004) Survey Guidelines for Australia's Threatened Mammals (DSEWPC 2011)	A total of 40 person-hours of targeted scat searches were undertaken for Brush-tailed Rock-wallaby.	Yes – The survey effort conducted exceeds the 30-minute minimum survey effort guideline outlined by DEC (2004).	An experienced ecologist conducted scat searches in rocky areas in association with the habitat assessments for Brush-tailed Rock-wallaby (see sections 2.4.3.11 and 2.4.3.13) and scats were identified in the field as Brush-tailed Rock-wallaby. No DNA analysis was undertaken; however, camera trapping was also conducted in the areas where scat was identified, capturing Brush-tailed Rock-wallaby and verifying species records.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Terrestrial Mammals (All species)	Spotlighting	Spotlighting involves foot-based nocturnal searches for wildlife, using high-powered torches. Surveys should be conducted for a one-hour period, over 1 km distance (or a proportionate amount if the survey is less than 1 km), with each transect surveyed twice (on separate nights). Two observers must be used in the survey. Spotlighting from a vehicle can also be undertaken along tracks and roads under the same parameters at a speed below 5 km/h.	No TBDC guidelines	NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004) Assessing the Habitat of the Parma Wallaby, Macropus parma (Marsupialia: Macropodidae) (Read & Fox 1991)	75 spotlighting hours were undertaken across the subject land.	Yes	As nocturnal mammals are often reliably detected by eyeshine, extensive spotlighting effort was conducted across the subject land. Foot-based searches with paired observers were undertaken in suitable habitat. Although not a TBDC recommended survey method for Parma Wallaby, nocturnal spotlighting and roadside drive-based surveys were identified as an effective method for the species detection by Read & Fox (1991). Part of this study was conducted in Olney State Forest, within the HTP subject land.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Arboreal Mammals (All species - Southern Greater Glider, Yellow-bellied Glider, Eastern Pygmy Possum, Squirrel Glider, Brush-tailed Phascogale, Koala)	Spotlighting	Spotlighting involves foot-based nocturnal searches for wildlife, using high-powered torches. Surveys should be conducted for a one-hour period, over 1 km distance (or a proportionate amount if the survey is less than 1 km), with each transect surveyed twice (on separate nights). Two observers must be used in the survey. Spotlighting from a vehicle can also be undertaken along tracks and roads under the same parameters at a speed below 5 km/h.	No TBDC guidelines	NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004)	75 spotlighting hours were undertaken across the subject land.	Yes	As nocturnal mammals are often reliably detected by eyeshine, extensive spotlighting effort was conducted across the subject land. Foot-based searches with paired observers were undertaken in suitable habitat, resulting in the detection of Southern Greater Glider, Yellow-bellied Glider, Squirrel Glider, and Koala.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Arboreal Mammals (All hollow-dwelling species)	Stag watching	Stag watching involves identifying potential hollows in habitat trees, and observing them for 30 minutes prior to sunset, and 60 minutes after sunset to determine whether hollow-dependent fauna are present.	Survey Guidelines for Australia's Threatened Mammals (DSEWPC 2011)	NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004) Evaluation of the Stagwatching Technique for Census of Possums and Gliders in Tall Open Forest (Smith et. al. 1989).	11 stag-watch locations were identified and surveyed within the subject land.	Yes – Stag watches were conducted where potential habitat was identified for hollow-dwelling species.	Stag watching has been found to be a more effective survey detection method for a number of arboreal mammals than spotlighting (Smith et. al., 1989). Stag watches were typically combined with nocturnal call payback and spotlighting surveys, and suitable hollows were stag-watched for the emergence of threatened species. The TBDC does not give specific guidelines for stag watching, however the guidelines proposed by DEC (2004) were applied where suitable habitat was identified.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Arboreal Mammals (Southern Greater Glider, Yellow-bellied Glider, Eastern Pygmy Possum, Squirrel Glider, Brush-tailed Phascogale)	Remote camera survey	Automatic camera systems are triggered by an animal passing in front of a sensor that detects movement, changes in light, or changes in ambient temperature. Some species-specific parameters exist as per the TBDC, but typical survey methodology (DSEWPC 2011) involves setting cameras either at ground level (terrestrial) or in trees (arboreal) depending on the target species. Cameras should be set 2–5 m from the target area (to avoid out of focus images) in areas where vegetation and other surroundings are unlikely to result in false triggers. A bait or lure can be used to draw species into the camera. Typically, cameras should be left in place for 14-days and deployed at a rate of 10 cameras/ha (DSEWPC 2011). As there are no specific TBDC guidelines for Southern Greater Glider, Yellow-bellied Glider, Eastern Pygmy Possum, or Squirrel Glider, the above approach has been used for these species.	Survey Guidelines for Australia's Threatened Mammals (DSEWPC 2011)		Remote camera survey was undertaken at 31 sites throughout the subject land, for a total of 5,435 trap nights.	Yes – Extensive remote camera surveys were conducted to achieve good coverage of the subject land for a range of species. Squirrel Glider, Eastern Pygmy Possum, and Brush-tailed Phascogale were detected by remote camera survey, with the remaining arboreal target species recorded within the subject land using other survey methods.	The length of remote camera surveys within the subject land varied between 11–53 days, with only 5 sites failing to reach the minimum survey effort (as per DSEWPC 2011) of 14 days. Targeted Brush-tailed Phascogale sites remained in place to reach the required 28 days of survey, as per the TBDC guidelines. All arboreal camera surveys were baited with peanut butter-oat balls and honey-water.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
		Brush-tailed Phascogale – Survey requires cameras baited with peanut butter-oat balls and a honey-water spray. Cameras should be set at head-height or above, facing a baited branch or tree trunk. Minimum survey effort is a 4 week camera deployment, with bait replacement and re-spray of honey-water at 2 weeks. A minimum of 4 cameras up to 1 ha, then 2 additional cameras/ha of suitable habitat thereafter (evenly spaced). Where potential habitat is disconnected by gaps of 50 m or more, each habitat patch should have a minimum of 4 cameras for the first ha, and 2 cameras for every ha thereafter. That is, at least 22 working, baited, evenly spaced camera traps are required for the first 10 ha of suitable habitat.					Most target species associated with the project are able to be surveyed for in all seasons, and as such remote camera survey effort extends across several different months to account for variation in species behaviours. Eastern Pygmy Possum and Brush-tailed Phascogale are the exception, as both have specific recommended survey periods as per the TBDC guidelines, and were targeted in in accordance with these requirements.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Species detections for Brush-tailed Phascoglale were confined to the Hunter IBRA subregion, and consultation with arboreal connectivity expert Rod Van der Ree was engaged to determine whether survey conducted in the Wyong and Yengo IBRA subregions was suitable to exclude the species in these areas (R. Van der Ree, personal communication, 2025).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Arboreal Mammals (Koala, Southern Greater Glider, Yellow-bellied Glider, Squirrel Glider)	Thermal drone survey	A drone equipped with a thermal and a visual camera was flown in a preprogrammed lawnmower pattern consisting of parallel linear transects 50 m apart, at a constant height of 65 m, and a maximum speed of 8 metres per second to provide a 30% overlap in survey field of view. Surveys were conducted between 9 pm and 6 am and were duplicated in the absence of Koala detection in the first survey.	Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DDPE 2022)	Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report (Umwelt 2022)	Thermal drone survey was completed across the Wyong and Yengo IBRA subregions, totalling 19 nights of survey. Surveys were completed in Winter and then duplicated in Spring. Further information on survey effort is provided in section 5.3.	Yes - The DDPE (2022) guidelines require the full extent of suitable habitat to be surveyed with a 30% overlap between flight paths which was applied to the surveys. Additionally, duplicating the survey meets the requirement for two nights of survey if no Koala detections are made on the first night, after which absence (for the purpose of the drone survey method)	While sufficient survey effort was conducted in the Wyong and Yengo IBRA subregions, thermal drone surveys for Koala were not conducted in the Hunter IBRA subregion as they were recently undertaken in the area as part of the survey associated with the HVOCP (Umwelt 2022). These surveys included locations within the HTP subject land, as well as the surrounding area, and did not result in the detection any individuals over a 10-day survey period (Umwelt 2022). The HVOCP (Umwelt 2022) fauna survey effort has previously been accepted by CPHR as suitable.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
						can be concluded (DDPE 2022). Drone surveys for Koala are also limited to periods where daily minimum temperatures are ≤18°C (typically March to December) (DDPE 2022), which is reflected in the survey dates.	

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Arboreal Mammals (Koala)	Spot Assessment Technique (SAT) survey	SAT survey protocol involves using a grid-based plot in suitable habitat. At each grid point, a SAT is undertaken by locating and marking a centre tree (of any species). The 29 trees nearest to the centre tree are identified, and Koala scat is searched for beneath each of the 30 trees, up to 1 m from the base of each tree for a minimum period of two minutes per person, searching the area underneath the tree in the initial undisturbed state, and then further inspecting the area by disturbing the substrate. The search at each tree is complete when either a koala scat is found, or the search time ends and no scat is detected.	Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DDPE 2022).		144 SAT surveys were conducted across the project.	Partial	A significant number of SAT surveys were conducted throughout the subject land in association with the project. However, given the size of the subject land and the difficulty of access in steep and densely vegetated conditions, only partial coverage of the grid-based search technique could be achieved. Multiple additional survey methods were utilised to ensure adequate survey for koala, including drone survey, call playback, spotlighting, and remote camera surveys, and the species was detected multiple times in the subject land.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Microchiropteran bats (All species)	Passive ultrasonic survey	One passive detector night is defined as an entire night using a single recorder capable of recording and storing the calls of the target species automatically. The detectors should be set to recording before sunset and stopped after dawn, placed in positions that maximise the likelihood of recording bats at least 50 m apart to sample intra-site variability. Recorded calls should be analysed by a specialist. Species-specific minimum survey effort requirements apply to the following candidate species: — Large-eared Pied Bat – 16 trap nights total (over 4 nights) per ≤50 ha of suitable habitat, from Mid Nov-end of Jan. — Eastern Cave Bat - 16 trap nights total (over 4 nights) per ≤50 ha of suitable habitat, from Nov-end of Jan. — Southern Myotis - 16 trap nights total (over 4 nights) per ≤2.5 km riparian length of potential habitat, from Oct-Mar.	'Species credit' Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018) 'Species credit' Threatened Bats and their Habitats. NSW Guide for the Biodiversity Assessment Method (DPIE 2021)		466 nights of passive ultrasonic survey was conducted as part of the HTP survey (see Figure 14.7).	Partial – The TBDC guidelines require a total effort of 16 nights of passive of ultrasonic detection, typically across a minimum of 4 nights. Minimum survey effort was met at all but 4 deployment locations.	Passive ultrasonic survey was conducted in suitable habitat for multiple microbat species, and at potential or suspected roost/breeding locations for target candidate species as part of the rocky area fauna assessments (see section 2.4.3.13). Only partial effort achieved as some survey locations were not surveyed for the full 4 nights, however all of the target candidate microbat species were positively identified in the analysis of the ultrasonic recordings (and all at multiple locations), with the exception of Eastern Cave Bat, which cannot be distinguished from Little Forest Bat (Vespadelus vulturnus) by call analysis and was recorded as possible in the analysis (see Appendix G).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
						The guidelines also require the minimum survey effort to be applied to specific areas of potential habitat, i.e. ⩽50 ha of suitable habitat for Large-eared Pied Bat and Eastern Cave Bat, and ⩽2.5 km riparian length of potential habitat for Southern Myotis. These parameters are also partially met by the survey effort undertaken.	Both Eastern Cave Bat and Large-eared Pied Bat were also recorded as captures during harp trapping surveys. Passive ultrasonic survey is not a recommended survey method for Large and Little Bent-winged Bats, as they are considered ecosystem credits for foraging habitat, and must be harp trapped to determine potential breeding as a candidate species.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Microchiropteran bats (Southern Myotis)	Active ultrasonic survey	One active detection night is defined as an observer using a single handheld acoustic detector and visual aid to concurrently search for and observe foraging bats flying over suitable waterbodies for at least two hours after dusk. The observer must use a combination of the echolocation call pattern and characteristic foraging habits to identify species. Visual aids such as a spotlight, thermal or infrared device may also be used to observe bat flight behaviour at a distance of at least 30 m. Active ultrasonic detection is only applicable to Southern Myotis as a recommended survey method, which requires a total of 8 hours of survey, across 4 nights.	'Species credit' Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018) 'Species credit' Threatened Bats and their Habitats. NSW Guide for the Biodiversity Assessment Method (DPIE 2021)		8 hours of active ultrasonic survey were conducted.	Yes	Southern Myotis was conclusively detected during active ultrasonic survey and visual confirmation within the suitable survey period (October - March) (see Figure 14.13f). Confirmation of species presence resulted in cessation of the survey, before reaching the minimum time requirement in the guidelines. A species polygon for Southern Myotis has been applied throughout the subject land as the species is associated with almost all PCTs found within the subject land (where suitable habitat also occurs).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Active ultrasonic detection was also utilised as part of the site selection process for the rocky area assessments for the cave-dwelling bat species (see section 2.4.3.13). While not a recognised survey method for these species, this provided a preliminary indictor of species and habitat use, prior to passive ultrasonic survey.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Microchiropteran bats (All species)	Harp trapping	Harp trapping involves setting traps in potential fly-ways, cave entrances, and habitat used by bats as a method to catch and identify the bat species using an area. Harp trapping consisted of multiple nights of trapping, with single or double-banked harp traps, placed at least 20 m apart. Traps were set before dusk and closed at dawn, with checks in between. Standard and Mini-sized Austbat harp traps were utilised for surveys. Species-specific minimum survey effort requirements apply to the following candidate species: — Large-eared Pied Bat – 16 trap nights total (over 4 nights) per ≤50 ha, from Mid Nov-end of Jan. — Eastern Cave Bat - 16 trap nights total (over 4 nights) per ≤50 ha, from Nov-end of Jan. — Southern Myotis - 16 trap nights total (over 4 nights) per ≤2.5 km riparian length of potential habitat, Oct-Mar.	'Species credit' Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018) 'Species credit' Threatened Bats and their Habitats. NSW Guide for the Biodiversity Assessment Method (DPIE 2021)		32 nights of harp trapping have been conducted during the HTP surveys.	Yes	Areas of potential habitat were methodically targeted to determine both species presence and potential breeding sites. Harp trap site selection was informed by the rocky area habitat assessments for the cave-dwelling bats (see section 2.4.3.13). Full-sized Austbat harp traps were used for each of the surveys. Two surveys also utilised Austbat Mini harps in two areas where the standard-sized traps were too large to fit in cave entrances. Where Austbat Mini harps were deployed, one survey night was defined by the use of two traps, to compensate for the size difference from the standard-sized harp traps. The Austbat Mini traps can be considered supplementary survey effort, as they were

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
		— Large Bent-winged Bat – 8 trap nights total (over 4 nights) per cave/tunnel/mine, from Dec-Feb. — Little Bent-winged Bat - 8 trap nights total (over 4 nights) per cave/tunnel/mine, from Dec-Feb.					always deployed at sites where the standard-sized harp traps were also used for survey. Harp traps were moved frequently during surveys to improve capture rates and minimise avoidance behaviour, as per the guidelines (OEH 2018). Where cave entrances were inaccessible for deploying harp traps, trap sites were selected near cave locations (rather than at cave entrances), in areas most likely to be flyways for the caves.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							The presence of reproductively active individuals (i.e. lactating females) was used as an indicator of nearby breeding habitat and informed confirmed breeding polygons for Large-eared Pied Bat (see Table 5.21). Out of season survey was undertaken for both Eastern Cave Bat and Large-eared Pied Bat with a week of harp trapping (at 2 locations, totalling 32 traps nights) conducted in the first week of February 2025. This survey was intended to be completed in the final week of January 2025 (inside the survey period), but a large local storm resulted in the downing of several trees preventing access to the proposed trapping sites. A decision was made to

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							conduct the surveys at 2 sites the following week once safe access was available. Both sites were expected to be a low chance of trapping Eastern Cave Bat or Large-eared Pied Bat due to the available habitat, but a high number of recorded Vespadelus spp. calls at one of the sites were unable to be attributed to either V. troughtoni or V. vulturnus without definite species identification, necessitating trap-based survey. Harp trapping of the site resulted in 33 captures of V. vulturnus, suggesting that this species was responsible for the recorded calls. Harp trapping was not conducted for Southern Myotis as the species was determined to be present using other methods.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Microchiropteran bats (All cave-dwelling species and Southern Myotis)	Roost searches	Roost searches involve inspection for signs of bats in suitable roost habitat during the daytime. Surveyors are required to carry torches to inspect crevices, holes or cracks that might house bats, and carry a handheld bat detector to locate and identify bat call.	'Species credit' Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018) 'Species credit' Threatened Bats and their Habitats. NSW Guide for the Biodiversity Assessment Method (DPIE 2021)	-	6 microbat roost inspections were undertaken during the HTP surveys.	Yes – supplementary survey method.	Roost searches are listed as a supplementary method of survey for the cave-dwelling bat species associated with the subject land, and effort is expected to be undertaken 'as required' (OEH 2018). Significant effort was undertaken to identify potential roost and breeding caves within the subject land and follow up trapping was undertaken in viable locations (see section 2.4.3.13). Targeted roost searches as supplementary survey for Southern Myotis were not undertaken given the confirmed detection of the species in the subject land during other survey methods.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Some habitat assessments and roost inspections for Eastern Cave Bat and Large-eared Pied Bat were conducted outside the survey season. These surveys were conducted prior to the recommended survey period as preliminary searches used to inform which potential sites would be targeted during the recommended survey season (see section 2.4.3.13). If deemed a viable survey option these sites were revisited in the correct Nov-Jan period for ultrasonic survey or harp trapping.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Amphibians (All species - Giant Burrowing Frog, Stuttering Frog, Green and Golden Bell Frog, Green-thighed Frog, Littlejohn's Tree Frog, Giant Barred Frog, Red-crowned Toadlet, Booroolong Frog)	Aural-visual survey	Aural-visual surveys involve surveying for frogs along a transect, combining visual searching and periods of listening. One survey night is defined as a minimum 120-minute period of listening for calling frogs and conducting a visual search along a 500 m wide transect in frog breeding habitat along, around or through a suitable waterbody, unless otherwise defined in the species-specific guidelines (DPIE 2020). Where suitable habitat is less than 500 m, a pro-rata effort is applied, and all suitable habitat is surveyed. Surveys should begin with an aural survey listening for calls for a minimum of 5 minutes. This process should be repeated every 50 m of the transect. Following the aural listening period, for a minimum 2-minute period, call playback should be conducted. Another 2-minute listening period should follow to detect any responses. Visual detection is by eyeshine or movement, for a minimum of 5 minutes each 50 m of transect. One transect should be repeated for every 1000 m of suitable breeding habitat (up to 5 km). Surveys are repeated over multiple nights or seasons as guidelines dictate.	NSW Survey Guide for Threatened Frogs (DPIE 2020) The following species-specific survey methods are listed in the DPIE (2020) guidelines: Giant Burrowing Frog – Aural-visual survey of 960 minutes total (8 repeats) undertaken in Sept-May, within a week of heavy rainfall (>100 mm over 3 days).		448 person-hours of targeted surveys were conducted for frogs in the subject land. Surveys were completed for each impacted creekline containing potential breeding habitats by two ecologists for a minimum of 240 minutes (4 repeats). Surveys commenced at ridge lines first order stream and progressed downslopes	All impacted streams subject to survey points completed in accordance with (DPIE 2020).	Following CPHR consultation, the surveys for target frog species were combined to facilitate sampling all impacted watercourses within the subject land. The differences in species preferred habitats were accommodated by commencing surveys on the ridges and proceeding downslope to highest order creeks (first to fourth order). Suitable ephemeral habitats upslope of drainage lines were also surveyed. In areas where suitable habitat was smaller than 500 m survey followed the pro-rata approach outlined in the survey guidelines (DPIE 2020).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
			Green and Golden Bell Frog – Aural-visual survey of 480 minutes total (4 repeats) undertaken in Nov-Mar. Booroolong Frog – Aural-visual survey of 480 minutes total (4 repeats) undertaken in Oct-Dec. Green-thighed Frog – Aural-visual survey of 240 minutes (2 repeats) undertaken in Spring-Autumn after flooding rains.				Where potential habitat or impacted streams could not be surveyed, assumed polygons were created (see Table 5.21) species polygon section). Surveys were undertaken in accordance with the TBDC requirements, including species-specific weather parameters (see cross-ref weather table).

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
			Littlejohn's Tree Frog – Aural-visual survey of 480 minutes (4 repeats) undertaken in July-Nov. Stuttering Frog – Aural-visual survey of 480 minutes (4 repeats) undertaken in Sept-Mar. Giant Barred Frog – Aural-visual survey of 480 minutes (4 repeats) undertaken in Oct-Mar.				

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
			Red-crowned Toadlet – Aural-visual survey of 480 minutes (4 repeats) undertaken year-round following significant rain.				
Amphibians (Giant Burrowing Frog, Littlejohn's Tree Frog, Green-thighed Frog)	Tadpole searches	Tadpole searches involve sweeping a fine mesh net through the water for 10 minutes per 50 m2 of the waterbody surface area. The net should be checked for tadpoles every third sweep. Individuals that need to be examined for identification should be placed in a clear plastic bag containing water from the survey site to prevent shock. One tadpole search has been completed when an identified breeding waterbody has been identified. Surveys for Green-thighed Frog require flooding rains to have inundated the breeding areas (DPIE 2020).	NSW Survey Guide for Threatened Frogs (DPIE 2020)		Tadpole searches were conducted where suitable breeding waterbodies were identified during amphibian habitat assessment surveys (see section 2.4.3.6).	Yes	Tadpole searches and species identifications were conducted by an experienced ecologist as per the DPIE (2020) guidelines. Heleioporus australiacus and Litoria littlejohni tadpoles were positively identified within the subject land during survey. Mixophyes balbus, Mixophyes iteratus, and Pseudophryne australis tadpoles were also identified within the subject land during tadpole surveys.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Reptiles (Pink-tailed Legless Lizard, Broad-headed Snake, Hunter Valley Delma)	Herpetofauna active searches	Active herpetofauna searches involve walking slowly (approximately 2 km/hr) through suitable habitat searching for active and non-active individuals (by checking under shelter sites), stopping every 10 m to observe moving reptiles. One survey is a minimum of 120 person-min per 50 has of suitable habitat (unless other species-specific measures apply) and can be undertaken by one (120 minutes) or two (60 minutes each) surveyors (DPE 2022). Pink-tailed Legless Lizard – As above, with 4 replicates. The TBDC recommends that this species is assessed by expert report due to difficulty in detecting with confidence during survey (DPE 2022). Hunter Valley Delma – 120 person-minute surveys weekly for 8 weeks, or daily for 10 days, from Sept-Dec (DPE 2022). Broad-headed Snake – 120 person-minute surveys between Aug-Sept, with 4 replicates (DPE 2022).	Threatened Reptiles Biodiversity Assessment Method Survey Guide (DPE 2022)	Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report (Umwelt 2022)	96 person-hours of herpetofauna active searches were conducted as part of the HTP survey.	Yes	The TBDC identifies suitable habitat for Pink-tailed Legless Lizard as rocky areas (or within 50 m of rocky areas) located within PCTs associated with the species in the TBDC. Surveys for this species were conducted in areas of suitable rocky habitat within PCT 3314 in the Hunter IBRA subregion, and involved diurnal rock searches, as per the survey guidelines for the species. One targeted survey for this species was conducted a day prior to the recommended survey period, as a result of access negotiations.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Remaining areas of PCT 3314 within the subject land in the Hunter IBRA subregion have been assessed as unsuitable for Pink-tailed Legless Lizard, as the absence of rocky areas fails to meet the species microhabitat requirements. The HVOCP (Umwelt 2022) also identified large areas of the HVO lands as unable to meet the habitat constraint for Pink-tailed Legless Lizard. Active herpetofauna searches for Hunter Valley Delma were conducted in association with the artificial habitat surveys for the species, targeting areas of suitable habitat where tile grids were not deployed.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Comprehensive Broad-headed Snake active herpetofauna searches were conducted as outlined in section 2.4.3.13, and were undertaken in both associated PCTs in the subject land, and in other areas with potential suitable rocky area habitat.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Reptiles (Hunter Valley Delma)	Herpetofauna artificial habitat searches	Artificial cover, in the form of tiles, were installed in grids of 50 tiles set 5 x 10, with 5 m spacing between tiles. For Delma impar (which Delma vescolineata is also being assessed as – see section 2.4.3.7) the minimum survey requirement is 100 tiles (2 grids) checked weekly for 8 weeks (between September and December).	Threatened Reptiles Biodiversity Assessment Method Survey Guide (DPE 2022)	Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report (Umwelt 2022)	10 tile grids were installed in suitable habitat in the subject land.	Yes – Artificial habitat surveys were conducted in 10 locations within the subject land meeting the survey guideline requirement of 10 grids where the suitable habitat is >30-50 ha (DPE 2022). Additionally, 24 artificial habitat surveys were conducted by Umwelt in 2020-21 in association with the HVOCP (Umwelt 2022).	The WSP survey effort meets the minimum survey requirements for the design and spatial sampling, however in tile grids where the species was detected the survey ceased early to limit the possibility of disturbance impacts to the species. 39 individuals were detected in 7 locations within the subject land.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
							Artificial habitat surveys for Delma spp. were not conducted in some areas of the HVO land, as they were recently surveyed as part of the study associated with the HVOCP (Umwelt 2022). These surveys included locations within the HTP subject land, as well as the surrounding area, and resulted in the detection of 48 individuals. The HVOCP (Umwelt 2022) fauna survey effort has previously been accepted by CPHR as suitable.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Reptiles (Pale-headed Snake, Stephens' Banded Snake, Broad-headed Snake)	Spotlighting	Spotlight surveys are used to detect 'eyeshine' or movement of reptiles. Surveyors must walk slowly and quietly through areas where species are likely to be active. One survey is 120 person-minutes per 50 ha of suitable habitat, unless the target species has a specific requirement listed in the TBDC guidelines. Species-specific minimum survey effort requirements: — Broad-headed Snake – ≥ 120 person-minutes per survey, 4 replicates over consecutive nights per 50 ha of suitable habitat, from Dec-Feb. — Pale-headed Snake – 120 person-minutes per survey, 4 replicates per 50 ha of suitable habitat, from Nov-Mar. — Stephens' Banded Snake – 120 person-minutes, 4 replicates per 50 ha of suitable habitat, from Oct-Mar.	Threatened Reptiles Biodiversity Assessment Method Survey Guide (DPE 2022)		276 person-hours of spotlighting surveys were conducted withing the subject land.	Partial	A significant number of spotlighting surveys were undertaken across suitable habitat in the subject land. As assumed polygon has been created for Pale-headed Snake in areas of associated PCTs that were unable to be surveyed in accordance with the TBDC guidelines for the species.

Species guild	Method	Survey description	TBDC survey guidelines	Other published survey methods or supporting literature	Survey effort	Survey requirements met?	Justification
Reptiles (Stephens' Banded Snake)	Nocturnal road surveys	Drive a vehicle at 5 km/h and observe for snakes on the road. A passenger may use a spotlight to search further ahead along the road. Where a snake is detected, stop the vehicle in a safe position and identify the snake. Minimum survey effort for Stephens' Banded Snake is defined as 120 person-minutes per survey, with 4 replicates, and the survey must be undertaken from Oct-Mar.	Threatened Reptiles Biodiversity Assessment Method Survey Guide (DPE 2022)	-	148 person-hours of road surveys were conducted for Stephens' Banded Snake.	Yes – The minimum survey effort was met for this species.	Nocturnal road surveys for this species were conducted throughout suitable habitat in the subject land, as per the TBDC guidelines, resulting in the detection of the species. In many instances, nocturnal road surveys were conducted in association with accessing areas of the subject land for other nocturnal survey, contributing to a comprehensive survey effort for this species.

2.5 Weather conditions

Table 2.17 Environmental conditions during threatened species surveys

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
August 2023						
14/08/23	Nocturnal	Mammal and Avian call-playback	11.9 Lak	18.0 Lak	N 2 Lak	10.2 Lak
		Spotlighting	9.6 Ces	16.9 Ces	NW 11 Ces	4.4 Ces
15/08/23	Diurnal	Koala SATs	6.9 Lak	18.2 Lak	SW 6 Lak	9.6 Lak
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback	7.9 Ces	18.5 Ces	SSW 9 Ces	6.6 Ces
		Spotlighting				
16/08/23	Nocturnal	Mammal and Avian call-playback	6.3 Lak	18.3 Lak	– Lak	0 Lak
17/08/23	Diurnal	Diurnal bird survey	2.3 Lak	22.7 Lak	– Lak	0.2 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback	3.1 Ces	22.5 Ces	W 7 Ces	0 Ces
		Spotlighting				
		Amphibian call-playback and targeted survey (48.4 mm rain during fortnight prior, 48% relative humidity at 3 pm)				
18/08/23	Diurnal	Koala SATs	8.8 Lak	19.6 Lak	NW 7 Lak	5.8 Lak
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting	8.2 Ces	19.2 Ces	WNW 17 Ces	11 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
29/08/23	Diurnal	Diurnal bird survey	4.4 Lak	23.9 Lak	– Lak	0 Lak
		Koala SATs				
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
30/08/23	Diurnal	Diurnal bird survey	5.4 Lak	26.9 Lak	– Lak	0.2 Lak
		Koala SATs				
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
31/08/23	Diurnal	Diurnal bird survey	8.0 Lak	20.4 Lak	SW 6 Lak	5.4 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
September 2023						
04/09/23	Diurnal	Diurnal bird survey	3.5 Lak	22.4 Lak	– Lak	0 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
05/09/23	Diurnal	Diurnal bird survey	8.8 Lak	26.1 Lak	WSW 7 Lak	1.2 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
06/09/23	Diurnal	Diurnal bird survey	2.8 Lak	21.4 Lak	– Lak	0 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
07/09/23	Diurnal	Diurnal bird survey	3.8 Lak	28.0 Lak	– Lak	0 Lak
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
08/09/23	Diurnal	Diurnal bird survey	13.9 Lak	21.1 Lak	– Lak	4.2 Lak
		Koala SATs				
18/09/23	Diurnal/Nocturnal	Fauna cameras	7.2 Lak	34.3 Lak	– Lak	0 Lak
19/09/23	Diurnal/Nocturnal	Fauna cameras	9.2 Lak	34 Lak	NW 13 Lak	0 Lak
20/09/23	Diurnal/Nocturnal	Fauna cameras	15.2 Lak	33.9 Lak	NW 15 Lak	0 Lak
20/09/23	Diurnal/Nocturnal	Fauna cameras	15.2 Lak	33.9 Lak	NW 15 Lak	0 Lak
21/09/23	Diurnal/Nocturnal	Fauna cameras	15.2 Lak	25.3 Lak	SW 6 Lak	0 Lak
22/09/24	Diurnal/Nocturnal	Fauna cameras	11.2 Lak	19.5 Lak	SSW 6 Lak	4.2 Lak
23/09/24	Diurnal/Nocturnal	Fauna cameras	6.5 Lak	20 Lak	SSW 6 Lak	0.2 Lak
24/09/24	Diurnal/Nocturnal	Fauna cameras	6.2 Lak	20.8 Lak	N 2 Lak	0 Lak
25/09/23	Diurnal/Nocturnal	Fauna cameras	11.2 Lak	19.5 Lak	SSW 6 Lak	4.2 Lak
26/09/23	Diurnal/Nocturnal	Fauna cameras	7 Lak	24.9 Lak	SSW 6 Lak	0 Lak
27/09/23	Diurnal/Nocturnal	Fauna cameras	12.3 Lak	23.9 Lak	– Lak	0.4 Lak
28/09/23	Diurnal/Nocturnal	Fauna cameras	14.9 Lak	22.3 Lak	NW 4 Lak	25 Lak
29/09/23	Diurnal/Nocturnal	Fauna cameras	7.3 Lak	31.3 Lak	– Lak	0.2 Lak
30/09/23	Diurnal/Nocturnal	Fauna cameras	12.4 Lak	27.1 Lak	– Lak	0 Lak
October 2023						
01/10/23	Diurnal/Nocturnal	Fauna cameras	11.4 Lak	34.4 Lak	NW 11 Lak	0.2 Lak
02/10/23	Diurnal/Nocturnal	Fauna cameras	14 Lak	23.3 Lak	SW 6 Lak	0 Lak

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
03/10/23	Diurnal/Nocturnal	Fauna cameras	10.9 Lak	34.9 Lak	E 6 Lak	0 Lak
04/10/23	Diurnal/Nocturnal	Fauna cameras	12.9 Lak	29.3 Lak	W 2 Lak	0 Lak
05/10/23	Diurnal/Nocturnal	Fauna cameras	12.7 Lak	23.1 Lak	WNW 15 Lak	11.2 Lak
06/10/23	Diurnal	Diurnal bird survey	6.3 Ces	23.6 Ces	NW 7 Ces	0 Ces
	Diurnal/Nocturnal	Fauna cameras	6.7 Lak	22.2 Lak	SW 9 Lak	0 Lak
07/10/23	Diurnal/Nocturnal	Fauna cameras	12.1 Lak	19.7 Lak	SSW 7 Lak	2.2 Lak
08/10/23	Diurnal/Nocturnal	Fauna cameras	6.5 Lak	21.3 Lak	SSW 4 Lak	0.8 Lak
09/10/23	Diurnal/Nocturnal	Fauna cameras	5.2 Lak	23.5 Lak	– Lak	0 Lak
10/10/23	Diurnal/Nocturnal	Fauna cameras	8.3 Lak	23.5 Lak	SSW 6 Lak	0 Lak
11/10/23	Diurnal/Nocturnal	Fauna cameras	14 Lak	24.3 Lak	E 2 Lak	0 Lak
12/10/23	Diurnal/Nocturnal	Fauna cameras	8.6 Lak	33.2 Lak	N 2 Lak	0 Lak
13/10/23	Diurnal/Nocturnal	Fauna cameras	11.9 Lak	25.5 Lak	WSW 15 Lak	0 Lak
14/10/23	Diurnal/Nocturnal	Fauna cameras	6.7 Lak	29.6 Lak	NW 7 Lak	0 Lak
15/10/23	Diurnal/Nocturnal	Fauna cameras	7.1 Lak	26.8 Lak	WNW 2 Lak	0 Lak
16/10/23	Diurnal/Nocturnal	Fauna cameras	7.4 Lak	28.9 Lak	WNW 2 Lak	0 Lak
17/10/23	Diurnal/Nocturnal	Fauna cameras	11.6 Lak	20.9 Lak	SSW 7 Lak	0 Lak
18/10/23	Diurnal/Nocturnal	Fauna cameras	11.2 Lak	21.4 Lak	SW 6 Lak	3 Lak
19/10/23	Diurnal/Nocturnal	Fauna cameras	11.8 Lak	22.8 Lak	WNW 2 Lak	0 Lak

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
20/10/23	Diurnal/Nocturnal	Fauna cameras	7.9 Lak	25.6 Lak	NE 4 Lak	0 Lak
21/10/23	Diurnal/Nocturnal	Fauna cameras	10.5 Lak	25.9 Lak	W 2 Lak	0 Lak
22/10/23	Diurnal/Nocturnal	Fauna cameras	13.2 Lak	29.4 Lak	SSE 4 Lak	0.2 Lak
23/10/23	Diurnal/Nocturnal	Fauna cameras	7.1 Lak	25.6 Lak	WNW 7 Lak	0 Lak
24/10/23	Diurnal	Herpetofauna active searches	6.1 Ces	35.1 Ces	NE 4 Ces	0 Ces
	Diurnal/Nocturnal	Fauna cameras				
25/10/23	Diurnal	Herpetofauna active searches	8.7 Ces	29.2 Ces	– Ces	0 Ces
	Diurnal/Nocturnal	Fauna cameras				
26/10/23	Diurnal/Nocturnal	Fauna cameras	13.5 Ces	14.3 Ces	S 15 Ces	1.6 Ces
27/10/23	Diurnal/Nocturnal	Fauna cameras	3.6 Ces	22 Ces	NNE 6 Ces	0 Ces
28/10/23	Diurnal/Nocturnal	Fauna cameras	3.8 Ces	21.9 Ces	N 7 Ces	0 Ces
29/10/23	Diurnal/Nocturnal	Fauna cameras	3.4 Ces	24.4 Ces	N 11 Ces	0 Ces
30/10/23	Diurnal/Nocturnal	Fauna cameras	3.1 Ces	26.8 Ces	NE 6 Ces	0 Ces
31/10/23	Diurnal/Nocturnal	Fauna cameras	6.9 Ces	21.8 Ces	N 9 Ces	6.0 Ces
November 2023						
01/11/23	Diurnal/Nocturnal	Fauna cameras	11.2 Ces	24.1 Ces	ESE 13 Ces	0 Ces
02/11/23	Diurnal/Nocturnal	Fauna cameras	8.8 Ces	24.9 Ces	S 13 Ces	0 Ces
03/11/23	Diurnal/Nocturnal	Fauna cameras	9.7 Ces	25.5 Ces	E 15 Ces	0 Ces
04/11/23	Diurnal/Nocturnal	Fauna cameras	13.5 Ces	25.6 Ces	SE 9 Ces	0.2 Ces
05/11/23	Diurnal/Nocturnal	Fauna cameras	15.0 Ces	20.7 Ces	ESE 9 Ces	0.4 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
06/11/23	Diurnal/Nocturnal	Fauna cameras	10.7 Ces	22.1 Ces	S 7 Ces	12 Ces
07/11/23	Diurnal/Nocturnal	Fauna cameras	10.2 Ces	27.1 Ces	N 9 Ces	0 Ces
08/11/23	Diurnal/Nocturnal	Fauna cameras	9.0 Ces	29.4 Ces	ENE 6 Ces	0 Ces
09/11/23	Diurnal	Artificial habitat surveys – Delma spp.	15.7 Sin	30.8 Sin	WNW 6 Sin	0 Sin
	Diurnal/Nocturnal	Fauna cameras	13.8 Ces	29.2 Ces	– Ces	1.4 Ces
10/11/23	Diurnal/Nocturnal	Fauna cameras	13.6 Ces	28.9 Ces	N 9 Ces	15.2 Ces
11/11/23	Diurnal/Nocturnal	Fauna cameras	13.2 Ces	34.1 Ces	ENE 6 Ces	0.2 Ces
12/11/23	Diurnal/Nocturnal	Fauna cameras	14.5 Ces	37.5 Ces	NE 2 Ces	0 Ces
13/11/23	Diurnal/Nocturnal	Fauna cameras	17.6 Ces	24.6 Ces	S 15 Ces	0 Ces
14/11/23	Diurnal/Nocturnal	Fauna cameras	11.3 Ces	32.3 Ces	NNE 6 Ces	0 Ces
15/11/23	Diurnal/Nocturnal	Fauna cameras	16.1 Ces	32.9 Ces	W 7 Ces	0 Ces
16/11/23	Diurnal/Nocturnal	Fauna cameras	14.8 Ces	31.1 Ces	NNE 9 Ces	0 Ces
17/11/23	Diurnal/Nocturnal	Fauna cameras	16.1 Ces	23.3 Ces	SSE 13 Ces	0.8 Ces
18/11/23	Diurnal/Nocturnal	Fauna cameras	9.0 Ces	25.9 Ces	ENE 13 Ces	0 Ces
19/11/23	Diurnal/Nocturnal	Fauna cameras	9.2 Ces	31.9 Ces	N 6 Ces	0 Ces
20/11/23	Diurnal/Nocturnal	Fauna cameras	16.0 Ces	23.6 Ces	SW 6 Ces	0 Ces
23/11/23	Diurnal/Nocturnal	Fauna cameras	17.0 Sin	25.5 Sin	SSE 11 Sin	0 Sin
24/11/23	Diurnal/Nocturnal	Fauna cameras	18.0 Sin	26.2 Sin	ESE 9 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
25/11/23	Diurnal/Nocturnal	Fauna cameras	17.6 Sin	23.8 Sin	NNW 4 Sin	18.2 Sin
26/11/23	Diurnal/Nocturnal	Fauna cameras	18.1 Sin	33.4 Sin	NW 22 Sin	2.0 Sin
27/11/23	Diurnal/Nocturnal	Fauna cameras	16.3 Sin	31.3 Sin	SW 9 Sin	0 Sin
28/11/23	Diurnal/Nocturnal	Fauna cameras	18.7 Sin	24.1 Sin	E 15 Sin	11.4 Sin
29/11/23	Diurnal/Nocturnal	Fauna cameras	19.4 Sin	31.3 Sin	E 11 Sin	4.4 Sin
30/11/23	Diurnal/Nocturnal	Fauna cameras	15.8 Sin	30.6 Sin	NW 19 Sin	15.0 Sin
December 2023						
01/12/23	Diurnal/Nocturnal	Fauna cameras	18.2 Sin	32.9 Sin	NW 11 Sin	0 Sin
02/12/23	Diurnal/Nocturnal	Fauna cameras	18.4 Sin	29.2 Sin	WNW 6 Sin	1.2 Sin
03/12/23	Diurnal/Nocturnal	Fauna cameras	16.0 Sin	32.5 Sin	WNW 6 Sin	0 Sin
04/12/23	Diurnal/Nocturnal	Fauna cameras	17.1 Sin	27.0 Sin	SE 7 Sin	0 Sin
05/12/23	Diurnal/Nocturnal	Fauna cameras	14.6 Sin	37.0 Sin	W 6 Sin	0 Sin
06/12/23	Diurnal/Nocturnal	Fauna cameras	21.9 Sin	31.9 Sin	E 15 Sin	0 Sin
07/12/23	Diurnal/Nocturnal	Fauna cameras	17.7 Sin	37.5 Sin	NW 6 Sin	0 Sin
08/12/23	Diurnal/Nocturnal	Fauna cameras	18.2 Sin	40.8 Sin	NW 4 Sin	0 Sin
09/12/23	Diurnal/Nocturnal	Fauna cameras	23.9 Sin	42.5 Sin	NW 19 Sin	0 Sin
10/12/23	Diurnal/Nocturnal	Fauna cameras	21.6 Sin	33.2 Sin	S 11 Sin	0 Sin
11/12/23	Diurnal/Nocturnal	Fauna cameras	19.6 Sin	36.3 Sin	S 2 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
12/12/23	Diurnal/Nocturnal	Fauna cameras	21.2 Sin	32.4 Sin	E 20 Sin	0 Sin
13/12/23	Diurnal/Nocturnal	Fauna cameras	19.5 Sin	37.5 Sin	SSW 4 Sin	0 Sin
14/12/23	Diurnal/Nocturnal	Fauna cameras	23.7 Sin	40.3 Sin	NW 19 Sin	0 Sin
15/12/23	Diurnal/Nocturnal	Fauna cameras	20.3 Sin	31.3 Sin	E 4 Sin	0 Sin
16/12/23	Diurnal/Nocturnal	Fauna cameras	16.4 Sin	38.0 Sin	WNW 6 Sin	0 Sin
17/12/23	Diurnal/Nocturnal	Fauna cameras	18.9 Sin	30.3 Sin	ESE 15 Sin	0 Sin
18/12/23	Diurnal/Nocturnal	Fauna cameras	21.8 Sin	37.0 Sin	ESE 13 Sin	0 Sin
19/12/23	Diurnal/Nocturnal	Fauna cameras	22.9 Sin	33.8 Sin	WNW 4 Sin	0 Sin
20/12/23	Diurnal/Nocturnal	Fauna cameras	19.8 Sin	21.2 Sin	NE 4 Sin	10.2 Sin
21/12/23	Diurnal/Nocturnal	Fauna cameras	16.4 Sin	22.6 Sin	SSW 9 Sin	20.6 Sin
22/12/23	Diurnal/Nocturnal	Fauna cameras	17.2 Sin	26.6 Sin	SSW 9 Sin	0 Sin
23/12/23	Diurnal/Nocturnal	Fauna cameras	13.7 Sin	29.2 Sin	SSW 6 Sin	0 Sin
24/12/23	Diurnal/Nocturnal	Fauna cameras	15.9 Sin	26.3 Sin	NE 6 Sin	7.8 Sin
25/12/23	Diurnal/Nocturnal	Fauna cameras	17.7 Sin	30.3 Sin	SSE 6 Sin	5.6 Sin
26/12/23	Diurnal/Nocturnal	Fauna cameras	16.9 Sin	31.8 Sin	W 4 Sin	16.6 Sin
27/12/23	Diurnal/Nocturnal	Fauna cameras	16.5 Sin	31.8 Sin	NW 9 Sin	0.8 Sin
28/12/23	Diurnal/Nocturnal	Fauna cameras	16.4 Sin	33.6 Sin	NW 7 Sin	0 Sin
29/12/23	Diurnal/Nocturnal	Fauna cameras	17.9 Sin	32.5 Sin	NW 2 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
30/12/23	Diurnal/Nocturnal	Fauna cameras	18.9 Sin	31.4 Sin	SSW 7 Sin	9.0 Sin
31/12/23	Diurnal/Nocturnal	Fauna cameras	18.0 Sin	22.7 Sin	SE 20 Sin	0 Sin
January 2024						
01/01/24	Diurnal/Nocturnal	Fauna cameras	19.1 Sin	28.1 Sin	E 24 Sin	0 Sin
02/01/24	Diurnal/Nocturnal	Fauna cameras	17.7 Sin	31.2 Sin	ENE 7 Sin	0 Sin
03/01/24	Diurnal/Nocturnal	Fauna cameras	18.1 Sin	32.7 Sin	ESE 6 Sin	0 Sin
04/01/24	Diurnal/Nocturnal	Fauna cameras	18.8 Sin	33.9 Sin	NNW 6 Sin	0 Sin
05/01/24	Diurnal/Nocturnal	Fauna cameras	19.9 Sin	24.6 Sin	S 9 Sin	17.2 Sin
06/01/24	Diurnal/Nocturnal	Fauna cameras	17.3 Sin	27.4 Sin	SSE 6 Sin	0 Sin
07/01/24	Diurnal/Nocturnal	Fauna cameras	17.3 Sin	32.2 Sin	ENE 6 Sin	0 Sin
08/01/24	Diurnal/Nocturnal	Fauna cameras	18.7 Sin	27.5 Sin	WSW 2 Sin	0 Sin
09/01/24	Diurnal/Nocturnal	Fauna cameras	20.3 Sin	31.2 Sin	NE 6 Sin	2.0 Sin
10/01/24	Diurnal/Nocturnal	Fauna cameras	20.6 Sin	32.2 Sin	SE 6 Sin	3.0 Sin
11/01/24	Diurnal/Nocturnal	Fauna cameras	21.2 Sin	32.3 Sin	SSW 6 Sin	3.6 Sin
12/01/24	Diurnal/Nocturnal	Fauna cameras	22.0 Sin	30.6 Sin	ENE 19 Sin	2.0 Sin
13/01/24	Diurnal/Nocturnal	Fauna cameras	19.3 Sin	34.0 Sin	- Sin	0 Sin
14/01/24	Diurnal/Nocturnal	Fauna cameras	21.2 Sin	26.1 Sin	SSW 13 Sin	0 Sin
15/01/24	Diurnal/Nocturnal	Fauna cameras	19.5 Sin	23.3 Sin	SE 22 Sin	0.4 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
16/01/24	Diurnal/Nocturnal	Fauna cameras	18.3 Sin	26.4 Sin	ESE 13 Sin	0.4 Sin
17/01/24	Diurnal/Nocturnal	Fauna cameras	18.8 Sin	32.6 Sin	ENE 4 Sin	0.8 Sin
18/01/24	Diurnal/Nocturnal	Fauna cameras	21.2 Sin	33.8 Sin	NW 9 Sin	2.0 Sin
19/01/24	Diurnal/Nocturnal	Fauna cameras	15.3 Sin	33.0 Sin	NNW 7 Sin	1.0 Sin
20/01/24	Diurnal/Nocturnal	Fauna cameras	19.8 Sin	31.8 Sin	E 19 Sin	0 Sin
21/01/24	Diurnal/Nocturnal	Fauna cameras	18.6 Sin	39.9 Sin	WNW 6 Sin	0 Sin
22/01/24	Nocturnal	Ultrasonic microbat detector	21.1 Lak	26 Lak	SSE 11 Lak	0 Lak
		Amphibian call-playback and targeted survey (84.6 mm rain during month prior, 28.6 mm rain during fortnight prior, 59% relative humidity at 3 pm)				
		Mammal and Avian call-playback				
		Spotlighting				
		Herpetofauna active searches				
	Diurnal/Nocturnal	Fauna cameras	21.1 Sin	28.8 Sin	SE 11 Sin	0 Sin
23/01/24	Nocturnal	Ultrasonic microbat detector	19.2 Lak	26.2 Lak	WNW 2 Lak	1.2 Lak
		Amphibian call-playback and targeted survey (82 mm rain during month prior, 28.6 mm during fortnight prior, 55% relative humidity at 3 pm)				
		Mammal and Avian call-playback				
		Spotlighting				
		Herpetofauna active searches				
	Diurnal/Nocturnal	Fauna cameras	18.2 Sin	28.4 Sin	ESE 13 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
24/01/24	Nocturnal	Ultrasonic microbat detector	13.2 Ces	37 Ces	NNW 7 Ces	0 Ces
		Amphibian call-playback and targeted survey (83.2 mm rain during the month prior, 28.2 mm during the fortnight prior, 60% relative humidity at 3 pm)				
		Herpetofauna active searches				
		Microbat harp trapping				
	Diurnal/Nocturnal	Fauna cameras	15.4 Sin	37.0 Sin	N 4 Sin	0 Sin
25/01/24	Nocturnal	Ultrasonic microbat detector	21.2 Lak	39 Lak	– Lak	0 Lak
		Mammal and Avian call-playback				
		Spotlighting				
		Amphibian call-playback and targeted survey (83.2 mm rain during the month prior, 28.2 mm rain during the fortnight prior, 33% relative humidity at 3 pm)				
		Herpetofauna active searches				
		Microbat harp trapping				
	Diurnal/Nocturnal	Fauna cameras	21.7 Sin	41.5 Sin	NW 11 Sin	0 Sin
26/01/24	Diurnal/Nocturnal	Fauna cameras	23.8 Sin	41.3 Sin	NW 28 Sin	0 Sin
27/01/24	Diurnal/Nocturnal	Fauna cameras	21.6 Sin	24.8 Sin	ESE 19 Sin	0 Sin
28/01/24	Diurnal/Nocturnal	Fauna cameras	19.3 Sin	28.7 Sin	S 6 Sin	0 Sin
29/01/24	Nocturnal	Ultrasonic microbat detector	19.3 Ces	36.5 Ces	ENE 11 Ces	0 Ces
	Diurnal/Nocturnal	Fauna cameras	19.3 Ces 21.1 Sin	36.5 Ces 38.1 Sin	ENE 11 Ces E 11 Sin	0 Ces 0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
30/01/24	Nocturnal	Ultrasonic microbat detector	23 Ces	33.3 Ces	SE 11 Ces	0 Ces
		Herpetofauna active searches				
		Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	23.5 Sin 23 Ces	34.5 Sin 33.3 Ces	E 11 Sin SE 11 Ces	0 Sin 0 Ces
31/01/24	Diurnal	Diurnal bird survey	19.3 Ces	31.1 Ces	– Ces	0 Ces
	Nocturnal	Ultrasonic microbat detector				
	Diurnal/Nocturnal	Fauna cameras	19.3 Ces 20.7 Sin	31.1 Ces 32.4 Sin	– Ces SSE 4 Sin	0 Ces 0 Sin
February 2024						
01/02/24	Nocturnal	Ultrasonic microbat detector	21.9 Ces	32.9 Ces	S 7 Ces	0.4 Ces
		Mammal and Avian call-playback				
		Spotlighting				
		Herpetofauna active searches				
	Diurnal/Nocturnal	Fauna cameras	21.9 Ces 21.5 Sin	32.9 Ces 33.7 Sin	S 7 Ces S 9 Sin	0.4 Ces 0 Sin
02/02/24	Diurnal/Nocturnal	Fauna cameras	17.3 Ces 20.6 Sin	37.2 Ces 38.9 Sin	NW 2 Ces SSW 6 Sin	0 Ces 0 Sin
03/02/24	Diurnal/Nocturnal	Fauna cameras	16.3 Ces 19.6 Sin	29.8 Ces 31.3 Sin	E 9 Ces E 13 Sin	0 Ces 0 Sin
04/02/24	Diurnal/Nocturnal	Fauna cameras	16.3 Ces 18.5 Sin	41.2 Ces 41.6 Sin	- Ces W 6 Sin	0 Ces 0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
05/02/24	Diurnal/Nocturnal	Fauna cameras	22.7 Ces 23.2 Sin	37.0 Ces 36.5 Sin	NW 13 Ces W 4 Sin	0 Ces 0 Sin
06/02/24	Diurnal	Diurnal bird survey	23.7 Ces	28.3 Ces	- Ces	2.4 Ces
	Diurnal/Nocturnal	Fauna cameras	23.7 Ces 23.3 Sin	28.3 Ces 27.8 Sin	- Ces S 6 Sin	2.4 Ces 0 Sin
07/02/24	Diurnal	General habitat assessment Diurnal bird survey	16.3 Ces	21.1 Ces	- Ces	9.6 Ces
	Diurnal/Nocturnal	Fauna cameras	16.3 Ces 15.6 Sin	21.1 Ces 19.8 Sin	- Ces SSW 9 Sin	9.6 Ces 2.0 Sin
08/02/24	Diurnal	General habitat assessment	16.8 Ces	24.2 Ces	SSE 13 Ces	2.4 Ces
	Diurnal/Nocturnal	Fauna cameras	16.8 Ces 15.8 Sin	24.2 Ces 23.9 Sin	SSE 13 Ces S 7 Sin	2.4 Ces 3.4 Sin
09/02/24	Diurnal/Nocturnal	Fauna cameras	14.1 Ces 16.9 Sin	27.3 Ces 28.6 Sin	SW 9 Ces S 9 Sin	0 Ces 0 Sin
10/02/24	Diurnal/Nocturnal	Fauna cameras	19.4 Ces 18.7 Sin	26.3 Ces 25.8 Sin	SSE 20 Ces S 17 Sin	3.0 Ces 0.2 Sin
11/02/24	Diurnal/Nocturnal	Fauna cameras	20.5 Ces 19.1 Sin	24.8 Ces 24.3 Sin	SSE 19 Ces S 9 Sin	0 Ces 0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
12/02/24	Diurnal	Diurnal bird survey	18.3 Sin	33.1 Sin	E 11 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	Mammal and Avian call-playback	15.5 Ces	32.6 Ces	ENE 13 Ces	0 Ces
		Amphibian call-playback and targeted survey (37.4 mm rain during the month prior, 18.2 mm during the fortnight prior, 44% relative humidity at 3 pm)				
		Herpetofauna active searches				
	Diurnal/Nocturnal	Fauna cameras	15.5 Ces 18.3 Sin	32.6 Ces 33.1 Sin	ENE 13 Ces E 11 Sin	0 Ces 0 Sin
		Ultrasonic microbat detector				
13/02/24	Diurnal	Diurnal bird survey	18.9 Sin	35.5 Sin	E 4 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	Microbat harp trapping	16.8 Ces	35.0 Ces	N 6 Ces	0 Ces
		Spotlighting				
		Herpetofauna active searches				
	Diurnal/Nocturnal	Fauna cameras	16.8 Ces 18.9 Sin	35.0 Ces 35.5 Sin	N 6 Ces E 4 Sin	0 Ces 0 Sin
		Ultrasonic microbat detector				
14/02/24	Diurnal	Diurnal bird survey	20.2 Sin	36.5 Sin	NW 17 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	Microbat harp trapping	17.1 Ces	35.8 Ces	NW 19 Ces	2.2 Ces
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	17.1 Ces 20.2 Sin	35.8 Ces 36.5 Sin	NW 19 Ces NW 17 Sin	2.2 Ces 0 Sin
		Ultrasonic microbat detector				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
15/02/24	Diurnal	Diurnal bird survey	19.2 Sin	24.5 Sin	SW 7 Sin	17.8 Sin
		Herpetofauna active searches				
		Koala SATs				
		General habitat assessments	20.2 Ces	24.8 Ces	S 9 Ces	7.8 Ces
	Nocturnal	Microbat harp trapping	20.2 Ces	24.8 Ces	S 9 Ces	7.8 Ces
	Diurnal/Nocturnal	Fauna cameras	20.2 Ces	24.8 Ces	S 9 Ces	7.8 Ces
		Ultrasonic microbat detector	19.2 Sin	24.5 Sin	SW 7 Sin	17.8 Sin
16/02/24	Diurnal	Diurnal bird survey	18.5 Sin	31.8 Sin	SW 6 Sin	0.2 Sin
	Nocturnal	Herpetofauna active searches	19.3 Ces	30.9 Ces	SSE 7 Ces	0.2 Ces
		Amphibian call-playback and targeted survey (27.6 mm rain during the fortnight prior, 62% relative humidity at 3 pm)				
		Spotlighting				
		Ultrasonic microbat detector				
	Diurnal/Nocturnal	Fauna cameras	19.3 Ces	30.9 Ces	SSE 7 Ces	0.2 Ces
			18.5 Sin	31.8 Sin	SW 6 Sin	0.2 Sin
		Acoustic detector	19.3 Ces	30.9 Ces	SSE 7 Ces	0.2 Ces
17/02/24	Nocturnal	Mammal and Avian call-playback	18.4 Ces	34.3 Ces	E 6 Ces	0 Ces
		Amphibian call-playback and targeted survey (27.6 mm rain during the fortnight prior, 47% relative humidity at 3 pm)				
		Ultrasonic microbat detector				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	18.4 Ces	34.3 Ces	E 6 Ces	0 Ces
			19.7 Sin	33.4 Sin	W 6 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
18/02/24	Nocturnal	Mammal and Avian call-playback	17.3 Ces	33.1 Ces	NNE 9 Ces	16.2 Ces
		Ultrasonic microbat detector				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	17.3 Ces 18.6 Sin	33.1 Ces 33.6 Sin	NNE 9 Ces SW 4 Sin	16.2 Ces 3.0 Sin
19/02/24	Nocturnal	General habitat assessment	18.1 Lak	29.9 Lak	- Lak	0 Lak
		Amphibian call-playback and targeted survey (67 mm rain during the fortnight prior, 95% relative humidity at 3 pm)				
		Spotlighting				
		Ultrasonic microbat detector	19.4 Ces	24.6 Ces	NNW 9 Ces	1.0 Ces
	Diurnal/Nocturnal	Fauna cameras	19.4 Ces 18.6 Sin	24.6 Ces 25.1 Sin	NNW 9 Ces S 7 Sin	1.0 Ces 6.2 Sin
20/02/24	Diurnal	Diurnal bird survey	16.8 Ces	– Ces	E 2 Ces	0.8 Ces
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	General habitat assessment				
		Mammal and Avian call-playback				
		Ultrasonic microbat detector				
	Diurnal/Nocturnal	Fauna cameras	16.8 Ces 18.2 Sin	- Ces 25.1 Sin	E 2 Ces SW 6 Sin	0.8 Ces 0.6 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
21/02/24	Nocturnal	Amphibian call-playback and targeted survey (69.8 mm rain during the fortnight prior, 68% relative humidity at 3 pm)	17.5 Lak	27.7 Lak	SW 6 Lak	19.2 Lak
		General habitat assessment				
		Ultrasonic microbat detector	16.5 Ces	29.8 Ces	- Ces	0 Ces
	Diurnal/Nocturnal	Fauna cameras	16.5 Ces 18.6 Sin	29.8 Ces 29.4 Sin	- Ces S 9 Sin	0 Ces 23.0 Sin
22/02/24	Diurnal	Diurnal bird survey	18.4 Ces	34 Ces	– Ces	0 Ces
		Koala SATS				
		Herpetofauna active searches				
	Nocturnal	Ultrasonic microbat detector				
		Amphibian call-playback and targeted survey (55.8 mm during the month prior, 54.4 mm during the fortnight prior, 47% relative humidity at 3 pm)	18.4 Ces 20.0 Sin	34 Ces 34.0 Sin	– Ces SSW 2 Sin	0 Ces 0 Sin
		Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras				
23/02/24	Nocturnal	Amphibian call-playback and targeted survey (80.4 mm rain during the fortnight prior, 32% relative humidity at 3 pm)	18.8 Lak	39.1 Lak	NNW 6 Lak	0 Lak
		Spotlighting				
		Mammal and Avian call-playback				
	Diurnal/Nocturnal	Fauna cameras	19.3 Ces 21.9 Sin	38.4 Ces 38.9 Sin	NW 15 Ces NW 11 Sin	0 Ces 0 Sin
24/02/24	Diurnal/Nocturnal	Fauna cameras	21.6 Ces 21.0 Sin	22.5 Ces 22.2 Sin	S 15 Ces S 7 Sin	3.4 Ces 2.2 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
25/02/24	Diurnal/Nocturnal	Fauna cameras	19.0 Ces 18.3 Sin	28.9 Ces 29.0 Sin	W 2 Ces SSW 6 Sin	0 Ces 0.6 Sin
26/02/24	Diurnal	Fauna cameras and ultrasonic microbat detector retrieval/ Opportunistic	14.3 Ces 14.6 Lak	35.1 Ces 33.1 Lak	NW 9 Ces NNW 4 Lak	0.2 Ces 0 Lak
		Diurnal bird survey	17.3 Sin	36.0 Sin	NW 6 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
		General habitat assessment				
	Nocturnal	Ultrasonic microbat detector	14.3 Ces 17.3 Sin	35.1 Ces 36.0 Sin	NW 9 Ces NW 6 Sin	0.2 Ces 0 Sin
	Diurnal/Nocturnal	Fauna cameras	14.3 Ces 17.3 Sin	35.1 Ces 36.0 Sin	NW 9 Ces NW 6 Sin	0.2 Ces 0 Sin
27/02/24	Diurnal	Fauna cameras and ultrasonic microbat detector retrieval/ Opportunistic	20.2 Ces	25.4 Ces	SW 6 Ces	2.2 Ces
		Diurnal bird survey	20.1 Sin	27.1 Sin	SW 7 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	Ultrasonic microbat detector				
	Diurnal/Nocturnal	Fauna cameras	20.2 Ces 20.1 Sin	25.4 Ces 27.1 Sin	SW 6 Ces SW 7 Sin	2.2 Ces 0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
28/02/24	Diurnal	Fauna cameras and ultrasonic microbat detector retrieval/ Opportunistic	18.3 Ces 20.2 Sin	33.7 Ces 33.4 Sin	- Ces SE 6 Sin	0.4 Ces 0.2 Sin
		Diurnal bird survey	20.2 Sin	33.4 Sin	SE 6 Sin	0.2 Sin
		Koala SATs				
		Herpetofauna active searches				
	Nocturnal	Ultrasonic microbat detector				
29/02/24	Diurnal	Diurnal bird survey	21.7 Sin	40 Sin	NW 17 Sin	0 Sin
		Koala SATs				
		Herpetofauna active searches				
		Ultrasonic microbat detector retrieval/ Opportunistic				
April 2024						
15/04/24	Diurnal	Diurnal bird survey	10.5 Ces	27.7 Ces	– Ces	0.2 Ces
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
16/04/24	Diurnal	Diurnal bird survey	13.2 Ces	26.6 Ces	NNW 6 Ces	0 Ces
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
17/04/24	Diurnal	Diurnal bird survey	12.6 Ces	26.5 Ces	– Ces	0 Ces
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
18/04/24	Diurnal	Diurnal bird survey	12 Ces	25.4 Ces	NE 7 Ces	6.4 Ces
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
30/04/24	Nocturnal	Mammal and Avian call-playback	14.1 Sin	21 Sin	SSW 13 Sin	0 Sin
		Spotlighting				
May 2024						
01/05/24	Nocturnal	Mammal and Avian call-playback	12.1 Sin	16.4 Sin	SSW 9 Sin	11.6 Sin
		Spotlighting				
02/05/24	Diurnal	Diurnal bird survey	12.7 Sin	20.1 Sin	SSW 15 Sin	1.6 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
03/05/24	Diurnal	Diurnal bird survey	10.9 Sin	20.6 Sin	S 9 Sin	0 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
13/05/24	Diurnal	Diurnal bird survey	12.6 Sin	21.4 Sin	WSW 9 Sin	0 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
14/05/24	Diurnal	Diurnal bird survey	9.9 Sin	23.1 Sin	WSW 7 Sin	0 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
15/05/24	Nocturnal	Mammal and Avian call-playback	11 Sin	22.5 Sin	NNE 4 Sin	0 Sin
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras				
16/05/24	Nocturnal	Mammal and Avian call-playback	10.3 Sin	22 Sin	SE 2 Sin	0 Sin
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras				
17/05/24	Diurnal	Diurnal bird survey	10.6 Sin	21.3 Sin	WNW 7 Sin	0 Sin
	Diurnal/Nocturnal	Fauna cameras				
18/05/24	Diurnal/Nocturnal	Fauna cameras	10.6 Sin	15.1 Sin	SSW 22 Sin	0 Sin
19/05/24	Diurnal/Nocturnal	Fauna cameras	7.8 Sin	18.7 Sin	W 11 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
20/05/24	Diurnal	Diurnal bird survey	3.1 Ces	18.3 Ces	NW 9 Ces	0.2 Ces
		Ultrasonic microbat detector retrieval/ Opportunistic				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	4.1 Sin	17.7 Sin	WNW 9 Sin	0 Sin
21/05/24	Diurnal	Diurnal bird survey	10.9 Ces	17.9 Ces	SSW 13 Ces	0 Ces
		Ultrasonic microbat detector retrieval/ Opportunistic				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	9.4 Sin	18.1 Sin	SSW 19 Sin	0 Sin
22/05/24	Diurnal	Diurnal bird survey	4.6 Ces	19.2 Ces	N 9 Ces	0 Ces
	Nocturnal	Stag-watch				
		Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	7.3 Sin	19.6 Sin	W 9 Sin	0 Sin
23/05/24	Diurnal	Diurnal bird survey	4.1 Ces	19.6 Ces	NW 9 Ces	0 Ces
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	7.2 Sin	19.8 Sin	W 2 Sin	0.4 Sin
24/05/24	Diurnal/Nocturnal	Fauna cameras	7.5 Sin	20.1 Sin	SW 4 Sin	0 Sin
25/05/24	Diurnal/Nocturnal	Fauna cameras	8.4 Sin	19.1 Sin	WSW 4 Sin	0 Sin
26/05/24	Diurnal/Nocturnal	Fauna cameras	10.0 Sin	20.7 Sin	W 6 Sin	0 Sin
27/05/24	Diurnal/Nocturnal	Fauna cameras	7.4 Sin	21.4 Sin	WSW 4 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
28/05/24	Diurnal/Nocturnal	Fauna cameras	7.3 Sin	21.3 Sin	WSW 6 Sin	0 Sin
29/05/24	Diurnal/Nocturnal	Fauna cameras	6.5 Sin	22.2 Sin	W 4 Sin	0 Sin
30/05/24	Diurnal/Nocturnal	Fauna cameras	7.9 Sin	23.1 Sin	WSW 6 Sin	0.6 Sin
31/05/24	Diurnal/Nocturnal	Fauna cameras	11.9 Sin	21.9 Sin	NNW 9 Sin	0 Sin
June 2024						
01/06/24	Diurnal/Nocturnal	Fauna cameras	11.8 Sin	13.5 Sin	S 11 Sin	1.0 Sin
02/06/24	Diurnal/Nocturnal	Fauna cameras	10.9 Sin	13.2 Sin	WNW 4 Sin	0.8 Sin
03/06/24	Diurnal/Nocturnal	Fauna cameras	8.3 Sin	16.4 Sin	NW 22 Sin	0 Sin
04/06/24	Diurnal	Koala SATs	7.7 Sin	14.3 Sin	NW 15 Sin	0 Sin
	Diurnal/Nocturnal	Fauna cameras				
05/06/24	Diurnal	Diurnal bird survey	5.9 Sin	17.4 Sin	– Sin	0.4 Sin
		Fauna cameras rebaited/ Opportunistic				
	Diurnal/Nocturnal	Fauna cameras				
06/06/24	Diurnal	Fauna cameras rebaited/ Opportunistic	8.9 Sin	19 Sin	WSW 4 Sin	0 Sin
		Diurnal bird survey				
	Diurnal/Nocturnal	Fauna cameras				
07/06/24	Diurnal/Nocturnal	Fauna cameras	10.4 Sin	13.5 Sin	NW 17 Sin	6.6 Sin
08/06/24	Diurnal/Nocturnal	Fauna cameras	10.2 Sin	17.6 Sin	NW 11 Sin	1.6 Sin
09/06/24	Diurnal/Nocturnal	Fauna cameras	9.3 Sin	17.8 Sin	NW 20 Sin	0 Sin
10/06/24	Diurnal/Nocturnal	Fauna cameras	5.7 Sin	17.6 Sin	WNW 9 Sin	0 Sin
11/06/24	Diurnal/Nocturnal	Fauna cameras	5.3 Sin	17.9 Sin	WSW 7 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
12/06/24	Diurnal/Nocturnal	Fauna cameras	8.7 Sin	19.9 Sin	NW 19 Sin	0 Sin
13/06/24	Diurnal/Nocturnal	Fauna cameras	6.0 Sin	15.9 Sin	SSW 15 Sin	0 Sin
14/06/24	Diurnal/Nocturnal	Fauna cameras	9.5 Sin	16.3 Sin	W 6 Sin	0 Sin
15/06/24	Diurnal/Nocturnal	Fauna cameras	10.7 Sin	15.3 Sin	SSW 6 Sin	0.8 Sin
16/06/24	Diurnal/Nocturnal	Fauna cameras	8.2 Sin	17.4 Sin	W 7 Sin	0.4 Sin
17/06/24	Nocturnal	Mammal and Avian call-playback	4.5 Ces	17.4 Ces	NNW 20 Ces	0 Ces
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	4.5 Sin	16.6 Sin	WNW 9 Sin	0 Sin
18/06/24	Nocturnal	Mammal and Avian call-playback	4.7 Ces	17.4 Ces	NNW 11 Ces	0 Ces
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	4.5 Sin	17.7 Sin	WNW 7 Sin	0 Sin
19/06/24	Nocturnal	Mammal and Avian call-playback	0.8 Ces	15..2 Ces	NNW 19 Ces	0 Ces
		Spotlighting				
	Diurnal	Fauna cameras rebaited/ Opportunistic	3 Sin	15.7 Sin	WNW 11 Sin	0 Sin
	Diurnal/Nocturnal	Fauna cameras				
20/06/24	Diurnal	Diurnal bird survey	3.8 Sin	17.1 Sin	WSW 6 Sin	0 Sin
		Koala SATs				
		Fauna cameras rebaited/ Opportunistic				
	Nocturnal	Mammal and Avian call-playback	0.2 Ces	17.3 Ces	- Ces	0 Ces
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	3.8 Sin	17.1 Sin	WSW 6 Sin	0 Sin
21/06/24	Diurnal/Nocturnal	Fauna cameras	6.2 Sin	18.9 Sin	WSW 4 Sin	0 Sin
22/06/24	Diurnal/Nocturnal	Fauna cameras	5.0 Sin	14.4 Sin	NW 6 Sin	1.4 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
23/06/24	Diurnal/Nocturnal	Fauna cameras	9.0 Sin	16.7 Sin	SSW 19 Sin	0 Sin
24/06/24	Nocturnal	Mammal and Avian call-playback	4.0 Sin	17.0 Sin	NW 6 Sin	0.2 Sin
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras				
25/06/24	Nocturnal	Mammal and Avian call-playback	3.8 Sin	19.6 Sin	W 4 Sin	0 Sin
		Spotlighting				
	Diurnal	Fauna camera retrieval/ Opportunistic				
	Diurnal/Nocturnal	Fauna cameras				
26/06/24	Nocturnal	Mammal and Avian call-playback	6.7 Sin	21.8 Sin	W 4 Sin	0 Sin
		Spotlighting				
	Diurnal	Fauna camera retrieval/ Opportunistic				
	Diurnal/Nocturnal	Fauna cameras				
27/06/24	Diurnal	Diurnal bird survey	5.1 Sin	18.5 Sin	W 6 Sin	0.2 Sin
		Koala SATs				
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras				
28/06/24	Diurnal/Nocturnal	Fauna cameras	3.1 Sin	18.3 Sin	W 4 Sin	0 Sin
29/06/24	Diurnal/Nocturnal	Fauna cameras	2.5 Sin	21.6 Sin	WNW 6 Sin	0 Sin
30/06/24	Diurnal/Nocturnal	Fauna cameras	6.5 Sin	15.5 Sin	SW 4 Sin	10.4 Sin
July 2024						
01/07/24	Diurnal/Nocturnal	Fauna cameras	8.9 Sin	15.8 Sin	SSW 11 Sin	5.4 Sin
02/07/24	Diurnal/Nocturnal	Fauna cameras	8.8 Sin	14.9 Sin	S 9 Sin	1.4 Sin
03/07/24	Diurnal	Fauna camera retrieval/ Opportunistic	9.2 Sin	16.1 Sin	SSW 9 Sin	0.6 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
08/07/24	Nocturnal	Mammal and Avian call-playback	10.6 Ces	15.8 Ces	– Ces	1 Ces
		Spotlighting				
09/07/24	Nocturnal	Mammal and Avian call-playback	11.6 Ces	17.7 Ces	– Ces	3.6 Ces
		Spotlighting				
10/07/24	Nocturnal	Mammal and Avian call-playback	6.1 Ces	17.9 Ces	NNW 19 Ces	2.2 Ces
		Spotlighting				
11/07/24	Nocturnal	Mammal and Avian call-playback	2.9 Ces	16.8 Ces	– Ces	0 Ces
		Spotlighting				
22/07/24	Diurnal	General habitat assessment/ Opportunistic	3.9 Sin	17.8 Sin	WNW 7 Sin	0 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
23/07/24	Diurnal	Herpetofauna active searches	5.5 Sin	19.1 Sin	NW 7 Sin	0 Sin
	Nocturnal	Mammal and Avian call-playback				
		Spotlighting				
24/07/24	Diurnal	Herpetofauna active searches/ Opportunistic	4.7 Sin	19.6 Sin	WNW 9 Sin	0 Sin
30/07/24	Nocturnal	Mammal and Avian call-playback	4.2 Ces	15.8 Ces	WSW 11 Ces	0 Ces
		Spotlighting				
31/07/24	Nocturnal	Mammal and Avian call-playback	7.2 Ces	16.0 Ces	SW 13 Ces	0 Ces
		Spotlighting				
August 2024						
01/08/24	Nocturnal	Mammal and Avian call-playback	4.3 Ces	15.7 Ces	SSW 9 Ces	0 Ces
		Spotlighting				
13/08/24	Diurnal	Herpetofauna active searches/ Opportunistic	13.3 Sin	20.5 Sin	ESE 15 Sin	2.0 Sin
20/08/24	Nocturnal	Mammal and Avian call-playback	7.4 Sin	21.6 Sin	W 6 Sin	0 Sin
		Spotlighting				
21/08/24	Nocturnal	Mammal and Avian call-playback	10.7 Sin	25.4 Sin	NW 11 Sin	0 Sin
		Spotlighting				
22/08/24	Nocturnal	Mammal and Avian call-playback	10.6 Sin	22.8 Sin	W 4 Sin	0 Sin
		Spotlighting				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
26/08/24	Nocturnal	Thermal drone survey	14.3 Ces	24.4 Ces	NNW 20 Ces	7.6 Ces
27/08/24	Nocturnal	Thermal drone survey	3.4 Ces	24.2 Ces	NNW 17 Ces	0 Ces
28/08/24	Nocturnal	Thermal drone survey	9.9 Ces	28.1 Ces	NW 17 Ces	0 Ces
29/08/24	Nocturnal	Thermal drone survey	7.1 Ces	22.5 Ces	NNW 19 Ces	0 Ces
September 2024						
02/09/24	Nocturnal	Thermal drone survey	6.1 Lak	26.9 Lak	NW 13 Lak	0 Lak
03/09/24	Nocturnal	Thermal drone survey	2.9 Lak	18.5 Lak	WSW 11 Lak	0 Lak
04/09/24	Nocturnal	Thermal drone survey	1.9 Lak	21.7 Lak	N 4 Lak	0 Lak
05/09/24	Nocturnal	Thermal drone survey	3.7 Lak	26.4 Lak	NNW 9 Lak	0 Lak
06/09/24	Nocturnal	Thermal drone survey	6.8 Lak	27.8 Lak	NNW 2 Lak	0 Lak
07/09/24	Nocturnal	Thermal drone survey	19.6 Lak	29.0 Lak	NW 11 Lak	0 Lak
09/09/24	Diurnal	Microbat roost searches/General habitat assessments	8.6 Ces	22.3 Ces	NNW 20 Ces	0 Ces
10/09/24	Diurnal	Microbat roost searches/General habitat assessments	3.9 Ces	22.6 Ces	NNE 9 Ces	0 Ces
11/09/24	Diurnal	Microbat roost searches/General habitat assessments	5.8 Lak	26.2 Lak	NNE 9 Lak	0 Lak
12/09/24	Diurnal	Microbat roost searches/General habitat assessments	15.0 Ces 14.8 Lak	22.1 Ces 22.6 Lak	NW 9 Ces SW 6 Lak	0.2 Ces 0 Lak
13/09/24	Diurnal	Microbat roost searches/General habitat assessments	11.1 Ces	18.0 Ces	SSE 9 Ces	6.6 Ces
23/09/24	Diurnal	Herpetofauna active searches	4.3 Ces	27.2 Ces	NNW 20 Ces	0 Ces
		Opportunistic				
	Diurnal/Nocturnal	Fauna cameras				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
24/09/24	Diurnal	Herpetofauna active searches	6.2 Ces	25.0 Ces	NNE 7 Ces	0 Ces
		Microbat roost searches/General habitat assessments				
		Opportunistic				
	Diurnal/Nocturnal	Fauna cameras				
25/09/24	Diurnal	Opportunistic	13.4 Lak	29.2 Lak	NNW 2 Lak	0 Lak
		Diurnal bird survey				
		Herpetofauna active searches	11.2 Ces	28.7 Ces	NNW 13 Ces	0 Ces
	Nocturnal	Ultrasonic microbat detector				
		Call playback				
	Diurnal/Nocturnal	Fauna cameras	13.4 Lak 11.2 Ces	29.2 Lak 28.7 Ces	NNW 2 Lak NNW 13 Ces	0 Lak 0 Ces
26/09/24	Diurnal	Herpetofauna active searches	13.5 Lak	16.9 Lak	SSW 4 Lak	19.2 Lak
		General habitat assessment/ Opportunistic				
		Amphibian call-playback and targeted survey (28.2 mm rain during the fortnight prior, 92% relative humidity at 3 pm)				
	Diurnal/Nocturnal	Fauna cameras	13.5 Lak 13.6 Ces	16.9 Lak 15.4 Ces	SSW 4 Lak S 11 Ces	19.2 Lak 10.6 Ces
27/09/24	Diurnal	Herpetofauna active searches	11.5 Ces	17.9 Ces	ESE 19 Ces	18.0 Ces
	Diurnal/Nocturnal	Fauna cameras	11.5 Ces 11.8 Lak	17.9 Ces 18.2 Lak	ESE 19 Ces SE 11 Lak	18.0 Ces 33.8 Lak
28/09/24	Diurnal/Nocturnal	Fauna cameras	10.6 Ces 11.4 Lak	19.3 Ces 19.4 Lak	E 9 Ces SE 11 Lak	1.6 Ces 1.8 Lak

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
29/09/24	Diurnal/Nocturnal	Fauna cameras	13.2 Ces 12.0 Lak	21.2 Ces 20.3 Lak	ESE 11 Ces ESE 2 Lak	2.4 Ces 4.6 Lak
30/09/24	Diurnal/Nocturnal	Fauna cameras	14.7 Ces 14.3 Lak	23.0 Ces 21.4 Lak	NNW 9 Ces WNW 2 Lak	5.8 Ces 6.6 Lak
October 2024						
01/10/24	Diurnal/Nocturnal	Fauna cameras	6.2 Ces 7.8 Lak	23.1 Ces 22.2 Lak	NE 4 Ces - Lak	0.2 Ces 0.8 Lak
02/10/24	Diurnal/Nocturnal	Fauna cameras	10.9 Ces 11.1 Lak	- Ces 20.0 Lak	SE 9 Ces SSW 6 Lak	0 Ces 0.8 Lak
03/10/24	Diurnal/Nocturnal	Fauna cameras	11.0 Ces 12.1 Lak	21.4 Ces 21.0 Lak	ENE 11 Ces - Lak	- Ces 0.8 Lak
04/10/24	Diurnal/Nocturnal	Fauna cameras	5.1 Ces 6.0 Lak	25.7 Ces 24.2 Lak	ENE 6 Ces SSW 2 Lak	0 Ces 0 Lak
05/10/24	Diurnal/Nocturnal	Fauna cameras	12.8 Ces 14.3 Lak	27.7 Ces 28.8 Lak	NW 26 Ces NW 11 Lak	0 Ces 0 Lak
06/10/24	Diurnal/Nocturnal	Fauna cameras	10.6 Ces 9.3 Lak	29.2 Ces 29.7 Lak	NNW 17 Ces N 2 Lak	0 Ces 0 Lak

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
07/10/24	Nocturnal	Amphibian call-playback and targeted survey (68.4 mm rain during the fortnight prior, 22% relative humidity at 3 pm)	8.7 Lak	30.6 Lak	NNE 6 Lak	0 Lak
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	6.9 Ces 8.7 Lak	30.1 Ces 30.6 Lak	NNW 11 Ces NNE 6 Lak	0 Ces 0 Lak
08/10/24	Nocturnal	Amphibian call-playback and targeted survey (69 mm rain during the fortnight prior, 91% relative humidity at 3 pm)	12.4 Lak	17.4 Lak	SSW 4 Lak	0.6 Lak
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	11.1 Ces 12.4 Lak	20.3 Ces 17.4 Lak	SSE 11 Ces SSW 4 Lak	0 Ces 0.6 Lak
09/10/24	Diurnal	Fauna camera retrieval	12.3 Ces 12.4 Lak	18.2 Ces 16.9 Lak	SE 11 Ces SSE 6 Lak	0.8 Ces 2.6 Lak
	Nocturnal	Thermal drone survey	12.4 Lak	16.9 Lak	SSE 6 Lak	2.6 Lak
		Spotlighting				
	Diurnal/Nocturnal	Fauna cameras	12.3 Ces	18.2 Ces	SE 11 Ces	0.8 Ces
10/10/24	Diurnal	Fauna camera retrieval	12.1 Ces	24.4 Ces	E 7 Ces	1.0 Ces
	Nocturnal	Spotlighting	12.0 Lak	23.0 Lak	- Lak	6.8 Lak
		Amphibian call-playback and targeted survey (52.4 mm rain during the fortnight prior, 61% relative humidity at 3 pm)				
		Thermal drone survey				
11/10/24	Nocturnal	Amphibian call-playback and targeted survey (25.4 mm rain during the fortnight prior, 65% relative humidity at 3 pm)	10.4 Lak	24.9 Lak	WSW 7 Lak	0 Lak
		Spotlighting				
		Thermal drone survey				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
14/10/24	Diurnal	Herpetofauna active searches	10.0 Sin	19.8 Sin	NW 6 Sin	0 Sin
		Artificial habitat surveys – Delma spp.				
	Nocturnal	Amphibian call-playback and targeted survey (Ces – 2.0 mm rain during the fortnight prior, 69% relative humidity at 3 pm; Lak – 17.6 mm rain during the fortnight prior, 57% relative humidity at 3 pm)	8.4 Lak 7.5 Ces	24.2 Lak 20.6 Ces	N 2 Lak N 11 Ces	0.2 Lak 0 Ces
		Thermal drone survey	7.5 Ces	20.6 Ces	N 11 Ces	0 Ces
15/10/24	Diurnal	Herpetofauna active searches	13.2 Sin	18.4 Sin	SSW 11 Sin	15.8 Sin
		Artificial habitat surveys – Delma spp.				
	Nocturnal	Amphibian call-playback and targeted survey (Ces – 14.2 mm rain during the fortnight prior, 84% relative humidity at 3 pm; Lak – 17.0 mm rain during the fortnight prior, 72% relative humidity at 3 pm)	14.7 Lak 12.5 Ces	18.4 Lak 19.3 Ces	SSW 2 Lak S 7 Ces	24.0 Lak 12.2 Ces
		Thermal drone survey	12.5 Ces	19.3 Ces	S 7 Ces	12.2 Ces
16/10/24	Diurnal	Herpetofauna active searches	11.8 Sin	17.6 Sin	S 6 Sin	5.8 Sin
		Artificial habitat surveys – Delma spp.				
	Nocturnal	Amphibian call-playback and targeted survey (Ces – 14.0 mm rain during the fortnight prior, 83% relative humidity at 3 pm; Lak – 40.2 mm rain during the fortnight prior, 65% relative humidity at 3 pm)	11.1 Lak 9.5 Ces	19.7 Lak 18.5 Ces	SSW 2 Lak SSE 9 Ces	2.4 Lak 0.6 Ces
		Thermal drone survey	11.1 Lak	19.7 Lak	SSW 2 Lak	2.4 Lak

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
17/10/24	Diurnal	Herpetofauna active searches	7.9 Sin	24.0 Sin	SW 2 Sin	4.0 Sin
		Artificial habitat surveys – Delma spp.				
	Nocturnal	Amphibian call-playback and targeted survey (Ces – 14.6 mm rain during the fortnight prior, 56% relative humidity at 3 pm; Lak – 41.8 mm rain during the fortnight prior, 63% relative humidity at 3 pm)	7.2 Lak 7.1 Ces	23.3 Lak 23.9 Ces	- Lak NNW 13 Ces	0.6 Lak 0.8 Ces
		Thermal drone survey	7.2 Lak	23.3 Lak	- Lak	0.6 Lak
18/10/24	Diurnal	Herpetofauna active searches	13.1 Sin	27.1 Sin	- Sin	2.6 Sin
		Artificial habitat surveys – Delma spp.				
	Nocturnal	Amphibian call-playback and targeted survey (Ces – 15.4 mm rain during the fortnight prior, 74% relative humidity at 3 pm; Lak – 42.4 mm rain during the fortnight prior, 71% relative humidity at 3 pm)	14.4 Lak 14.4 Ces	25.4 Lak 26.1 Ces	- Lak - Ces	0.4 Lak - Ces
		Thermal drone survey	14.4 Lak	25.4 Lak	- Lak	0.4 Lak
22/10/24	Diurnal	Artificial habitat surveys – Delma spp.	12.3 Sin	25.6 Sin	SW 6 Sin	0 Sin
23/10/24	Diurnal	Artificial habitat surveys – Delma spp.	11.7 Sin	30.0 Sin	NW 9 Sin	0 Sin
24/10/24	Diurnal	Artificial habitat surveys – Delma spp.	15.9 Sin	27.3 Sin	SSW 6 Sin	0 Sin
29/10/24	Diurnal	Artificial habitat surveys – Delma spp.	14.9 Sin	25.1 Sin	ESE 13 Sin	2.8 Sin
30/10/24	Diurnal	Artificial habitat surveys – Delma spp.	11.3 Sin	30.1 Sin	E 6 Sin	0 Sin
31/10/24	Diurnal	Artificial habitat surveys – Delma spp.	13.3 Sin	31.8 Sin	WNW 9 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
November 2024						
05/11/24	Diurnal	Artificial habitat surveys – Delma spp.	18.0 Sin	24.7 Sin	SE 7 Sin	0 Sin
06/11/24	Diurnal	Artificial habitat surveys – Delma spp.	17.4 Sin	33.8 Sin	ENE 2 Sin	0 Sin
07/11/24	Diurnal	Artificial habitat surveys – Delma spp.	20.2 Sin	39.1 Sin	WNW 4 Sin	0 Sin
12/11/24	Diurnal	Artificial habitat surveys – Delma spp.	16.6 Sin	21.5 Sin	SE 4 Sin	8.2 Sin
19/11/24	Diurnal	Artificial habitat surveys – Delma spp.	16.2 Sin	25.4 Sin	ESE 19 Sin	0.8 Sin
20/11/24	Diurnal	Artificial habitat surveys – Delma spp.	14.6 Sin	27.1 Sin	E 9 Sin	0 Sin
		Opportunistic	12.2 Ces	26.2 Ces	E 15 Ces	0 Ces
21/11/24	Diurnal	Artificial habitat surveys – Delma spp.	15.1 Sin	26.7 Sin	ESE 17 Sin	0 Sin
25/11/24	Nocturnal	Amphibian call-playback and targeted survey (21.0 mm rain during the fortnight prior, 34% relative humidity at 3 pm)	13.9 Ces	34.5 Ces	ENE 9 Ces	0 Ces
26/11/24	Nocturnal	Amphibian call-playback and targeted survey (21.0 mm rain during the fortnight prior, 29% relative humidity at 3 pm)	15.4 Ces	37.4 Ces	NE 2 Ces	0 Ces
	Diurnal	Artificial habitat surveys – Delma spp.	18.1 Sin	37.6 Sin	NW 9 Sin	0 Sin
27/11/24	Diurnal/Nocturnal	Fauna cameras	18.0 Lak	36.4 Lak	NW 9 Lak	0 Lak
	Nocturnal	Amphibian call-playback and targeted survey (13.4 mm rain during the fortnight prior, 29% relative humidity at 3 pm)	16.7 Ces	37.5 Ces	NW 24 Ces	0 Ces
28/11/24	Diurnal/Nocturnal	Fauna cameras	22.1 Lak	26.5 Lak	- Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
		Amphibian call-playback and targeted survey (13.0 mm rain during the fortnight prior, 71% relative humidity at 3 pm)	22.6 Ces	26.0 Ces	- Ces	0.4 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
29/11/24	Diurnal/Nocturnal	Fauna cameras	20.4 Lak	23.4 Lak	SSW 2 Lak	2.8 Lak
	Nocturnal	Ultrasonic microbat detector				
		Amphibian call-playback and targeted survey (9.2 mm rain during the fortnight prior, 77% relative humidity at 3 pm)	19.2 Ces	24.9 Ces	SSE 7 Ces	5.4 Ces
30/11/24	Diurnal/Nocturnal	Fauna cameras	21.2 Lak	26.9 Lak	ENE 6 Lak	5.3 Lak
	Nocturnal	Ultrasonic microbat detector				
December 2024						
01/12/24	Diurnal/Nocturnal	Fauna cameras	19.9 Lak	32.7 Lak	N 7 Lak	2.0 Lak
	Nocturnal	Ultrasonic microbat detector				
02/12/24	Diurnal/Nocturnal	Fauna cameras	15.2 Lak	35.9 Lak	- Lak	2.4 Lak
	Nocturnal	Ultrasonic microbat detector				
03/12/24	Diurnal	Artificial habitat surveys – Delma spp.	20.5 Sin	31.6 Sin	NNW 4 Sin	0 Sin
	Diurnal/Nocturnal	Fauna cameras	17.4 Lak	32.6 Lak	- Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
04/12/24	Diurnal/Nocturnal	Fauna cameras	22.1 Lak	27.9 Lak	S 6 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
05/12/24	Diurnal/Nocturnal	Fauna cameras	19.9 Lak	26.9 Lak	SW 4 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
06/12/24	Diurnal/Nocturnal	Fauna cameras	19.3 Lak	30.4 Lak	ENE 2 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
07/12/24	Diurnal/Nocturnal	Fauna cameras	21.7 Lak	34.3 Lak	- Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector				
08/12/24	Diurnal/Nocturnal	Fauna cameras	20.2 Lak	31.6 Lak	ESE 7 Lak	7.8 Lak
	Nocturnal	Ultrasonic microbat detector				
09/12/24	Diurnal/Nocturnal	Fauna cameras	19.2 Lak	24.7 Lak	- Lak	2.8 Lak
	Nocturnal	Ultrasonic microbat detector				
		Microbat harp trapping	19.4 Ces	26.2 Ces	SSE 11 Ces	0 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
10/12/24	Diurnal/Nocturnal	Fauna cameras	20.1 Lak	27.3 Lak	SSE 7 Lak	0.2 Lak
	Nocturnal	Ultrasonic microbat detector				
		Microbat harp trapping	20.4 Ces	31.5 Ces	NW 7 Ces	0 Ces
11/12/24	Diurnal	Fauna camera re-bait/Ultrasonic microbat detector retrieval/Opportunistic	16.8 Lak	26.6 Lak	NE 6 Lak	0 Lak
	Diurnal/Nocturnal	Fauna cameras				
	Nocturnal	Ultrasonic microbat detector				
		Microbat harp trapping	14.0 Ces	29.6 Ces	SE 6 Ces	0.2 Ces
12/12/24	Diurnal	Fauna camera re-bait/Ultrasonic microbat detector retrieval/Opportunistic	14.4 Lak	30.3 Lak	SE 2 Lak	0 Lak
	Diurnal/Nocturnal	Fauna cameras				
	Nocturnal	Ultrasonic microbat detector	14.1 Ces	35.2 Ces	NW 9 Ces	0 Ces
		Microbat harp trapping	14.4 Lak	30.3 Lak	SE 2 Lak	0 Lak
13/12/24	Diurnal/Nocturnal	Fauna cameras	16.5 Lak	33.3 Lak	- Lak	0 Lak
	Nocturnal	Microbat roost searches	15.2 Ces	37.3 Ces	N 9 Ces	0 Ces
		Ultrasonic microbat detector	15.2 Ces	37.3 Ces	N 9 Ces	0 Ces
			16.5 Lak	33.3 Lak	- Lak	0 Lak
14/12/24	Diurnal/Nocturnal	Fauna cameras	21.9 Lak	30.0 Lak	SW 7 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	21.9 Lak	30.0 Lak	SW 7 Lak	0 Lak
			20.1 Ces	34.1 Ces	S 9 Ces	0 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
15/12/24	Diurnal/Nocturnal	Fauna cameras	20.6 Lak	30.0 Lak	ESE 7 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	20.6 Lak	30.0 Lak	ESE 7 Lak	0 Lak
			17.5 Ces	35.2 Ces	ESE 6 Ces	0 Ces
16/12/24	Diurnal/Nocturnal	Fauna cameras	22.2 Lak	29.6 Lak	ENE 2 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	22.2 Lak	29.6 Lak	ENE 2 Lak	0 Lak
			20.8 Ces	34.0 Ces	E 13 Ces	0 Ces
17/12/24	Diurnal/Nocturnal	Fauna cameras	16.4 Lak	36.3 Lak	N 9 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	16.4 Lak	36.3 Lak	N 9 Lak	0 Lak
			15.7 Ces	40.8 Ces	NNE 9 Ces	0 Ces
18/12/24	Diurnal/Nocturnal	Fauna cameras	17.4 Lak	22.8 Lak	SSE 4 Lak	7.6 Lak
	Diurnal	Ultrasonic microbat detector retrieval/ Opportunistic	17.4 Lak	22.8 Lak	SSE 4 Lak	7.6 Lak
			18.6 Ces	22.0 Ces	SSE 13 Ces	3.8 Ces
19/12/24	Diurnal/Nocturnal	Fauna cameras	13.0 Lak	24.8 Lak	SSE 9 Lak	3.4 Lak
	Nocturnal	Ultrasonic microbat detector/ Opportunistic	11.9 Ces	26.4 Ces	SE 20 Ces	1.6 Ces
20/12/24	Diurnal/Nocturnal	Fauna cameras	12.4 Lak	26.4 Lak	SW 9 Lak	0.2 Lak
	Nocturnal	Ultrasonic microbat detector	9.9 Ces	29.0 Ces	S 13 Ces	0 Ces
21/12/24	Diurnal/Nocturnal	Fauna cameras	12.7 Lak	31.9 Lak	NNE 4 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	11.5 Ces	36.9 Ces	N 11 Ces	0 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
22/12/24	Diurnal/Nocturnal	Fauna cameras	20.6 Lak	28.2 Lak	SSW 2 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	20.7 Ces	32.1 Ces	SE 9 Ces	0 Ces
23/12/24	Diurnal/Nocturnal	Fauna cameras	17.0 Lak	32.1 Lak	WSW 6 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	17.6 Ces	33.9 Ces	NW 17 Ces	0 Ces
24/12/24	Diurnal/Nocturnal	Fauna cameras	10.9 Lak	25.5 Lak	SW 9 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	8.3 Ces	28.3 Ces	SSW 13 Ces	0 Ces
25/12/24	Diurnal/Nocturnal	Fauna cameras	12.9 Lak	28.6 Lak	NNE 4 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	10.5 Ces	32.6 Ces	ESE 4 Ces	0 Ces
26/12/24	Diurnal/Nocturnal	Fauna cameras	15.0 Lak	29.2 Lak	N 6 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	13.0 Ces	36.9 Ces	E 7 Ces	0 Ces
27/12/24	Diurnal/Nocturnal	Fauna cameras	17.5 Lak	37.2 Lak	W 9 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	17.8 Ces	38.3 Ces	WSW 15 Ces	0 Ces
28/12/24	Diurnal/Nocturnal	Fauna cameras	20.0 Lak	27.1 Lak	SSW 4 Lak	1.8 Lak
	Nocturnal	Ultrasonic microbat detector	18.9 Ces	28.6 Ces	SE 7 Ces	8.4 Ces
29/12/24	Diurnal/Nocturnal	Fauna cameras	12.8 Lak	30.1 Lak	SSW 4 Lak	0.2 Lak
	Nocturnal	Ultrasonic microbat detector	12.6 Ces	32.0 Ces	SSE 6 Ces	0.2 Ces
30/12/24	Diurnal/Nocturnal	Fauna cameras	19.6 Lak	28.4 Lak	ESE 7 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	16.9 Ces	29.9 Ces	ESE 11 Ces	0 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
31/12/24	Diurnal/Nocturnal	Fauna cameras	15.4 Lak	29.3 Lak	ESE 4 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	15.6 Ces	31.3 Ces	E 4 Ces	0 Ces
January 2025						
01/01/25	Diurnal/Nocturnal	Fauna cameras	15.2 Lak	30.6 Lak	NNE 6 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	15.3 Ces	34.8 Ces	WNW 2 Ces	0 Ces
02/01/25	Diurnal/Nocturnal	Fauna cameras	19.4 Lak	22.9 Lak	SSW 7 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	19.4 Ces	22.9 Ces	SSW 7 Ces	0 Ces
03/01/25	Diurnal/Nocturnal	Fauna cameras	18.1 Lak	25.6 Lak	SSW 4 Lak	2.2 Lak
	Nocturnal	Ultrasonic microbat detector	18.1 Ces	25.6 Ces	SSW 4 Ces	2.2 Ces
04/01/25	Diurnal/Nocturnal	Fauna cameras	15.0 Lak	28.3 Lak	NNE 7 Lak	0.4 Lak
	Nocturnal	Ultrasonic microbat detector	15.0 Ces	28.3 Ces	NNE 7 Ces	0.4 Ces
05/01/25	Diurnal/Nocturnal	Fauna cameras	14.1 Lak	31.8 Lak	N 6 Lak	0 Lak
	Nocturnal	Ultrasonic microbat detector	14.1 Ces	31.8 Ces	N 6 Ces	0 Ces
06/01/25	Diurnal/Nocturnal	Fauna cameras	16.0 Lak	34.3 Lak	- Lak	0 Lak
	Nocturnal	Amphibian call-playback and targeted survey (4.6 mm rain during the fortnight prior, 15% relative humidity at 3 pm)	19.7 Sin	40.1 Sin	WNW 7 Sin	0 Sin
	Nocturnal	Ultrasonic microbat detector	16.0 Ces	34.3 Ces	- Ces	0 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
07/01/25	Diurnal/Nocturnal	Fauna cameras	20.9 Lak	22.5 Lak	SSW 4 Lak	6.0 Lak
	Nocturnal	Amphibian call-playback and targeted survey (4.6 mm rain during the fortnight prior, 75% relative humidity at 3 pm)	19.9 Sin	22.8 Sin	NW 6 Sin	7.6 Sin
	Nocturnal	Ultrasonic microbat detector	20.9 Ces	22.5 Ces	SSW 4 Ces	6.0 Ces
08/01/25	Diurnal	Fauna camera retrieval/ Opportunistic	18.2 Lak	19.4 Lak	SSW 7 Lak	8.6 Lak
	Diurnal/Nocturnal	Fauna cameras				
	Nocturnal	Ultrasonic microbat detector	18.3 Ces	21.2 Ces	SSW 13 Ces	2.2 Ces
09/01/25	Diurnal	Fauna camera and ultrasonic microbat detector retrieval/ Opportunistic	16.9 Lak 16.7 Ces	24.1 Lak 26.1 Ces	SW 7 Lak WSW 20 Ces	6.4 Lak 10.4 Ces
13/01/25	Nocturnal	Microbat harp trapping	18.4 Lak 18.6 Ces	30.2 Lak 33.4 Ces	N 4 Lak NE 2 Ces	0.4 Lak 6.0 Ces
14/01/25	Nocturnal	Microbat harp trapping	18.9 Lak 19.4 Ces	31.7 Lak 34.9 Ces	S 7 Lak - Ces	0.2 Lak 0.2 Ces
15/01/25	Nocturnal	Microbat harp trapping	19.9 Lak 19.3 Ces	32.6 Lak 38.8 Ces	WNW 6 Lak ENE 7 Ces	0 Lak 9.4 Ces
16/01/25	Nocturnal	Microbat harp trapping	19.1 Lak 18.7 Ces	21.3 Lak 22.1 Ces	- Lak - Ces	- Lak 34.0 Ces
17/01/25	Nocturnal	Microbat harp trapping	16.5 Lak 16.9 Ces	21.0 Lak 21.1 Ces	SSW 7 Lak SSW 15 Ces	- Lak 9.8 Ces

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
20/01/25	Diurnal/Nocturnal	Fauna cameras	14.1 Sin	27.4 Sin	SSE 7 Sin	0 Sin
	Nocturnal	Microbat harp trapping	12.7 Lak	26.1 Lak	S 6 Lak	0 Lak
			12.3 Ces	26.8 Ces	SW 9 Ces	0 Ces
21/01/25	Diurnal/Nocturnal	Fauna cameras	13.4 Sin	32.0 Sin	SSE 6 Sin	0 Sin
	Nocturnal	Microbat harp trapping	12.6 Lak	27.6 Lak	SE 2 Lak	0 Lak
			12.0 Ces	31.8 Ces	ENE 2 Ces	0 Ces
		Mammal and Avian call-playback	12.6 Lak	27.6 Lak	SE 2 Lak	0 Lak
		Spotlighting				
22/01/25	Diurnal/Nocturnal	Fauna cameras	18.2 Sin	39.0 Sin	S 4 Sin	0 Sin
	Nocturnal	Microbat harp trapping	16.5 Lak	35.5 Lak	- Lak	0 Lak
			16.2 Ces	38.8 Ces	N 11 Ces	0 Ces
23/01/25	Diurnal/Nocturnal	Fauna cameras	19.3 Sin	26.6 Sin	SSE 15	- Sin
	Nocturnal	Microbat harp trapping	18.8 Lak	26.4 Lak	SSE 9 Lak	- Lak
			18.8 Ces	25.6 Ces	SSE 17 Ces	1.2 Ces
24/01/25	Diurnal/Nocturnal	Fauna cameras	18.3 Sin	29.3 Sin	NW 7 Sin	0 Sin
	Nocturnal	Microbat harp trapping	18.3 Lak	26.8 Lak	SSW 2 Lak	0 Lak
			17.9 Ces	27.5 Ces	ESE 4 Ces	0 Ces
25/01/25	Diurnal/Nocturnal	Fauna cameras	16.5 Sin	29.2 Sin	ESE 6 Sin	0 Sin
26/01/25	Diurnal/Nocturnal	Fauna cameras	17.0 Sin	32.4 Sin	SSW 2 Sin	0 Sin

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
27/01/25	Diurnal/Nocturnal	Fauna cameras	19.9 Sin	38.4 Sin	S 2 Sin	0 Sin
28/01/25	Diurnal/Nocturnal	Fauna cameras	23.1 Sin	41.3 Sin	WNW 22 Sin	0 Sin
29/01/25	Diurnal/Nocturnal	Fauna cameras	18.5 Sin	24.0 Sin	SSW 9 Sin	15.6 Sin
30/01/25	Diurnal/Nocturnal	Fauna cameras	19.5 Sin	25.9 Sin	SSW 7 Sin	0.6 Sin
31/01/25	Diurnal/Nocturnal	Fauna cameras	20.8 Sin	24.3 Sin	SW 13 Sin	0 Sin
February 2025						
01/02/25	Diurnal/Nocturnal	Fauna cameras	20.6 Sin	26.6 Sin	ESE 17 Sin	1.8 Sin
02/02/25	Diurnal/Nocturnal	Fauna cameras	17.9 Sin	29.6 Sin	E 11 Sin	0 Sin
03/02/25	Diurnal/Nocturnal	Fauna cameras	17.4 Sin	31.6 Sin	ESE 13 Sin	0 Sin
	Nocturnal	Microbat harp trapping	16.3 Ces	29.8 Ces	ESE 11 Ces	0 Ces
		Amphibian call-playback and targeted survey (32.2 mm rain during the fortnight prior, 70% relative humidity at 3 pm)				
04/02/25	Diurnal/Nocturnal	Fauna cameras	19.5 Sin	32.9 Sin	- Sin	0 Sin
	Nocturnal	Microbat harp trapping	18.8 Ces	31.6 Ces	SSE 6 Ces	0 Ces
		Amphibian call-playback and targeted survey (32.2 mm rain during the fortnight prior, 48% relative humidity at 3 pm)				
		Mammal and Avian call-playback				
05/02/25	Diurnal/Nocturnal	Fauna cameras	20.7 Sin	35.5 Sin	WNW 11 Sin	0 Sin
	Nocturnal	Microbat harp trapping	18.3 Ces	34.5 Ces	NW 20 Ces	0 Ces
		Amphibian call-playback and targeted survey (32.2 mm rain during the fortnight prior, 71% relative humidity at 3 pm)				

Date	Survey period	Survey undertaken e.g. method/targeted species	Temperature (°C)[1]		Wind direction and speed (km/h) at 9 am[1]	Rainfall since 9 am (mm)[1]
			Min.	Max		
06/02/25	Diurnal/Nocturnal	Fauna cameras	18.5 Sin	30.0 Sin	SSW 11 Sin	18.6 Sin
	Nocturnal	Microbat harp trapping	20.7 Ces	29.3 Ces	S 9 Ces	4.6 Ces
		Ultrasonic microbat detector retrieval				
		Amphibian call-playback and targeted survey (32.2 mm rain during the fortnight prior, 60% relative humidity at 3 pm)				
07/02/25	Diurnal/Nocturnal	Fauna cameras	17.9 Sin	32.2 Sin	SSW 2 Sin	0 Sin
	Nocturnal	Amphibian call-playback and targeted survey (35.6 mm rain during the fortnight prior, 34% relative humidity at 3 pm)	16.3	32.0	SE 6	0.2
08/02/25	Diurnal/Nocturnal	Fauna cameras	18.1 Sin	32.8 Sin	WNW 6 Sin	0 Sin
09/02/25	Diurnal/Nocturnal	Fauna cameras	19.3 Sin	30.5 Sin	WSW 6 Sin	0.4 Sin
10/02/25	Diurnal/Nocturnal	Fauna cameras	19.2 Sin	24.6 Sin	SSE 2 Sin	0.8 Sin
11/02/25	Diurnal/Nocturnal	Fauna cameras	15.7 Sin	23.3 Sin	S 6 Sin	8.0 Sin
12/02/2024	Diurnal/Nocturnal	Fauna camera retrieval/ Opportunistic	15.7 Sin	28.9 Sin	S 9 Sin	11.2 Sin

(1) Weather data station is depicted by 3 letter code indicating the Bureau of Meteorology weather observation station with the closest proximity to the survey location, where 'Lak' = Lake Macquarie-Cooranbong (Station ID: 061412), 'Ces' = Cessnock Airport (Station ID: 061260), and 'Sin' = Singleton (Defence) (Station ID: 061430) (Commonwealth of Australia 2025). Some surveys were conducted at multiple locations simultaneously, reflected in multiple weather station entries across a single survey period.

REF: *Commonwealth of Australia, 2025. Bureau of Meteorology: New South Wales Weather Observation Stations. Available at* www.bom.gov.au/nsw/observations/map.shtml

2.6 Limitations

Ecological impact assessment is based extensively on ecologist experience but is a less exact science than other scientific or engineering disciplines. This report has been prepared to meet the specific needs of the BAM. This report is based on investigations which were designed for project-specific factors, including the nature of the project, its size and configuration (subject land), the location of any development on the site and its orientation. This report cannot be applied to an adjacent site or areas outside of the subject land.

2.6.1 Plant Community Type allocation and mapping

Plant communities are naturally variable. The boundaries between different PCTs in the subject land overlap considerably with a gradual transition from 1 community to another. Broad ecotones are present in many cases and sharp boundaries between PCTs, and vegetation zones rarely exist. However, to map PCTs and vegetation zones a choice must be made. A hard boundary must be drawn to separate PCTs and vegetation zones. The PCTs and vegetation zones presented in this BDAR have been mapped as best as possible based on patterns observed on aerial photography and verified by observations made during the field survey (where possible).

Vegetation within the subject land and locality has been mapped at the regional scale in the SVTM (see section 2.2.2). This mapping data provides a guide to the occurrence and distribution of PCTs, vegetation classes, and vegetation formations. As with all maps, the SVTM is subject to error including:

- PCT attribution errors
- spatial errors or omissions (e.g., gaps and slithers or mapping linework inaccuracies)
- eastern NSW PCT classification typologies split many vegetation types from previous regional vegetation mapping projects and in some cases assign plots used for a single vegetation unit have become PCT reference plots for up to 4 different PCTs
- most PCTs mapped as part of earlier regional coverages have since been discontinued.

These limitations were considered when using the SVTM to aid in mapping native vegetation extent within the subject land.

Where access to areas of vegetation were not available, other local data was used. Where no other data was available for a PCT or vegetation zone (i.e. due to limited property access preventing survey), benchmark data for a PCT from the BioNet Vegetation Classification Database was used. This is discussed further in section 4.5.1.

2.6.1 Biodiversity surveys

No sampling technique can eliminate the possibility that a species is present on a site. For example, some species of plant may be present in the soil seed bank and some fauna species use habitats on a sporadic or seasonal basis and may not be present on site during surveys. The conclusions in this report are based upon previous studies, data acquired for the subject land and the biodiversity field surveys and are, therefore, indicative of the environmental condition of the subject land at the time of preparing the report, including the presence or otherwise of species. Also, it should be recognised that site conditions, including the presence of threatened species, can change with time. Ecological conditions may be modified by changing natural forces or man-made influences. This report is based on conditions which existed at the time of survey.

In assessing the subject land from a limited number of samples there is the possibility that variations may occur between sample locations. The surveys that were undertaken provide a professional estimate of the scope of investigation required to provide a general profile of the biodiversity within the subject land. The data derived from the biodiversity surveys and any later laboratory testing are extrapolated across the subject land to form an overview and scientific judgement about overall conditions and their likely behaviour with regard to the project. Despite the work that has been undertaken within the subject land, the actual conditions on ground might differ from those inferred to exist, since no survey program, no matter how comprehensive, can reveal all ecological details and anomalies.

The mapping of PCTs and species polygons is a subjective interpretation of on ground conditions at a particular location, made by trained personnel. The interpretation may be limited by the method of investigation and cannot always be definitive.

The extent and type of biodiversity surveys undertaken in preparation of this BDAR were limited by EIS timeframe and private property access. Evolving design of various project components and location in the landscape as biodiversity surveys were being undertaken resulted in surveys being undertaken outside of the final subject land or realignment of the 2-phase grid (for threatened plant surveys) after survey had been undertaken. As such, some survey effort is located outside of the subject land but provides relevant local data.

2.6.2 Property access restrictions

Some sections of the subject land were not able to be inspected due to access restrictions. Where access was not available biodiversity values were extrapolated from desktop assessment. In areas that were unable to be surveyed due to access restrictions, existing mapping e.g. the State Vegetation Type Map was adopted. Survey gaps, including where minimum BAM plots for vegetation zones are inadequate, are ultimately driven by property access restriction.

Seasonal survey capacity was limited significantly in some IBRA subregions (specifically North Corrabare Flora Reserve) due to access restrictions on a small number of private properties. This restriction in access has left some areas of the subject land unsurveyed or only surveyed in certain seasons. Consequently, a number of species credit species are being assumed present on these properties.

2.6.3 Reliance on data

This report is based on the assumption that threatened species data published in the TBDC, BioNet Atlas, BioNet Vegetation Information Database and any other government databases is correct and current.

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by EnergyCo and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

2.6.4 Weather conditions

Weather condition during scheduled survey periods limited the survey capacity, typically during periods where extreme weather is more common, such as the summer period. Heat-based survey effort limitations are more complex than a temperature-based stand down, as factors such as humidity and wind speed play a role in determining risk to field staff. Risks include, but are not limited to, bushfires and heat stress. Additionally, high heat or rainfall can limit access to site locations typically accessed via vehicle. Access to these sites via vehicles during periods of high heat or after long periods of rain are at high risk of starting grass fires or causing a permanent impact on the site's topsoil, respectively. Severe flooding in the Central West occurred at various times, which also impacted the ability to complete surveys and resulted in some surveys being shortened and postponed.

3 Site context

Section 3 of the NSW Biodiversity Assessment Method 2020 (BAM) sets out the requirement to assess landscape features and to establish the site context of the subject land in the surrounding landscape. This section of the BDAR identifies the range of landscape features that occur on the subject land or within the broader assessment area (see section 3.1). These features may contain biodiversity values that are important for:

- establishing the context of the subject land in relation to the surrounding area
- identifying the likely habitat suitability on the subject land for threatened entities.

The site map is provided in Chapter 14 as Figure 14.1. The site map shows the boundary of the subject land, cadastre boundaries within the subject land and the landscape features identified in section 3.2 of this BDAR.

3.1 Assessment area

As outlined in the BAM, the assessment area includes:

- the subject land and a 1500 metre buffer surrounding the outside edge of the boundary of the subject land, or
- 500 metres along each side of the centre line for linear-shaped projects.

The assessor must establish the assessment area using GIS software.

As this is a mixed linear-shaped and site-based project, a buffer of 500 metres along each side of the centre line of the linear aspect of the project and a 1500 metre buffer placed around point feature aspects of the project has been implemented to demarcate the assessment area for this BDAR.

The location map (see Figure 14.2) shows the boundary of the biodiversity study area, the landscape features identified in section 3.2, and any other relevant detail such as local government area boundaries or other base data relevant at the scale of the map. The map illustrating the extent of the assessment area is provided in Figure 14.3.

3.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figure 14.1 and Figure 14.2. This section provides a discussion of relevant landscape features.

Field reconnaissance was used to confirm the extent and condition of landscape features on the subject land and biodiversity study area. This was particularly important for geological features of significance (e.g. karst, caves, crevices, cliffs, rocks) or the presence of non-native vegetation that is difficult to interpret from remote imagery (i.e. exotic paddocks). This ground-truthed information was used to adjust maps and percent native vegetation cover estimates. Where access to private property was limited, professional judgement was used to determine whether certain landscape features of interest were present. Remote observation was undertaken where possible. Aerial imagery was also used to supplement the field survey. Field reconnaissance for landscape features was undertaken during ever survey session.

3.2.1 Interim Biogeographic Regionalisation for Australia (IBRA) bioregions and IBRA subregions

The subject land crosses through 1 mapped IBRA bioregion and 3 IBRA subregions:

- SYB – Sydney Basin (IBRA bioregion)
  - Wyong IBRA subregion
  - Yengo IBRA subregion
  - Hunter IBRA subregion.

This was determined using the IBRA Version 7 (regions) and IBRA Version 7 (subregions) mapping (DEE 2018).

An overview of the extent of each IBRA bioregion and subregion in the subject land and assessment area is presented in Table 3.1 and Figure 14.1.

Table 3.1 IBRA bioregion and subregions

IBRA bioregion	IBRA subregion	Subject land (ha)	Assessment area (ha)
Sydney Basin	Wyong	285.11	8,624.62
	Yengo	278.07	7,882.24
	Hunter	703.11	16,797.40
Totals		**1,266.29**	**32,304.25**

3.2.2 Topographic and hydrological setting, geology and soils

This section describes the topographic and hydrological setting, geology and soils of the subject land based on the IBRA bioregion and subregions provided in Table 3.1.

3.2.2.1 Sydney Basin regions

The Sydney Basin bioregion lies on the east coast and covers a significant portion of the catchments of the Hawkesbury Nepean, Hunter and Shoalhaven River systems, all of the smaller catchments of Lake Macquarie, Lake Illawarra, Hacking, Georges and Parramatta rivers, and smaller portions of the headwaters of the Clyde and Macquarie rivers. It consists of sandstones and shales of Permian to Triassic age that have been uplifted and gently folded during the formation of the Great Dividing Range. Coastal erosion has created a landscape of deep cliffed gorges and remnant plateaus. The vegetation is influenced by differences in soil and an east-west rainfall gradient (NPWS 2003).

The part of the subject land that is within the Sydney Basin bioregion is split between the Macquarie catchment and the Hunter catchment.

Much of the Sydney Basin bioregion landscape is elevated sandstone plateau, with the exceptions being the Hunter Valley and the low-lying Cumberland Plain. In the south and west the Basin ends in cliff lines formed on sandstones and conglomerates of the basal Permian sediments (NPWS 2003).

The specific geology of the subject land within the Wyong IBRA subregion is mapped by the Colquhoun et. al. (2025) as comprising the geological units presented in Table 3.2. The main geological unit within the Wyong IBRA subregion is the Triassic Hawkesbury Sandstones that occur on ridges and spurs (about 160.61 hectares) and sandstones of Terrigal formation within the Gosford subgroup (about 84.82 hectares).

Table 3.2 Mapped geological units within the Wyong IBRA subregion

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Alluvial fan deposits	Alluvium	Fluvially-deposited quartz-lithic sand, silt, gravel, clay.	1.16
Alluvial floodplain deposits	Alluvium	Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.	1.02
Alluvial terrace deposits	Alluvium	Silt, clay, (fluvially deposited) fine- to medium-grained quartz-lithic sand, polymictic gravel.	8.25
Alluvial valley deposits	Alluvium	Silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel.	0.08

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Hawkesbury Sandstone	Ungrouped Triassic units	Medium- to coarse-grained quartz sandstone displaying small- to large-scale, high-angle crossbedding; minor shale and laminite lenses.	160.61
Munmorah Conglomerate	Clifton Subgroup	Medium- to coarse-grained lithic to quartz-lithic sandstone, granule to pebble polymictic conglomerate; minor siltstone and white claystone, thin lenticular coal seams.	25.64
Patonga Claystone	Clifton Subgroup	Red-brown claystone and siltstone, light green-grey fine-grained sandstone.	1.67
Terrigal Formation	Gosford Subgroup	Interbedded laminite, shale and fine- to coarse-grained quartz- to quartz-lithic sandstone; minor red claystone.	84.82
Tuggerah Formation	Clifton Subgroup	Grey to green-grey laminite, to red-brown claystone and siltstone, (in turn interbedded with) fine- to medium-grained green-grey sandstone.	1.85

The specific geology of the subject land within the Yengo IBRA subregion is mapped by the Colquhoun et. al. (2025) as comprising the geological units presented in Table 3.3. The main geological unit within the Yengo IBRA subregion (covering towers 38 to 72) is the Narrabeen Group sandstones from the Grose Subgroup (about 195.34 hectares). The second main geological unit within the Yengo IBRA subregion (covering towers 30 to 38) is the Triassic Hawkesbury Sandstones (about 43.82 hectares). Microhabitat inspections of the Triassic Hawkesbury Sandstones within this area did not identify specific rock platform structures or ironstone lateritic deposits.

Table 3.3 Mapped geological units within the Yengo IBRA subregion

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Alluvium	Quaternary	Unconsolidated grey to brown to beige humic (±) micaceous silty clay, quartz-(±)lithic silt, fine- to medium-grained quartz-rich to quartz-lithic sand, polymictic pebble to cobble gravel (as sporadic lenses); sporadic palaeosol horizons.	10.23
Branxton Formation	Maitland Group	Conglomerate, sandstone, siltstone.	0.26
Grose Subgroup	Narrabeen Group	Cross-bedded, quartz to quartz-lithic sandstone, red-brown claystone and shale. Prominent cliff-forming unit in the Blue Mountains, comprising the basal Burra-Moko Head Sandstone, overlain by the Mount York Claystone, with the Banks Wall Sandstone (top).	195.34
Hawkesbury Sandstone	Ungrouped Triassic units	Medium- to coarse-grained quartz sandstone displaying small- to large-scale, high-angle crossbedding; minor shale and laminite lenses.	43.82
Newcastle Coal Measures	Singleton Supergroup	Fine- to medium-grained quartz-lithic sandstone, polymictic conglomerate, carbonaceous claystone, coal, laminated very fine-grained sandstone or siltstone with claystone/mudstone, tuffaceous claystone/mudstone; abundant plant fossils and bioturbation.	19.40

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Seaham Formation – mudstone	Seaham Formation	Mudstone, siltstone, tuffs.	0.13
Terrigal Formation	Gosford Subgroup	Interbedded laminite, shale and fine- to coarse-grained quartz- to quartz-lithic sandstone; minor red claystone.	8.84

The specific geology of the subject land within the Hunter IBRA subregion is mapped by the Colquhoun et. al. (2025) as comprising the geological units presented in Table 3.4.

Table 3.4 Mapped geological units within the Hunter IBRA subregion

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Alluvial gravel deposits	Quaternary	Deposits unconsolidated alluvial gravel, sand, silt and clay with variable humic content. Gravels commonly clast-supported.	4.37
Alluvial terrace deposits – high-stand gravel facies	Alluvial terrace deposits – high-stand facies	High-level gravel and conglomerate.	3.06
Alluvial terrace deposits – high-stand sand facies	Alluvial terrace deposits – high-stand facies	High-level sand and sandstone.	18.14
Alluvial valley deposits	Alluvium	Silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel.	108.90
Alluvium	Quaternary	Unconsolidated grey to brown to beige humic (±) micaceous silty clay, quartz-(±)lithic silt, fine- to medium-grained quartz-rich to quartz-lithic sand, polymictic pebble to cobble gravel (as sporadic lenses); sporadic palaeosol horizons.	10.98
Bimbadeen Basalt	Allandale Formation	Basalt with interbedded conglomerate lenses, basalt has sporadic amygdules variably infilled with secondary minerals.	0.15
Branxton Formation	Maitland Group	Conglomerate, sandstone, siltstone.	84.43
Cessnock Sandstone Member	Branxton Formation	Hard, massive- to planar-bedded quartz-lithic sandstone, sporadically conglomeratic, marine fossils in sandy phases.	0.19
Fenestella Shale Member	Branxton Formation	Medium- to dark-grey siltstone, interbedded with light green-brown fine-grained sandstone, abundant fenestellids including Fenestella and Polypora.	0.01
Greta Coal Measures	Permian	Sandstone, siltstone, pellet claystone, coal, chert, sporadic conglomerate.	2.87

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Grose Subgroup	Narrabeen Group	Cross-bedded, quartz to quartz-lithic sandstone, red-brown claystone and shale. Prominent cliff-forming unit in the Blue Mountains, comprising the basal Burra-Moko Head Sandstone, overlain by the Mount York Claystone, with the Banks Wall Sandstone (top).	5.39
Jerrys Plains Subgroup	Wittingham Coal Measures	Coarse-grained sandstone, fine- to medium-grained lithic (to quartz-lithic) sandstone, mudstone, coal seams and thin coaly partings, carbonaceous claystone, tuffaceous claystone and siltstone with fossil plant debris, pebble paraconglomerate.	137.38
Jerrys Plains Subgroup – sandstone	Jerrys Plains Subgroup	Top: medium-grained sandstone and siltstone, coal and tuffaceous claystone. Middle: persistent coal seams cut by conglomerate and upward-fining sandstone, tuffaceous claystone. Bottom: thick coal seam with fine sandstone and siltstone.	0.01
Matthews Gap Dacitic Tuff Member	Pokolbin Hills Volcanics	Dacitic crystal vitric tuff.	0.73
Mulbring Siltstone	Maitland Group	Medium- to dark-grey siltstone, minor claystone, sporadic thin cherty beds (resistant), rare thin sandstone and limestone beds, sporadic marine fossils.	135.99
Muree Sandstone	Maitland Group	Fine- to coarse-grained sandstone, conglomerate, minor claystone.	4.36
Newcastle Coal Measures	Singleton Supergroup	Fine- to medium-grained quartz-lithic sandstone, polymictic conglomerate, carbonaceous claystone, coal, laminated very fine-grained sandstone or siltstone with claystone/mudstone, tuffaceous claystone/mudstone; abundant plant fossils and bioturbation.	65.06
Rutherford Formation	Dalwood Group	Siltstone, marl and minor sandstone.	4.64
Saltwater Creek Formation	Wittingham Coal Measures	Quartz-lithic sandstone with rare shaly partings and laminae, siltstone, tuffaceous claystone beds and sporadic thin coal plies.	22.76
Seaham Formation – acid conglomerate	Seaham Formation	Acid conglomerate.	0.65
Seaham Formation – mudstone	Seaham Formation	Basic and intermediate conglomerate.	0.08
Source-bordering dunes	Aeolian dune	Red-brown to light-brown, poorly sorted to bi-modal, very fine- to medium-grained feldspathic quartz sand.	0.84
Ungrouped Jurassic igneous rocks – diorite	Ungrouped Jurassic igneous units	Diorite sills and dykes.	1.93

Stratigraphic unit	Parent unit	Description	Subject land (ha)
Vane Subgroup	Wittingham Coal Measures	Light-grey, fine- to medium-grained quartz-lithic sandstone, laminated siltstone, siltstone with fossil plant fragments, carbonaceous claystone, tuffaceous claystone and mudstone, sporadic pebble paraconglomerate, coal seams with bright and dull bands.	83.49
Vineyard Lookout Volcanic Agglomerate Member	Pokolbin Hills Volcanics	Conglomerate, agglomerate of trachytic and trachyandesitic composition, trachyte and trachyandesite.	6.11
Vineyard Lookout Volcanic Agglomerate Member – conglomerate	Vineyard Lookout Volcanic Agglomerate Member	Prominent conglomerate marker beds.	0.56
Wittingham Coal Measures – conglomerate	Wittingham Coal Measures	Conglomerate lenses (originally formed as point-bar deposits).	0.04

3.2.3 *Rivers, streams, estuaries and wetlands*

Table 3.5 identifies the rivers, streams, estuaries and wetlands on, adjacent to, and downstream of, the subject land and within the assessment area.

These watercourses are illustrated in Figure 14.1 and Figure 14.2.

Photos providing some examples of the watercourses in the assessment area are provided in Photo 3.1 to Photo 3.7.

Table 3.5 Watercourses on, adjacent to, and downstream of the subject land within the assessment area

Strahler Order	Watercourse names
Wyong IBRA subregion	
9	None
8	None
7	None
6	Jigadee Creek
5	Cedar Brush Creek, Dora Creek, Jigadee Creek, Lords Creek, Wyong River and several unnamed watercourses
4	Blarney Creek, Burnt Bridge Creek, Cedar Brush Creek, Felled Timber Creek, Jigadee Creek, Jilliby Jilliby Creek, Watagan Creek, Yorky Waters Gully, Wyong Rover and several unnamed watercourses
3	Blarney Creek, Crooked Creek, Jilliby Jilliby Creek, Merchants Creek, Watagan Creek, Wyong River and many unnamed watercourses
2	Crooked Creek, Merchants Creek, Watagan Creek, Wyong River and many unnamed watercourses
1	Merchants Creek and many unnamed watercourses

Strahler Order	Watercourse names
Yengo IBRA subregion	
9	None
8	None
7	Congewai Creek
6	Cedar Creek, Congewai Creek
5	Cedar Creek, Deep Creek, Monkey Place Creek
4	Baldy Creek, Cedar Creek, Deep Creek, Flying Fox Creek, Monkey Place Creek, Muggyrang Creek, Peach Tree Creek, Sweetmans Creek and several unnamed watercourses
3	Baldy Creek, Little Baldy Creek, Monkey Place Creek, Muggyrang Creek, Sweetmans Creek, Fleming Gully, Peach Tree Gully, Potholes Gully and several unnamed watercourses
2	Baldy Creek, Deep Creek, Little Baldy Creek, Monkey Place Creek, Muggyrang Creek, Sweetmans Creek, Fleming Gully, Peach Tree Gully and many unnamed watercourses
1	Baldy Creek, Deep Creek, Little Baldy Creek, Mary Annes Creek, Monkey Place Creek, Muggyrang Creek, Fleming Gully, Peach Tree Gully and many unnamed watercourses
Hunter IBRA subregion	
9	Hunter River
8	Wollombi Brook
7	None
6	Bowmans Creek, Congewai Creek
5	Bayswater Creek, Bellbird Creek, Black Creek, Maidswater Creek, Monkey Place Creek, Muggyrang Creek, Pokolbin Creek, Fleming Gully, Foxy Gully
4	Loder Creek, Several unnamed watercourses
3	Farrells Creek, Maidswater Creek, Muggyrang Creek, Parnells Creek, Pikes Creek, Pokolbin Creek, Redbank Creek, Sandy Hollow Creek, Swamp Creek, Tinkers Creek, Waterfall Creek, Foxy Gully, Potholes Gully and several unnamed watercourses
2	Doctors Creek, Maidswater Creek, Mudies Creek, Muggyrang Creek, Nine Mile Creek, Parnells Creek, Pikes Creek, Sandy Hollow Creek, Tinkers Creek, Wisemans Creek, Foxy Gully, Hobden Gully and many unnamed watercourses
1	Mudies Creek, Parnells Creek, Pikes Creek, Tinkers Creek, Wisemans Creek, Foxy Gully and many unnamed watercourses





Photo 3.1 Hunter River a large 9th order stream in the Hunter IBRA subregion





Photo 3.2 Hunter River a large 9th order stream in the Hunter IBRA subregion





Photo 3.3 Wollombi Brook a large 8th order stream with a small young stand of *Eucalyptus camaldulensis* (River red Gum)



Photo 3.4 Congewai Creek a large 7th order stream



Photo 3.5 An unnamed 3rd order stream in Watagan State Forest



Photo 3.6 Jilliby Jilliby Creek a small 3rd order stream in Olney State Forest



Photo 3.7 An unnamed small 1st order stream in Watagan State Forest



Photo 3.8 Watagan Creek a small 2nd order stream located in the Wyong IBRA subregion



Photo 3.9 Sweetmans Creek (upper part of the catchment)

3.2.4 Habitat connectivity

A variety of definitions have been proposed for 'habitat connectivity' [see (Merriam 1984; Taylor, Fahrig et al. 1993; Gardner et al. 1997)], and what they all imply is whether features, or patches, of interest are spatially connected to other, similar, features. It assesses whether plants or animals have the ability to move across the landscape, which is important for the health and persistence of their populations, and for ecosystem health in general. Connectivity can be subdivided into structural connectivity, or the quantification of the characteristics and spatial arrangements of elements of the landscape, and functional connectivity, or how an ecological process is influenced by the arrangement of elements of the landscape (Crooks and Sanjayan 2006).

The majority of the northern section of the project, in the Hunter Valley is within an area already affected by past clearing and fragmentation and would likely not affect habitat connectivity. However, in the central and southern sections of the alignment, project also transects large intact remnant patches of vegetation, including State forests and conservation areas. Here, terrestrial movement is unlikely to be substantially affected, given the project would be highly permeable. The nature of the potential impacts to connectivity primarily relate to arboreal mammals and aerial species such as birds and bats, through the interaction with the proposed transmission line towers and associated powerlines.

Research of powerlines on smaller bats is scarce, but a decrease in bat activity close to powerlines has been shown (Kahnonitch, Lubin et al. 2018). Powerline-associated collision and electrocution has been proven to lead to high mortality rates of birds across the world, including in Italy and the United States (Rubolini, Gustin et al. 2005; Loss, Will et al. 2014). As expected, placement of powerlines in migratory pathways (Kirby, Stattersfield et al. 2008) and in important habitat (Garrido and Fernández-Cruz 2003; Oppel, Ruffo et al. 2022) heightens bird mortality. As such, placement of powerlines in movement corridors can decrease the habitat connectivity for some aerial species.

In the Wyong and Yengo IBRA subregions the habitats are dominated by large contiguous mostly native forests on the Great Diving Range which facilitate wildlife connectivity for all flora and fauna species. These are located primarily within Olney State Forest, Watagan State Forest, Pokolbin State Forest and Corrabare State Forest but also within Corrabare North Flora Reserve and private lands. These areas are dominated by ridges and valleys containing significant watercourses such as Cedar Brush Creek, Dora Creek, Jigadee Creek, Lords Creek, Wyong River, Cedar Creek, Congewai Creek and many others. These areas provide some of the most important broad forested areas in the Hunter and Central Coast and there are few existing barriers to habitat connectivity.

In the Hunter IBRA subregion the habitat connectivity situation is very different. This subregion is part of the Hunter Valley floor which is dominated by mining and agriculture and essentially has no forestry or conservation reserves. To the north of Broke the Singleton Military Area acts as a quasi-reserve as it protects one of the largest forests remnants on the Hunter Valley floor and it is within and around this area that habitat connectivity remains mostly intact. The main riparian habitat corridors exist along the meandering Hunter River and Wollombi Brook.

In summary, the project is planned to occur in some likely movement corridors, where it may affect aerial and terrestrial arboreal species. However the nature of the project means that it would be highly permeable and is highly unlikely to result in any substantial impacts to local or regional connectivity for these species.

3.2.5 Karst, caves, crevices, cliffs, rocks or other geological features of significance

The geology has been described in section 3.2.2. Karst, caves, crevices, cliffs, rocks or other geological features of significance occur within the Wyong and Yengo IBRA subregions which contain high ridgelines, steep rocky escarpments and incised valleys across the Great Dividing Range. The subject land crosses extensive areas of caves, crevices, cliffs and rocky areas which generate opportunities for flora and fauna species adapted to those environments. Of particular interest are areas containing rocky escarpments for species potentially including Brush-tailed Rock-wallaby, cave-dwelling bats, large forest owls and reptiles. A majority of the Hunter IBRA subregion on the Hunter Valley floor is either mining or agricultural land containing negligible areas of rocky or geological significance.

3.2.6 Areas of outstanding biodiversity value

There are no areas of outstanding biodiversity value, as identified under the NSW *Biodiversity Conservation Act 2016* (BC Act), within the subject land or assessment area.

3.2.7 NSW (Mitchell) landscape

A summary of the NSW (Mitchell) landscapes within the subject land and assessment area for each IBRA subregion is provided in Table 3.6. Based on this assessment the Watagan Ranges (Mitchell) landscape has been used in the BAM Calculator (BAM-C) for both the Wyong and Yengo IBRA subregions whilst the Central Hunter Foothills has been used for the Hunter IBRA subregion.

Table 3.6 Summary of NSW (Mitchell) landscapes within the subject land and assessment area

NSW (Mitchell) landscapes	Subject land (ha)	Assessment area (ha)
Wyong IBRA subregion		
Bucketty Ridges	70.17	1003.55
Central Hunter Foothills	0	0.47
Gosford – Cooranbong Coastal Slopes	40.07	2884.78
Sydney – Newcastle Coastal Alluvial Plains	1.79	306.66
Watagan Ranges	155.47	4393.31
Yengo IBRA subregion		
Central Hunter Alluvial Plains	13.66	126.68
Central Hunter Foothills	0.68	417.53
Watagan Ranges	265.77	7,400.04
Hunter IBRA subregion		
Central Hunter Alluvial Plains	93.31	1,785.79
Central Hunter Foothills	618.77	11,460.29
Estuary/Water Added	0.60	315.07
Hunter River Basalts	2.42	237.40
Upper Hunter Channels and Floodplain	43.08	1,022.29
Watagan Ranges	24.68	1,020.79

3.2.8 Additional landscape features identified in Secretary's Environmental Assessment Requirements (SEARs)

No additional landscape features were identified in the SEARs.

3.3 Native vegetation cover

A summary of the extent of native vegetation cover within the assessment area for each IBRA subregion is provided in Table 3.7 to Table 3.9. Figure 14.4 shows native vegetation cover within the assessment area.

Native vegetation cover in the assessment area was determined via the use of published vegetation mapping NSW State Vegetation Type Map release C2.0M2.1 (November 2024) (NSW DCCEEW 2024f) combined with the field verified vegetation mapping within the subject land.

Table 3.7 Native vegetation cover in the assessment area for the Wyong IBRA subregion

Assessment area (ha)	8,589.32
Total area of native vegetation cover (ha)	7,202.76
Percentage of native vegetation cover (%)	83.86
Class (0–10, >10–30, >30–70 or >70%)	>70%

Table 3.8 Native vegetation cover in the assessment area for the Yengo IBRA subregion

Assessment area (ha)	7,944.25
Total area of native vegetation cover (ha)	7,562.61
Percentage of native vegetation cover (%)	95.20
Class (0–10, >10–30, >30–70 or >70%)	>70%

Table 3.9 Native vegetation cover in the assessment area for the Hunter IBRA subregion

Assessment area (ha)	15,841.63
Total area of native vegetation cover (ha)	5,619.61
Percentage of native vegetation cover (%)	35.47
Class (0–10, >10–30, >30–70 or >70%)	>30–70%

4 Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

Mapping of native vegetation extent within the subject land is required under section 4.1 of the NSW Biodiversity Assessment Method 2020 (BAM) with detailed requirements outlined in section 3.2 of the BAM 2020 Operational Manual.

Native vegetation extent within the biodiversity study area is illustrated in Figure 14.8. Native vegetation covers around 55% of the subject land.

4.1.1 Changes to the mapped native vegetation extent

The extent of native vegetation in the biodiversity study area was determined through digitisation of areas of vegetation using the aerial photos provided on the ArcGIS online World Imagery map server. The aerial photography used was Maxar (Vivid) imagery. In most cases the mapped boundaries of native vegetation differ from the boundaries presented in the NSW State Vegetation Type Map (SVTM) (see section 2.2.2). The mapped extent of native vegetation cover within the subject land was consequently adjusted to match on ground conditions observed at the time of survey.

Native vegetation extent within the subject land is illustrated in Figure 14.8.

4.1.2 Areas that are not native vegetation

The subject land contains areas that are not native vegetation. These areas have been allocated to PCT 0 for the purposes of mapping. These areas are illustrated in Figure 14.6 and Figure 14.8. Areas that were considered to be not native vegetation include:

- Category 1 – exempt land
- pre-existing infrastructure (e.g. buildings, rail and roads)
  miscellaneous ecosystems (e.g. dams, weed dominated paddocks, exotic tree plantings. These areas cannot be assigned to a plant community type (PCT) due to a lack of native vegetation.



Photo 4.1 Example of Category 1 lands (HTP-DR-09)



Photo 4.2 Location of plot HTP-DR-09 (90.7% exotic)



Photo 4.3 Example of Category 1 lands (HTP-MS-07)



Photo 4.4 Location of plot HTP-MS-07 (97.7% exotic)



Photo 4.5 Example of Category 1 lands (HTP-MS-29)



Photo 4.6 Location of plot HTP-MS-29 (79.8% exotic)



Photo 4.7 Example of Category 1 lands (HTP-MS-30)



Photo 4.8 Location of plot HTP-MS-30 (58.2% exotic)



Photo 4.9 Example of Category 1 lands (HTP-MS-66)



Photo 4.10 Location of plot HTP-MS-66 (56.1% exotic)



Photo 4.11 Example of Category 1 lands (HTP-MS-67)



Photo 4.12 Location of plot HTP-MS-67 (99.7% exotic)



Photo 4.13 Example of Category 1 lands (HTP-IGG-MS-02)



Photo 4.14 Location of HTP-IGG-MS-02 (100% exotic)



Photo 4.15 Example of Category 1 lands (HTP-IGG-MS-05)

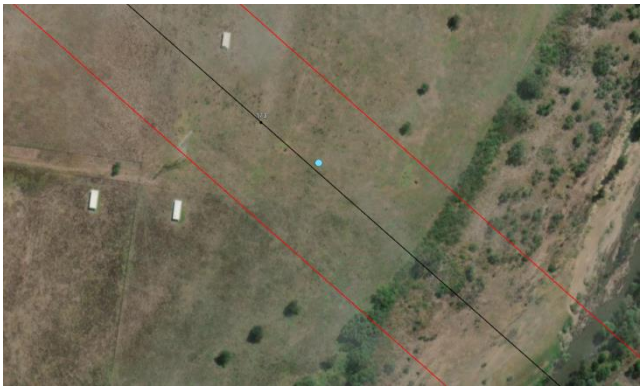


Photo 4.16 Location of HTP-IGG-MS-05 (96% exotic)



Photo 4.17 Example of Category 1 lands (HTP-IGG-MS-08)

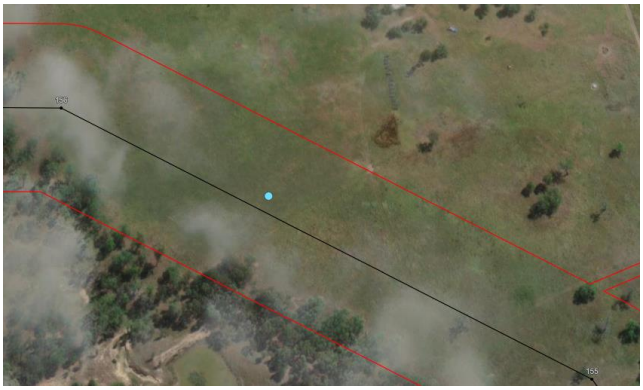


Photo 4.18 Location of HTP-IGG-MS-08 (99% exotic)

4.1.3 Category 1 – exempt land

This section summarises the method and results of native vegetation regulatory mapping of proposed category 1 – exempt land within the subject land.

In accordance with section 6.8 (3) of the NSW *Biodiversity Conservation Act 2016* (BC Act), the BAM excludes the assessment of impacts on category 1 – exempt land (within the meaning of Part 5A of the NSW *Local Land Services Act 2013* (LLS Act)), other than any impacts prescribed by the regulations under section 6.3.

The LLS Act defines 'category 1 – exempt land' as areas of the State to which Part 5A of the LLS Act applies, which are designated as category 1 – exempt land on the 'native vegetation regulatory map', prepared and published under the LLS Act. A native vegetation regulatory map is being developed by Conservation Programs, Heritage and Regulation (CPHR); however this is currently incomplete (in draft).

Section 60F of the LLS Act provides transitional requirements which identify how the relevant categorisation of land is to be determined pursuant to section 60H of the LLS Act in the absence of a native vegetation regulatory map. Accredited assessors may determine the categorisation of land during the transitional period in accordance with section 60F. The method applied to determine the categorisation is provided below.

4.1.3.1 Background to category 1 – exempt land

Under the NSW Land Management Framework, the categorisation of land determines the native vegetation management options available to landholders. Rural land in NSW is categorised into 3 main categories:

- Category 1 – exempt land is land where native vegetation can be cleared without approval from Local Land Services.
- Category 2 – land (category 2 lands) is divided into:
  - category 2 – **regulated land** is land that is not vulnerable or sensitive regulated land. This may require authorisation from Local Land Services to clear native vegetation from rural zoned land in this category
  - category 2 – **vulnerable regulated land** is land where clearing of native vegetation may not be permitted under the NSW Land Management (Native Vegetation) Code 2018, and a limited range of allowable activities are permitted
  - category 2 – **sensitive regulated land** is land where clearing is not permitted under the NSW Land Management Code (Native Vegetation) Code 2018, and a limited range of allowable activities is permitted.
- Excluded land – is land where the NSW Land Management (Native Vegetation) Code 2018 and allowable activities do not apply.

4.1.3.2 Land category criteria

Each land category is determined by various criteria as outlined in the LLS Act. Category 1 – exempt land is defined in 60H of the LLS Act as the below:

1 Land is to be designated as category 1 – exempt land if the Environment Agency Head reasonably believes that:

- **a** the land was cleared of native vegetation as of 1 January 1990, or
- **b** the land was lawfully cleared of native vegetation between 1 January 1990 and the commencement of this Part.

2 Land is to be designated as category 1 – exempt land if the Environment Agency Head reasonably believes that:

- **a** the land contains low conservation value grasslands, or
- **b** the land contains native vegetation that was identified as regrowth in a property vegetation plan referred to in section 9 (2) (b) of the NSW *Native Vegetation Act 2003*, or
- **c** the land is of a kind prescribed by the regulations as category 1 – exempt land.

3 Land is to be designated as category 1 – exempt land if the land is biodiversity certified under Part 8 of the BC Actor under any Act repealed by that Act.

4 However:

a land described in subsection (1) or (2) is not to be designated as category 1 – exempt land if section 60I (2) requires the land to be designated as category 2 – regulated land, and

b land described in subsection (1) (a) is not to be designated as category 1 – exempt land if the land was unlawfully cleared of native vegetation after 1 January 1990, and

c land described in subsection (2) (a) is not to be designated as category 1 – exempt land if the land was unlawfully cleared of native vegetation after 1 January 1990.

5 The regulations may make provision for the purposes of determining whether grasslands are low conservation value grasslands for the purposes of this Division.

4.1.3.3 Determination of mapped category of land

The matters relating to determination of mapped category of land are outlined in 60J of the LLS Act. Section 60J of the LLS Act is reproduced below:

1 This section makes provision relating to the mapping of land under this Division as category 1 – exempt land or category 2 – regulated land.

2 Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been cleared if the native vegetation was significantly disturbed or modified. The regulations may make provision for the purposes of determining whether native vegetation has been significantly disturbed or modified for the purposes of this Division.

3 Determinations may be made by the Environment Agency Head that land was unlawfully cleared of native vegetation only if compliance or enforcement action of a kind prescribed by regulations was taken in relation to the clearing.

4 Determinations may be made by the Environment Agency Head that land was cleared of native vegetation as of 1 January 1990 or between that date and the commencement of this Part only on the basis of the best available aerial photographs or satellite imagery before and after the relevant date, and any evidence provided by the landholder under section 60K (8).

5 Determinations made (or taken on appeal to have been made) by the Environment Agency Head as to whether land was or was not unlawfully cleared of native vegetation does not affect any decision made with respect to compliance or enforcement action taken under this or any other Act in relation to the clearing.

4.1.3.4 Assessment of critically endangered ecological communities and species

Critically endangered ecological communities (CEECs) and flora species are designated as category 2 – sensitive regulated land. Therefore, areas of potential category 1 – exempt land require consideration of the potential presence of critically endangered communities and species.

There are no critically endangered flora species predicted by BAM or considered to be affected candidate species likely to occur within the subject land. This assessment is supported by detailed seasonal surveys and verified vegetation mapping. An assessment of low conservation grasslands is provided in Table 4.1.

There are 2 CEECs within the biodiversity study area being:

- Central Hunter Valley Eucalypt Forest and Woodland
- Warkworth Sands Woodland of the Hunter Valley.

Derived grasslands adjoining and within 30 metres of remnant patches of Warkworth Sands Woodland of the Hunter Valley CEEC (TSSC 2016) and the Central Hunter Valley Eucalypt Forest and Woodland from part of the CEEC (DoE 2015).

The proposed category 1 – exempt land has included all areas of the derived grasslands within 30 metres of remnant patches of these CEECs.

4.1.3.5 Adoption of existing HVOCP mapping and survey information

The project intersects with areas of the Hunter Valley Operations North Open Cut Coal Continuation Project (HVOCP) (Umwelt 2024) currently being assessed for approval. As part of the CPHR review and assessment of the HVOCP, an application for land categorisation under the LLS Act has been provided to CPHR for approval. To enable consistency with the HVOCP assessment, HVO have requested that EnergyCo adopt the existing mapping and survey information consistent with the currently exhibited HVOCP BDAR. The proposed category 1 – exempt land for the HTP has therefore incorporated the HVOCP category 1– exempt land mapping (refer to Appendix P – HVOCP Category 1 – exempt land).

4.1.3.6 Existing transmission line approvals

The project has specifically co-located the alignment and infrastructure where possible with existing transmission infrastructure to minimise impacts to biodiversity and fragmentation. While some of this infrastructure is zoned SP2 Infrastructure and specifically excluded from the application of the LLS Act, several existing transmission lines extend beyond this zoning and therefore require further assessment.

These existing transmission lines are maintained by Transgrid and are subject to existing approvals, some of which pre-date the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A summary of the relevant transmission lines intersected by the project include:

- Line 5A3: Bayswater – Mt Piper 500 kV
- Line 5A4: Bayswater – Wollar 500 kV
- Line 31: Bayswater – Regentville 330 kV
- Line 32: Bayswater – Sydney West 330 kV
- Line 81: 330 kV: Newcastle – Liddell 330 kV
- Line 5A1 and 5A2: Eraring – Kemps Creek 500 kV.

Many of the above existing transmission lines incorporate areas of category 1 – exempt land as mapped by the draft 'native vegetation regulatory map' (blue areas in Figure 4.1) and are consistent with the 'Australian Land Use and Management Intensive Use Classification -5.6.5. not subject to requirements for rehabilitation/or conservation obligations'. The colours in Figure 4.1 and the state mapping consist of the following categories:

- Category 1-exempt land (blue) (draft)
- Category 2-regulated land (yellow) (draft)
- Category 2-vulnerable regulated land (orange) (in-force)
- Category 2-sensitive regulated land (pink) (in-force)
- Areas where category 2-vulnerable and category 2-sensitive regulated lands overlap (brown) (in-force)
- Land excluded from the LLS Act (grey)

Given these existing transmission lines are subject to existing approvals they have been incorporated into the area of proposed category 1 – exempt land under 60 H (1) of the LLS Act.

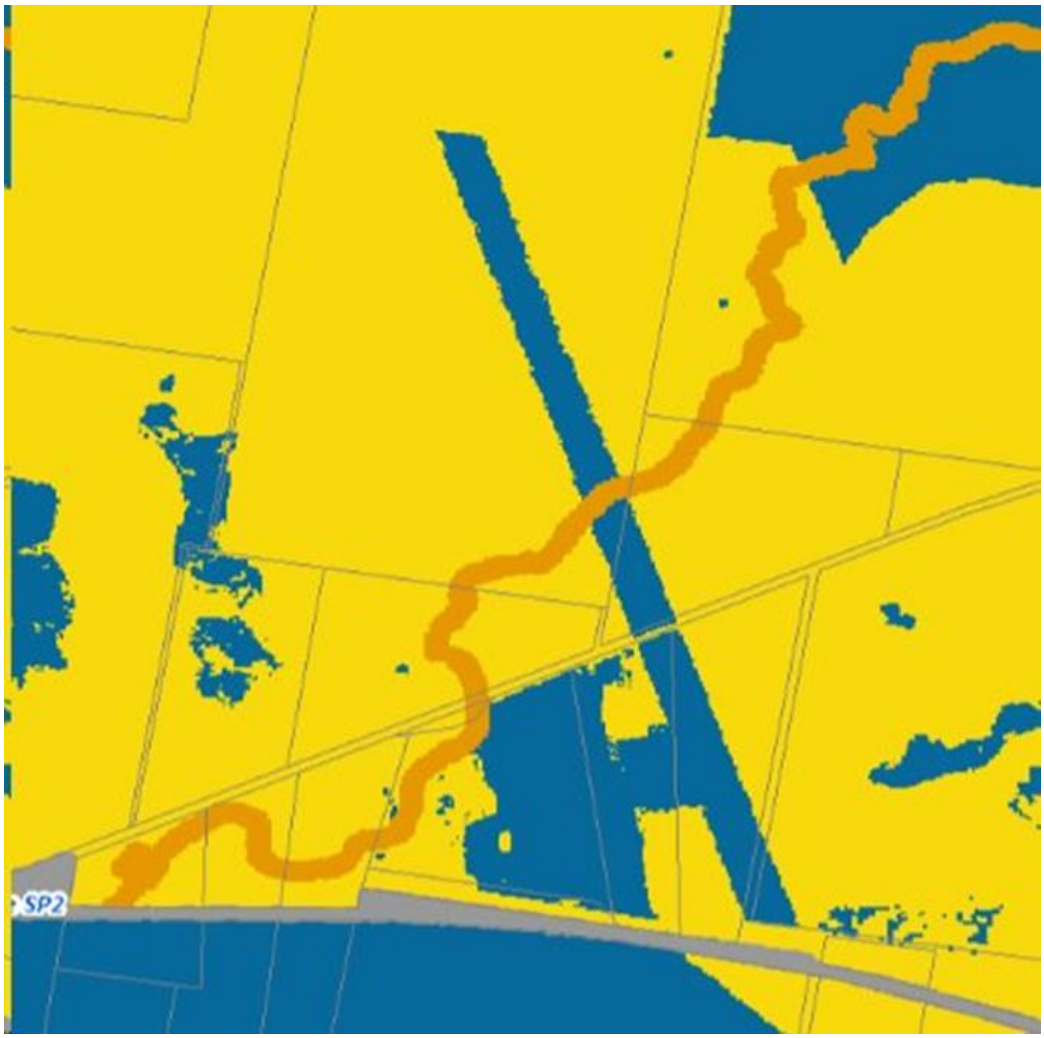


Figure 4.1 An example of mapped areas of category 1 – exempt land associated with existing transmission lines

4.1.3.7 Proposed assessment methodology for identifying category 1 – exempt land on HTP

As described in section 4.1.3, in the absence of the draft native vegetation regulatory map showing areas of NSW to which Part 5A of the LLS Act applies (those designated as category 1 – exempt land), section 60F of the LLS Act provides transitional requirements which identify how the relevant categorisation of land is to be determined.

WSP developed a desktop land characterisation methodology that builds on advice and consultation with CPHR and previous land categorisation assessments and with reference to the native vegetation regulatory map (NVR): method statement (OEH 2017).

In defining the area of category 1 – exempt land, an initial analysis of the following spatial datasets was undertaken:

- Land use: NSW Land Use 2017 v1.2, published June 2020.
- NSW Native Vegetation Extent 5m raster v1.2 dataset.
- State-wide Landcover and Tree Survey (SLATS) clearing for NSW.
- NVR: Transitional Native Vegetation Regulatory Map.
- Zoning: EPI LEP LZN Land Zoning, current at 23 April 2021.
- SVTM.
- aerial photos (to determine areas that were/are obviously under cultivation or improved pasture or otherwise disturbed)
- information and records, including current and historical photographs of the subject land and current and historical high resolution

- in areas of conflicting data, or potential derived native grasslands characteristic of a CEEC, a site-based verification was undertaken to confirm category 1 – exempt land or a precautionary approach was adopted and category 2 – land assigned.

Each of these datasets were used to determine whether native vegetation has been significantly disturbed or modified (and therefore cleared) in accordance with 60J of the LLS Act.

The steps in identifying category 1 – exempt land included:

1 Adoption of published draft native vegetation regulatory map, incorporating the mapping of category 1 – exempt land.

2 Overlaying the land use classification with the Transitional Native Vegetation Regulatory Map, version 3.0, published 26 March 2021 and excluding any areas of the subject land mapped as category 2 lands. This was followed by the exclusion of areas of extant remnant vegetation as published within the Woody vegetation: NSW Woody Vegetation Extent 2015 (State Government of NSW 2015), NSW Native Vegetation Extent 5 metre raster v1.2 datasets. SLATS clearing for NSW and areas of SVTM mapped native derived grassland potentially corresponding with a CEEC will be included within the category 2 lands.

3 Additional analysis of historical aerial imagery to further classify areas as cleared/highly disturbed, resulting from significant disturbance associated with cultivation and/or improved pasture.

4 Undertaking site-based verification in areas of conflicting data with areas accessible for field verification, or potential derived native grasslands, to confirm 'low conservation grasslands' in accordance with the Interim Grasslands and other Groundcover Assessment Method (IGGAM).

5 Review of local development approvals (such as for the approved mine disturbance areas, existing transmission line easements). Where clear evidence existed for approved vegetation clearing within the subject land these areas were also included within category 1 – exempt land.

The outcome of native vegetation regulatory mapping category 1- exempt land is presented and illustrated in Appendix B (Determination of excluded impacts). These areas have been identified through a combination of desktop modelling and field survey (where possible). The results of IGGAM sampling that show clear evidence for categorisation of land to category 1 – exempt land are provided in Table 4.1.

Table 4.1 Results of IGGAM sampling for category 1 – exempt land

PCT	Plot	Easting	Northing	Potential TEC or CEEC[1]	% native species cover	% exotic cover	VI score under BAM
PCT 3431	DR-01	305244	6408008	No	93.5	6.5	10.9
	DR-04	305840	6409510	No	93.2	7.7	
	DR-05	305961	6409872	No	93.4	6.6	
PCT 3314	NE-02	305271	6405658	No	97.7	2.3	9.9
	TS-12	306998	6403151	No	35.2	64.8	
PCT 0	MS-29	321271	6391997	No	20.2	79.8	–
PCT 0	MS-30	321111	6392263	No	41.8	58.2	–
PCT 3636	MS-33	318188	6395970	No	86.4	13.6	8.7
	MS-36	319845	6394924	No	93.4	6.6	
	MS-37	319471	6395631	No	74.3	25.7	
	MS-38	319145	6395977	No	85	15	

4.1.4 *Miscellaneous Ecosystems – PCT 0*

The project consists of areas that couldn't be assigned to any native PCTs due to a lack of native vegetation and didn't meet the criteria for category 1 – exempt land. These areas were assigned to PCT 0, and included areas of:

- dams: these dams often lacked any canopy and consisted of exotic grasses and aquatic weeds
- weed dominated paddocks: these areas were often dominated by exotic grasses including Coolatai Grass (*Hyparrhenia hirta*), Rhodes Grass (*Chloris gayana*) and Kikuyu Grass (*Cenchrus clandestinus*)
- exotic tree plantings: these areas were mainly linear planted windrows along agricultural or mining land.



Photo 4.19 Example of PCT 0 dominated by exotic Coolatai Grass and *Juncus acutus*



Photo 4.20 Creeklines dominated by *Juncus acutus* with neighbouring grassland dominated by Coolatai Grass.



Photo 4.21 Example of PCT 0 dominated by exotic grasses



Photo 4.22 Landscape dominated by exotic grasses



Photo 4.23 Example of miscellaneous ecosystem (dam)



Photo 4.24 Dam within Kikuyu Grass dominated floodplain



Photo 4.25 Example of miscellaneous ecosystem (dam)



Photo 4.26 Dam within agricultural landscape



Photo 4.27 Example of pre-existing infrastructure



Photo 4.28 Road infrastructure along easement

4.1.5 *Planted native vegetation*

Within the subject land, several areas of planted native vegetation have been identified being:

- planted windrows comprised of native canopy species
- supplemental plantings of shrub species within native vegetation
- plantings incorporated in restoration works.

Of the native plantings recorded within the subject land, both the areas of supplemental plantings of shrub species and restoration works have been associated with a PCT and have been considered as native vegetation within the BDAR. As such, these patches are not considered under the streamlined assessment module for planted native vegetation and are not discussed further in this section.

However, where desktop assessment and ground-truthing has identified areas of planted native vegetation within the subject land that were planted primarily for the functional agricultural purpose of windbreaks, this is evident in the linear nature of plantings and their situation bordering paddocks and category 1 cropped lands, the streamlined assessment module for planted native vegetation has been applied. These patches of vegetation have been identified as PCT 0 – Miscellaneous ecosystems.

The planted native vegetation module was deemed appropriate to use for planted native vegetation where a native PCT was not applied following the decision-making key contained in BAM Appendix D.1, notably Step 5 (the native vegetation was planted for functional, aesthetic, horticultural or plantation forestry purposes (i.e. windbreaks in agricultural landscapes and roadside plantings) (see Table 4.2).

BAM Appendix D.2 Assessment of planted native vegetation for threatened species habitat was used to assess impacts to areas of planted native vegetation (sections 4 and 5 of the BAM are not required to be applied), in which the assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation. No hollows, stick nests or other indication of threatened fauna habitat (rock outcrops, aquatic environments, significant leaf litter or fallen log accumulations) were observed during field survey within native planted vegetation zones. Planted vegetation not subject to field verification is considered consistent with surveyed areas of planted native vegetation within the subject land and is not considered to support habitat for threatened species.

Table 4.2 BAM Appendix D.1 decision making key

Decision making key		**Response**	
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the project?	No Rows of planted native vegetation generally occur as distinct windbreaks bordering paddocks or category 1 – exempt land. Tree species compositions do not represent that of local PCTs therefore cannot be reasonably assigned. The understorey was often lacking or highly disturbed/exotic.	If yes – apply the BAM
2	Is the planted native vegetation planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM section 11.9(2), and the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	No After review of arial desktop assessment and field verification, planted native vegetation seems to mostly function as windbreaks amongst an agricultural or mining landscapes. They mostly do not form components of surrounding PCTs and therefore it is unlikely that they have been planted for environmental restoration or rehabilitation under existing conservation agreements, or to regenerate a PCT.	If yes – apply the BAM
3	Is the planted or translocated native vegetation for the purpose of providing threatened species habitat under a project listed in Q3 of the Planted Native Vegetation Streamlined Assessment Module?	No It is unlikely that planted native vegetation was intended to provide threatened species habitat. As stated above, their primary function is as windbreaks within an agricultural or mining landscapes.	If yes – apply the BAM
4	Was the planted native vegetation undertaken voluntarily for revegetation, environmental rehabilitation or restoration without legal obligation to secure or provide for management of the native vegetation.	No It is unlikely that planted native vegetation was intended as voluntary revegetation or environmental restoration. As stated above, their primary function is as windbreaks within the mining or agricultural landscapes.	If yes – apply D.2 Assessment

Decision making key		Response	
5	Is the native vegetation planted for functional, aesthetic, horticultural or plantation forestry purposes?	Yes Due to the linear nature of planted vegetation with trees of approximately the same age, it is very likely that native vegetation was planted for functional, aesthetic or horticultural purposes. This is further justified by its position encompassed by category 1 – exempt land or low conservation value lands.	If yes – apply D.2 Assessment

4.1.6 Other excluded land

The eastern section of the project is located within NSW State forests associated with areas of certified hardwood plantations defined under the NSW *Plantations and Reafforestation Act 1999* and NSW Plantations and Reafforestation (Code) Regulation 2001 as 'an area of land on which the predominant number of trees or shrubs forming, or expected to form, the canopy are trees or shrubs that have been planted'.

These plantations are subject to existing and current coastal integrated forestry operations approval (CIFOA) under the NSW *Forestry Act 2012* (https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/forestagreements/18p1177-coastal-ifoa-conditions.pdf).

The CIFOA provided an approved licence for activities impacting biodiversity under the BC Act and includes biodiversity related conditions and commitments for conservation outcomes.

The approved hardwood plantation areas are currently subject to active clear-felling for timber extraction and would be considered complete loss under the BAM.

While these approved hardwood plantations are subject to State Forests operations excluded from further assessment under the BAM and BC Act, no regulatory exclusion is currently identified for the development of CSSI projects within these plantations and as such the projects impacts to these areas have conservatively been included in this assessment in accordance with BAM.

A map of the verified hardwood plantation (purple areas) proposed for exclusion from the assessment is provided in Figure 4.2 and Appendix B (Determination of excluded impacts). The green forested areas are not approved hardwood plantations.



Figure 4.2 An example of an area of State forest hardwood plantation within the subject land

4.2 Plant community types

4.2.1 Overview

The native vegetation within the subject land has been aligned to the most likely PCT as outlined in the BioNet Vegetation Classification Database. The extent of each PCT is shown in Figure 14.9. There were 37 PCTs identified within the subject land during the field survey.

Native vegetation has been recorded by vegetation formation, class and associated PCT. The native vegetation recorded within the subject land has been assigned to 7 vegetation formations and 13 vegetation classes that occur across the Sydney Basin IBRA bioregion (including the Wyong, Yengo, Hunter IBRA subregions)(under the Interim Biogeographic Regionalisation for Australia as described in section 3.2.1). The recorded vegetation formations and vegetation classes and associated PCTs in the subject land are:

- Dry sclerophyll forests (shrub/grass sub-formation)
  - Central Gorge Dry Sclerophyll Forests
    - PCT 3489 – Hunter Escarpment Grey Box Forest.
  - Hunter-Macleay Dry Sclerophyll Forests
    - PCT 3431 – Central Hunter Ironbark Grassy Woodland
    - PCT 3438 – Hunter Escarpment Footslopes Ironbark Forest
    - PCT 3439 – Hunter Escarpment Grey Gum Sheltered Forests
    - PCT 3444 – Lower Hunter Spotted Gum-Ironbark Forest
    - PCT 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest.
- Dry sclerophyll forests (shrubby sub-formation)
  - Sydney Coastal Dry Sclerophyll Forests
    - PCT 3581 – Hunter Coast Foothills Apple Forest.
  - Sydney Hinterland Dry Sclerophyll Forests
    - PCT 3599 – Blue Mountains Peppermint Shrub Forest
    - PCT 3605 – Hunter Range Ironbark Forest
    - PCT 3617 – Sydney Hinterland Peppermint-Apple Forest
    - PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest.
  - Sydney Sand Flats Dry Sclerophyll Forests
    - PCT 3636 – Warkworth Sands Woodland.
- Forested wetlands
  - Coastal Floodplain Wetlands
    - PCT 4015 – Central Hunter Riparian Forest
    - PCT 4039 – Hunter Range Creekflat Apple-Red Gum Forest.
  - Eastern Riverine Forests
    - PCT 4072 – Hunter River Oak Mesic Forest.
  - Inland Riverine Forests
    - PCT 4089 – Namoi-Upper Hunter River Red Gum Forest.

- Grassy Woodlands
  - Coastal Valley Grassy Woodlands
    - PCT 3314 – Central Hunter Slopes Grey Box Forest
    - PCT 3315 – Central Hunter Ironbark-Spotted Gum Forest
    - PCT 3328 – Lower Hunter Red Gum – Paperbark Riverflat Forest.
- Rainforests
  - Norther Warm Temperate Rainforest
    - PCT 3025 – Central Coast Gallery Rainforest
    - PCT 3029 – Lower North Wet Gully Palm Rainforest
    - PCT 3041 – Sydney Sandstone Coachwood-Grey Myrtle Rainforest.
  - Dry Rainforests
    - PCT 3086 – Lower North Hinterland Riparian Dry Rainforest
    - PCT 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest.
- Wet sclerophyll forests (grassy sub-formation)
  - Northern Hinterland Wet Sclerophyll Forests
    - PCT 3152 – Hunter Range Turpentine-Grey Myrtle Gully Forest
    - PCT 3230 – Central Coast Escarpment Moist Forest
    - PCT 3237 – Hunter Range Blue Gum Gully Forest
    - PCT 3238 – Hunter Range Colluvial Apple-Gum Forest
    - PCT 3239 – Hunter Range Sheltered Grey Gum Forest
    - PCT 3241 – Lower North White Mahogany-Spotted Gum Moist Forest
    - PCT 3242 – Lower North Ranges Turpentine Moist Forest
    - PCT 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
    - PCT 3250 – Northern Foothills Blackbutt Grassy Forest
    - PCT 3258 – Sydney Basin Creekflat Blue Gum-Apple Forest
    - PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest.
- Wet sclerophyll forests (shrubby sub-formation)
  - North Coast Wet Sclerophyll Forests
    - PCT 3087 – Lower North Ranges Riparian Turpentine Forest
    - PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest.

PCTs 3025, 3041 and 3258 are restricted to non-disturbance areas within the biodiversity study area but aren't within the subject land. These weren't assessed further within this BDAR. An overall summary of the extent of PCTs within the subject land for each IBRA subregion is presented in Table 4.3. A description and justification of each PCT selection is provided in section 4.2.2 to 4.2.35.

Table 4.3 Overall summary of PCTs identified within the subject land

PCT ID	PCT name	Wyong IBRA subregion subject land (ha)	Yengo IBRA subregion subject land (ha)	Hunter IBRA subregion subject land (ha)	Total subject land (ha)
3029	Lower North Wet Gully Palm Rainforest	4.81	0.00	0.00	4.81
3086	Lower North Hinterland Riparian Dry Rainforest	0.00	1.90	4.06	5.96
3087	Lower North Ranges Riparian Turpentine Forest	0.00	2.82	0.31	3.13
3150	Hunter Coast Ranges Turpentine Wet Forest	36.03	0.00	0.00	36.03
3151	Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	0.00	1.85	0.00	1.85
3152	Hunter Range Turpentine-Grey Myrtle Gully Forest	0.00	0.92	0.00	0.92
3230	Central Coast Escarpment Moist Forest	55.16	15.30	0.00	70.46
3237	Hunter Range Blue Gum Gully Forest	0.00	5.46	0.00	5.46
3238	Hunter Range Colluvial Apple-Gum Forest	0.00	0.05	0.00	0.05
3239	Hunter Range Sheltered Grey Gum Forest	4.90	99.26	5.81	109.97
3241	Lower North White Mahogany-Spotted Gum Moist Forest	0.00	10.21	2.09	12.30
3242	Lower North Ranges Turpentine Moist Forest	25.93	10.57	0.00	36.50
3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	1.31	0.31	0.00	1.62
3250	Northern Foothills Blackbutt Grassy Forest	2.02	0.00	0.00	2.02
3263	Watagan Range Turpentine-Mahogany Grassy Forest	39.10	0.00	0.00	39.10
3314	Central Hunter Slopes Grey Box Forest	0.00	0.00	77.88	77.88*
3315	Central Hunter Ironbark-Spotted Gum Forest	0.00	0.00	26.30	26.30*
3328	Lower Hunter Red Gum-Paperbark Riverflat Forest	0.00	0.45	0.00	0.45
3431	Central Hunter Ironbark Grassy Woodland	0.00	0.00	118.86	118.86*

PCT ID	PCT name	Wyong IBRA subregion subject land (ha)	Yengo IBRA subregion subject land (ha)	Hunter IBRA subregion subject land (ha)	Total subject land (ha)
3438	Hunter Escarpment Footslopes Ironbark Forest	0.00	1.97	10.22	12.19
3439	Hunter Escarpment Grey Gum Sheltered Forest	0.00	1.62	0.00	1.62
3444	Lower Hunter Spotted Gum-Ironbark Forest	0.00	1.21	36.66	37.87*
3446	Lower North Foothills Ironbark-Box-Gum Grassy Forest	0.00	1.35	0.02	1.37
3489	Hunter Escarpment Grey Box Forest	0.00	5.67	0.00	5.67
3581	Hunter Coast Foothills Apple Forest	0.67	0.00	0.00	0.67
3599	Blue Mountains Peppermint Shrub Forest	0.00	7.24	0.00	7.24
3605	Hunter Range Ironbark Forest	0.00	57.10	0.00	57.10
3617	Sydney Hinterland Peppermint-Apple Forest	33.65	1.91	0.00	35.56
3621	Sydney Hinterland Turpentine-Apple Gully Forest	4.86	0.00	0.00	4.86
3636	Warkworth Sands Woodland	0.00	0.00	22.08	22.08*
4015	Central Hunter Swamp Oak Riparian Forest	0.00	0.00	9.82	9.82*
4039	Hunter Range Creekflat Apple-Red Gum Forest	0.00	0.07	0.84	0.91
4072	Hunter River Oak Mesic Forest	0.00	0.07	0.14	0.21
4089	Namoi-Upper Hunter River Red Gum Forest	0.00	0.00	11.14	11.14*
Total		**208.44**	**227.31**	**326.23**	**761.98**

* These PCTs include vegetation zones with heights of less than 2 metres (derived/disturbed grassland) where impacts will be avoided in disturbance areas B and HZ. The overall area of native vegetation within the subject land is approximately 815.76 ha although 53.78 ha will be avoided due to impacts being restricted to disturbance area A only within vegetation zones having heights less than 2 metres. Given this, the total project impact area on native vegetation within the subject land is approximately 761.98 ha.

4.2.2 PCT 3029 – Lower North Wet Gully Palm Rainforest

4.2.2.1 PCT overview

PCT 3029 – Lower North Wet Gully Palm Rainforest is described in the BioNet Vegetation Classification Database as a tall to very tall dense rainforest, or occasionally tall to extremely tall eucalypt open forest with a dense rainforest sub-canopy, which occurs in gullies and along sheltered creeks, in 2 disjunct areas, the coastal ranges between Forster and Karuah and those between Newcastle and Gosford. Where a taller sclerophyll canopy is present, the most frequent species are *Syncarpia glomulifera* occasionally and *Eucalyptus saligna* rarely. The rainforest canopy or sub-canopy very frequently includes *Archontophoenix cunninghamiana*, *Doryphora sassafras*, *Ceratopetalum apetalum*, *Sloanea australis* and *Acmena smithii*, individually or combined, and usually with the highest cover. Among the vines, *Gynochthodes jasminoides* is almost always present, with *Ripogonum fawcettianum* and *Cissus antarctica* being very frequent, and all are occasionally abundant. The sparse to dense ground layer is comprised of ferns occurring very frequently to rarely, including *Adiantum silvaticum*, *Lastreopsis* spp. and *Blechnum cartilagineum* (NSW DCCEEW 2024c).

This PCT occurs mainly in moderately warm, moderately wet locations receiving 1110–1370 millimetres mean annual rainfall, at low to mid-elevations of up to 470 metres ASL (above sea level). On less sheltered creeks and gullies and in lower to mid-slope positions it grades into a number of wet sclerophyll PCTs. In the northern part of its range, it grades into PCT 3158, in the Watagans area in the south it grades into PCT 3262 and in both areas, it may grade into PCT 3242 (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.4 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3029 during the field survey presented in Table 4.5.

Table 4.4 PCT 3029 – Lower North Wet Gully Palm Rainforest

PCT ID	3029
PCT name	Lower North Wet Gully Palm Rainforest
Vegetation formation	KF_CH1 Rainforests
Vegetation class	Norther Warm Temperate Rainforest
Per cent cleared value (%)	5.99
Extent within subject land (ha)	4.81 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.5 PCT 3029 – Lower North Wet Gully Palm Rainforest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acmena smithii, Ceratopetalum apetalum, Cryptocarya glaucescens, Doryphora sassafras, Sloanea australis, Syncarpia glomulifera subsp. glomulifera*
Shrubs	*Backhousia myrtifolia, Callicoma serratifolia, Cryptocarya rigida, Pittosporum multiflorum, Synoum glandulosum subsp. glandulosum, Tasmannia insipida*
Ferns	*Adiantum formosum, Blechnum cartilagineum, Blechnum nudum, Blechnum wattsii, Lastreopsis decomposita, Microsorum scandens*
Grass & grasslike	*Gahnia sieberiana, Oplismenus imbecillis*
Forbs	*Calanthe triplicate, Gymnostachys anceps, Pseuderanthemum variabile*
Other	*Archontophoenix cunninghamiana, Cissus hypoglauca, Cordyline stricta, Gynochthodes jasminoides, Smilax australis*

4.2.2.2 Condition states

Within the subject land PCT 3029 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

Examples of PCT 3029 Mod-good are depicted in Photo 4.29 and Photo 4.30.



Photo 4.29 PCT 3029 – Lower North Wet Gully Palm Rainforest in Watagan State Forest



Photo 4.30 PCT 3029 in Mod-good condition fringing Jilliby Jilliby Creek in Olney State Forest

4.2.2.3 Justification of PCT selection

PCT 3029 is known to occur on coastal alluvial flats, particularly on major streams, between Dora Creek and Ourimbah Creek, Central Coast. It occurs on alluvium in landscapes of Narrabeen sandstone.

PCT reference plots for PCT 3029 occur both to the north, south and east of the subject land with the PCT being known to occur within the Wyong IBRA subregion. Within the subject land, PCT 3029 has been identified to occur within incised gullies fringing streams on Narrabeen sandstones.

PCT 3029 within the subject land is restricted to the Wyong IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3029.

The allocation of PCT 3029 relies on plots HTP-MS-43, HTP-MS-52, HTP-MS-59 and HTP-MS-63. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 3029 (see Appendix D (Vegetation survey data)).

HTP-MS-43 had a higher centroid match with PCT 3028 than it did with PCT 3029. However, PCT 3028 doesn't occur within any of the IBRA subregions that the subject land resides in.

HTP-MS-63 had a higher centroid match with PCT 3028 and 3037, than it did with PCT 3029. However, neither PCT 3028 or 3037 occur in the Wyong IBRA subregion.

Occurrences of PCT 3029 in Olney State Forest were dominated by *Archontophoenix cunninghamiana* with other tree species including *Acmena smithii, Ceratopetalum apetalum, Cryptocarya glaucescens, Doryphora sassafras, Sloanea australis, Syncarpia glomulifera subsp. glomulifera.* Occurrences of this PCT within the Watagan State Forest were also dominated by these species although *Archontophoenix cunninghamiana* was generally lacking.

Patches within the Watagan State Forest were then considered against PCT 3025 due to the absence of *Archontophoenix cunninghamiana* although plot analysis using the Plot to PCT Assignment Tool showed plots having a stronger centroid relationship to PCT 3029 than PCT 3025.

4.2.2.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3029 may form part of the BC Act listed Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act. PCT 3029 is classified as a warm temperate rainforest and to form part of this TEC the vegetation must occur in conjunction with subtropical rainforest vegetation alliances (Floyd 1990) listed in paragraph 4 of the final determination being:

- *Argyrodendron trifoliolatum* alliance
  - 1. *Argyrodendron trifoliolatum* suballiance
  - 5. *Castanospermum australe – Dysoxylum muelleri* suballiance
  - 6. *Archontophoenix – Livistona suballiance*
- *Dendrocnide excelsa – Ficus* spp. Alliance
  - 14. *Doryphora sassafras – Daphnandra micranthus – Dendrocnide excelsa Ficus*-spp. – *Toona* suballiance
  - 15. *Ficus* spp. – *Dysoxylum fraserianum – Toona – Dendrocnide suballiance*
- *Drypetes australasica – Araucaria cunninghamii* alliance
  - 21. *Araucaria cunninghamii* suballiance
  - 22. *Flindersia* spp. – *Araucaria* suballiance.

No patches of PCT 3029 within the subject land occur in conjunction with any of the alliances or suballiances listed under paragraph 4 of the final determination for Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (NSW Scientific Committee 2006).

PCT 3029 may also form part of the Lowland Rainforest on Floodplain in New South Wales North Coast Bioregion TEC, however this TEC is restricted NSW North Coast bioregion which is outside of the subject land.

4.2.2.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3029.

4.2.3 PCT 3086 – Lower North Hinterland Riparian Dry Rainforest

4.2.3.1 PCT overview

PCT 3086 – Lower North Hinterland Riparian Dry Rainforest is described in the BioNet Vegetation Classification Database as a mid-high to tall rainforest, usually with eucalypt emergents, or very tall to extremely tall, sclerophyll open forest with a rainforest sub-canopy. This PCT occurs along creeks and gullies in coastal and escarpment ranges from the upper Barnard River northwest of Gloucester to the upper MacDonald River northwest of Gosford. The canopy composition is heterogeneous with no single species consistently dominant, however *Streblus brunonianus* and *Diospyros australis* are very frequent in the canopy or sub-canopy and either species sometimes with a high foliage cover. Other tree species which sometimes have a high cover very frequently include *Claoxylon australe* and commonly *Acmena smithii* and *Ficus coronata*. Of the vines *Cissus antarctica* is very frequent and *Cissus hypoglauca* common, either of which often has high cover (NSW DCCEEW 2024c).

Sclerophyll tree species are often present as emergents or in the canopy, however no individual species occurs more than occasionally. The most frequent species are *Eucalyptus saligna*, *Syncarpia glomulifera* and *Eucalyptus deanei*. *Pittosporum multiflorum* is the most frequent mid-stratum shrub and the sparse to dense ground cover includes ferns, almost always *Adiantum formosum*, and very frequently *Doodia aspera* and *Pellaea falcata*. This PCT occurs mainly along rocky streams in areas of high relief, in mild locations receiving a moderate 840–1160 millimetres mean annual rainfall, at low to mid-elevations of 100-640 metres ASL. It occurs mostly on sandstone or other sedimentary lithologies (NSW DCCEEW 2024c).

At the site scale, it often has a canopy which is very heterogeneous in density and height, due partly to the heterogeneous physical nature of the streams along which it occurs and the variable nature of flooding effects. It is floristically similar to PCT 3087 which occurs along the same streams. The factors which determine the relative occurrence of these 2 PCTs are uncertain, however PCT 3086 may occur in areas which are more prone to flood scouring and has a higher abundance of herbs such as *Rubus rosifolius*, *Stellaria flaccida* and *Urtica incisa*.

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.6 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3086 during the field survey presented in Table 4.7.

Table 4.6 PCT 3086 – Lower North Hinterland Riparian Dry Rainforest diagnostic species recorded within the subject land

PCT ID	3086
PCT name	Lower North Hinterland Riparian Dry Rainforest
Vegetation formation	KF_CH1 Rainforests
Vegetation class	Dry Rainforests
Per cent cleared value (%)	46.33
Extent within subject land (ha)	5.96 (1.90 ha in the Yengo IBRA subregion and 4.06 ha in the Hunter IBRA subregion)

Table 4.7 PCT 3086 – Lower North Hinterland Riparian Dry Rainforest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acmena smithii, Cryptocarya microneura, Ficus rubiginosa, Streblus brunonianus*
Shrubs	*Claoxylon australe, Diospyros australis, Pittosporum multiflorum, Rhodamnia rubescens*
Ferns	*Adiantum formosum, Doodia aspera, Pellaea falcata*
Grass & grasslike	*Cyperus tetraphyllus, Oplismenus aemulus, Oplismenus imbecillis*
Forbs	*Plectranthus parviflorus, Stellaria flaccida, Urtica incisa*
Other	*Cissus antarctica, Marsdenia rostrata, Smilax australis*

4.2.3.2 Condition states

Within the subject land PCT 3086 is present in the following broad condition states (equivalent to vegetation zones):

- Mod/Good.

Examples of PCT 3086 Mod-good are depicted in Photo 4.31 and Photo 4.32.



Photo 4.31 PCT 3086 Mod-good in Corrabare North Flora Reserve



Photo 4.32 PCT 3086 Mod-good in Pokolbin State Forest

4.2.3.3 Justification of PCT selection

PCT 3086 is known to occur along creeks and gullies in coastal and escarpment ranges from the upper Barnard River northwest of Gloucester to the upper MacDonald River northwest of Gosford.

PCT reference plots for PCT 3086 occur to the east and west of the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3086 has been identified along the gullies east of Pokolbin State Forest.

PCT 3086 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3029.

PCT 3086 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as PCT 3029 and 3242.

The allocation of PCT 3086 relies on plot HTP-MS-74. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a centroid match with PCT 3086 (see Appendix D (Vegetation survey data)). HTP-MS-74 had a higher centroid match with PCT 3087, than it did with PCT 3086. These PCTs are floristically similar and can occur along the same streams. The factors which determine the relative occurrence of these 2 PCTs are uncertain, however PCT 3086 may occur in areas which are more protected from fire by rocky banks and may also occur in areas which are more prone to flood scouring (NSW DCCEEW 2024c).

The absence of the *Backhousia myrtifolia* dominated mid-story and presence of the rainforest sub-canopy suggests that HTP-MS-74 is more likely to be assigned to PCT 3086 than PCT 3087.

The patches within the subject land had a canopy that included *Alphitonia excelsa, Ficus rubiginosa*, *Mallotus philippensis, Melia azedarach* and *Streblus brunonianus*. The midstory contained a mix of *Backhousia myrtifolia, Cissus antarctica*, *Commersonia fraseri*, *Maclura cochinchinensis, Pittosporum multiflorum* and *Rhodamnia rubescens*. Native groundcovers included *Commelina cyanea, Doodia aspera* and *Oplismenus imbecillis. Toona ciliata* seedling were identified along the patch within Corrabare North Flora Reserve.

4.2.3.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3086 may form part of the BC Act listed Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act. PCT 3086 is classified as a dry rainforest and to form part of this TEC the vegetation must occur in conjunction with subtropical rainforest vegetation alliances (Floyd 1990) listed in paragraph 4 of the final determination being:

- *Argyrodendron trifoliolatum* alliance
  - 1. *Argyrodendron trifoliolatum* suballiance
  - 5. *Castanospermum australe – Dysoxylum muelleri* suballiance
  - 6. *Archontophoenix – Livistona suballiance*
- *Dendrocnide excelsa – Ficus* spp. Alliance
  - 14. *Doryphora sassafras – Daphnandra micranthus – Dendrocnide excelsa Ficus*-spp. *– Toona* suballiance
  - 15. *Ficus* spp. *– Dysoxylum fraserianum – Toona – Dendrocnide suballiance*
- *Drypetes australasica – Araucaria cunninghamii* alliance
  - 21. *Araucaria cunninghamii* suballiance
  - 22. *Flindersia* spp. *– Araucaria* suballiance.

No patches of PCT 3086 within the subject land occur in conjunction with any of the alliances or suballiances listed under paragraph 4 of the final determination for Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (NSW Scientific Committee 2006). In addition, this vegetation type does not form part of any dry rainforest suballiance listed under paragraph 5 of the final determination and as such PCT 3086 within the subject land does not for part of this TEC listing.

PCT 3086 may also form part of the Lowland Rainforest on Floodplain in New South Wales North Coast Bioregion TEC, however this TEC is restricted NSW North Coast bioregion which is outside of the subject land.

4.2.3.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3086.

4.2.4 PCT 3087 – Lower North Ranges Riparian Turpentine Forest

4.2.4.1 PCT overview

PCT 3087 – Lower North Ranges Riparian Turpentine Forest is described in the BioNet Vegetation Classification Database as a tall to extremely tall, mid-dense to dense sclerophyll forest with a rainforest sub-canopy, or rarely, mid-high to tall rainforest with sclerophyll emergents, which occurs along creeks and gullies in coastal ranges between Taree and Gosford. The sclerophyll canopy is very variable in structure and composition, however it commonly includes *Syncarpia glomulifera*, which is sometimes locally dominant, often with a suite of species that are individually rare including *Lophostemon confertus* and a range of eucalypt species, the most frequent being *Eucalyptus acmenoides*, *Eucalyptus deanei* and *Eucalyptus saligna*. Other tree species in the canopy or sub-canopy very frequently include Backhousia myrtifolia, often with high cover, *Diospyros australis* and *Ficus coronata*, commonly *Alectryon subcinereus* and *Acmena smithii*, and occasionally *Guioa semiglauca*. *Pittosporum multiflorum* is almost always present as a sub-canopy shrub. Among the vines *Cissus antarctica*, *Geitonoplesium cymosum*, *Gynochthodes jasminoides* and *Smilax australis* are very frequent, while *Cissus hypoglauca* is common. The sparse to dense ground layer is ferny and almost always includes Doodia aspera, often with a high local abundance, and very frequently *Pellaea falcata* (NSW DCCEEW 2024c).

This PCT occurs mainly in moderately warm, moderately wet locations receiving 870-1290 millimetres mean annual rainfall, at low to mid-elevations of 20–350 metres above sea level. In the Watagans area it occurs on Narrabeen sandstone, with an isolated sample on a basalt intrusion at Peats Ridge. However elsewhere to the north it occurs on any of a range of sediments or metasediments, or occasionally on alluvium. It often has a canopy which is heterogeneous in density and height, due partly to variations in stream morphology and the variable nature of flooding effects. It is floristically similar to PCT 3086 which may occur along the same streams. The factors which determine the relative occurrence of these 2 PCTs are uncertain, however PCT 3086 may occur in areas which are more protected from fire by rocky banks, but more prone to localised flood scouring (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.8 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3087 during the field survey presented in Table 4.9.

Table 4.8 PCT 3087 – Lower North Ranges Riparian Turpentine Forest diagnostic species recorded within the subject land

PCT ID	3087
PCT name	Lower North Ranges Riparian Turpentine Forest
Vegetation formation	KF_CH2B Wet Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	North Coast Wet Sclerophyll Forests
Per cent cleared value (%)	26.6
Extent within subject land (ha)	3.13 (2.82 ha in the Yengo IBRA subregion and 0.31 ha in the Hunter IBRA subregion)

Table 4.9 PCT 3087 – Lower North Ranges Riparian Turpentine Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Eucalyptus deanei, Eucalyptus punctata, Scolopia braunii, Syncarpia glomulifera*
Shrubs	*Astrotricha latifolia, Backhousia myrtifolia, Commersonia fraseri*
Ferns	*Doodia aspera, Lastreopsis decomposita, Pellaea falcata, Pyrrosia rupestris*
Grass & grasslike	*Oplismenus aemulus, Oplismenus imbecillis*
Forbs	*Hydrocotyle laxiflora, Plectranthus parviflorus, Pseuderanthemum variabile*
Other	*Cissus antarctica, Gynochthodes jasminoides, Hibbertia dentata, Smilax australis*

4.2.4.2 Condition states

Within the subject land PCT 3087 is present in the following broad condition states (equivalent to vegetation zones):

- Mod/Good.

Examples of PCT 3087 Mod-good are depicted in Photo 4.33 and Photo 4.34.



Photo 4.33 PCT 3087 Mod-good in the Yengo IBRA subregion



Photo 4.34 PCT 3087 Mod-good as sampled in plot TC-19

4.2.4.3 Justification of PCT selection

PCT 3087 is known to occur along creeks and gullies in coastal ranges between Taree and Gosford.

PCT reference plots for PCT 3087 occur to the east and west of the subject land with the PCT known to occur in the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3087 has been identified along the creeks and gullies Corrabare and Pokolbin State Forest.

PCT 3087 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as either PCT 3086, 3087 and 3152.

The allocation of PCT 3087 relies on plots HTP-MS-10 and TC-19. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3087 (see Appendix D (Vegetation survey data). Plot TC-19 did have a greater centroid match to PCTs 3111, 3151 and 3152 than it did for PCT 3087. The vegetation formation in TC-19 is Wet Sclerophyll Forest and has been recently affected by intense fires, which rules out 3111 and 3151, since they fall under the Rainforest vegetation formation. Due to the fire affected understory, some diagnostic species were absent and made it difficult to distinguish between PCT 3087 and PCT 3152. However, the nearest reference plot to TC-19 is assigned to PCT 3087 and occurs along the same gully in Corrabare State Forest.

Patches within the subject land had a canopy that included *Eucalyptus deanei* and *Syncarpia glomulifera*, with a small tree layer of *Backhousia myrtifolia.* The shrub layered included a mix of *Alectryon subcinereus, Commersonia frazeri, Diospyros australis* and *Pittosporum multiflora*. The ground layer included *Adianthum atheopicus, Oplismenus imbacillis, Pellaea falcata, Plectranthus parviflorus* and *Stellaria flaccida*.

4.2.4.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3087.

4.2.4.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3087.

4.2.5 PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest

4.2.5.1 PCT overview

PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest is described in the BioNet Vegetation Classification Database as a very tall to extremely tall sclerophyll open forest with a mid-high sub-canopy of warm temperate rainforest trees and shrubs or rarely a tall closed rainforest with eucalypt emergents found in gullies and sheltered slopes of the Watagan range and hills of the Central and Hunter coasts. The tree canopy or emergent layer very frequently includes *Syncarpia glomulifera* occasionally with *Eucalyptus saligna* or rarely *Eucalyptus deanei*. The latter 2 species are occasionally replaced or accompanied by *Eucalyptus acmenoides* or *Eucalyptus pilularis* and rarely *Eucalyptus paniculata* (NSW DCCEEW 2024c).

The mid-stratum is layered with a mix of taller mesophyll small trees, palms and lower growing shrubs. The taller stratum very frequently includes *Synoum glandulosum* subsp. *glandulosum*, commonly *Cryptocarya microneura*, *Acmena smithii* and *Eupomatia laurina*, occasionally *Glochidion ferdinandi*, *Elaeocarpus reticulatus* and *Guioa semiglauca*, rarely with *Cryptocarya glaucescens*. Among the palms *Livistona australis* is occasional, *Archontophoenix cunninghamiana* rare, and both are recorded in the taller mid-stratum as well as the tree *Allocasuarina torulosa*, which is usually just a few individuals (NSW DCCEEW 2024c).

The lower shrub layer commonly includes *Wilkiea huegeliana* and *Breynia oblongifolia*, occasionally with *Pittosporum revolutum* and *Trochocarpa laurina*. A diverse range of vines are found in in multiple strata and almost always include Smilax australis, very frequently *Dioscorea transversa*, *Gynochthodes jasminoides* and *Geitonoplesium cymosum*; and commonly with *Ripogonum fawcettianum*. The ground layer is characterised by ferns, very frequently including *Blechnum cartilagineum* and *Doodia aspera*, commonly with *Calochlaena dubia*, along with the graminoid *Gymnostachys anceps* (NSW DCCEEW 2024c).

Primarily found on Narrabeen clays and shales, and sometimes on sandstone along the very wet escarpment and ranges of the Central Coast, Wyong and Lake Macquarie districts. Several low elevation coastal outliers occur on alluvial soils that fringe forested wetlands. This community is replaced by PCT 3158 north of Newcastle and PCT 3153 south of Sydney, both of which share moderate floristic relationships to this PCT. It grades into rainforest PCT 3029 in deeper gullies and very protected slopes (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.10 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3150 during the field survey presented in Table 4.11.

Table 4.10 PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest diagnostic species recorded within the subject land

PCT ID	3150
PCT name	Hunter Coast Ranges Turpentine Wet Forest
Vegetation formation	KF_CH2B Wet Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	North Coast Wet Sclerophyll Forests
Per cent cleared value (%)	10.36
Extent within subject land (ha)	36.03 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.11 PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acmena smithii, Cryptocarya glaucescens, Doryphora sassafras, Eucalyptus acmenoides, Eucalyptus deanei, Eucalyptus pilularis, Eucalyptus saligna, Syncarpia glomulifera subsp. glomulifera*
Shrubs	*Acacia schinoides, Commersonia fraseri, Cryptocarya rigida, Elaeocarpus reticulatus, Lasiopetalum ferrugineum var. cordatum, Melicope micrococca, Polyscias sambucifolia, Prostanthera incisa, Psychotria loniceroides, Rubus rosifolius, Stenocarpus salignus, Synoum glandulosum subsp. glandulosum, Tasmannia insipida*
Ferns	*Blechnum cartilagineum, Doodia aspera, Lastreopsis decomposita, Lastreopsis microsora subsp. microsora, Microsorum scandens, Pellaea falcata, Pteris tremula, Pteridium esculentum*
Grass & grasslike	*Entolasia marginata, Gahnia sieberiana, Lepidosperma laterale, Lomandra longifolia, Oplismenus aemulus, Oplismenus imbecillis, Ottochloa gracillima*
Forbs	*Dianella caerulea, Gymnostachys anceps, Lobelia purpurascens, Pseuderanthemum variabile,* Senecio linearifolius, *Sigesbeckia orientalis subsp. orientalis*
Other	*Calochlaena dubia, Cissus hypoglauca, Gynochthodes jasminoides, Palmeria scandens, Parsonsia straminea, Ripogonum fawcettianum, Smilax australis, Smilax glyciphylla*

4.2.5.2 Condition states

Within the subject land PCT 3150 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

Examples of PCT 3150 Mod-good are depicted in Photo 4.35 and Photo 4.36.



Photo 4.35 PCT 3150 (Mod-good) as sampled in plot HTP-MS-42



Photo 4.36 PCT 3150 (Mod-good) as sampled in plot HTP-MS-56

4.2.5.3 Justification of PCT selection

PCT 3150 is known to occur in gullies and sheltered slopes of the Watagan range and hills of the Central and Hunter coasts.

PCT reference plots for PCT 3150 occur east and west of the subject land with the PCT known to occur in the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3150 has been identified along the gullies and slopes within Olney, Watagan and Corrabare State Forest.

PCT 3150 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as either PCT 3150 or PCT 3263.

The allocation of PCT 3150 relies on plots LCSM-19, HTP-MS-42, HTP-MS-44, HTP-MS-56 and HTP-MS-58, with plots LCSM-15 and HTP-MS-50 used for its Plantation condition class. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3150 (see Appendix D (Vegetation survey data)).

HTP-MS-44 had a higher centroid match with PCT 3270, than it did with PCT 3150, however this PCT doesn't occur within any of the IBRA subregions that the subject land is present in.

HTP-MS-50 had a higher centroid match with PCT 3025, than it did with PCT 3150. MS-50 is located along a sheltered slope in the Watagan SF, which is more characteristic of PCT 3150 than it is of PCT 3025, which only occurs on coastal alluvial flats.

HTP-MS-56 had a higher centroid match with PCT 3028, than it did with PCT 3150, however this PCT doesn't occur within any of the IBRA subregions that the subject land is present in.

LCSM-15 had a higher centroid match with PCT 3082, than it did with PCT 3150. however this PCT doesn't occur within the Wyong IBRA subregions, which is where this plot is located.

LCSM-19 had a higher centroid match with PCT 3167 and 3169, than it did with PCT 3150, however neither of these PCTs occur within any of the IBRA subregions that the subject land is present in.

Patches within the subject land had a canopy that included *Eucalyptus deanei*, *Eucalyptus saligna* and *Syncarpia glomulifera* subsp. glomulifera, with a small tree layer that included *Acmena smithii* and *Allocasuarina torulosa*. The midstory usually included *Cryptocarya rigida, Psychotria loniceroides* and *Synoum glandulosum subsp. glandulosum*. The ground layer included a mix of *Cissus hypoglauca, Pseuderanthemum variabile* and *Smilax australis*.

4.2.5.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3150.

4.2.5.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3150.

4.2.6 PCT 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest

4.2.6.1 PCT overview

PCT 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest is described in the BioNet Vegetation Classification Database as a very tall to extremely tall, sclerophyll open forest with dense *Backhousia myrtifolia* sub-canopy, or sometimes a mid-high to tall, dense *Backhousia myrtifolia* forest with or without eucalypt emergents. This PCT occurs in gullies, along creeks and on steep slopes between Wisemans Ferry and the upper Goulburn River, particularly in the Hunter Range area. *Backhousia myrtifolia* almost always has the highest foliage cover of any tree species and is dominant in the sub-canopy or canopy (NSW DCCEEW 2024c).

Where a sclerophyll overstorey exists, occasional species include *Angophora floribunda*, *Eucalyptus michaeliana* and *Syncarpia glomulifera*, rarely with *Eucalyptus deanei*. Mid-stratum tree and shrub species, generally with low cover, commonly include *Notelaea longifolia* and *Bursaria spinosa*, with rainforest species *Melicope micrococca* occasional and rarely, *Acmena smithii* and *Alphitonia excelsa* in the more easterly, wetter sites. The very sparse to dense ground layer is comprised mostly of ferns, almost always including *Pellaea falcata* and very frequently *Adiantum aethiopicum*, *Doodia aspera* and *Asplenium flabellifolium*, very frequently with the grass *Oplismenus imbecillis* and commonly the forb *Plectranthus parviflorus* (NSW DCCEEW 2024c).

This PCT occurs mainly in mild, moderately dry locations receiving 640–870 millimetres mean annual rainfall, at low to mid-elevations of 130-380 metres ASL. It occurs mainly on Narrabeen sandstone, rarely in enriched gullies on Hawkesbury sandstone. Towards the eastern, wetter end of its range, this PCT occurs along creeks, in gullies and on steep, rocky slopes where there is some protection from fire. At the drier western end, it occurs on sheltered flats below cliffs along larger creeks. This PCT has a similar range to the related PCT 3152, however tends to occupy warmer sites with lower rainfall (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.12 with detailed description of each species per growth form recorded from BAM plots undertaken PCT 3151 during the field survey presented in Table 4.13.

Table 4.12 PCT 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest

PCT ID	3151
PCT name	Northwest Sydney Sandstone Grey Myrtle Dry Rainforest
Vegetation formation	KF_CH1 Rainforests
Vegetation class	Dry Rainforests
Per cent cleared value (%)	2.27%
Extent within subject land (ha)	1.85 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.13 PCT 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Clerodendrum tomentosum, Notelaea longifolia, Streblus brunonianus*
Shrubs	*Backhousia myrtifolia, Elaeodendron australe, Melaleuca styphelioides*
Ferns	*Adiantum hispidulum var. hispidulum, Doodia australis, Pellaea falcata*
Grass & grasslike	*Lepidosperma cf. laterale, Microlaena stipoides, Oplismenus imbecillis*
Forbs	*Aneilema acuminatum, Dichondra sp. Inglewood,, Plectranthus parviflorus*
Other	*Cissus hypoglauca, Dioscorea transversa, Gynochthodes jasminoides*

4.2.6.2 Condition states

Within the subject land PCT 3151 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

4.2.6.3 Justification of PCT selection

PCT 3151 is known to occur in in gullies, along creeks and on steep slopes between Wisemans Ferry and the upper Goulburn River, particularly in the Hunter Range area.

PCT reference plots for PCT 3151 occur east and west of the subject land with the PCT known to occur in the Yengo IBRA subregion. Within the subject land, PCT 3151 has been identified along steep gullies near Congewai Creek.

PCT 3151 within the subject land is restricted to the Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as 3605.

The allocation of PCT 3151 relies on plot HTP-MS-75. This plot was run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3151 (see Appendix D (Vegetation survey data)). This plot also had a close centroid match to PCT 3098 and PCT 3110, however PCT 3098 doesn't occur in the Yengo IBRA subregion. PCT 3110 partly overlaps in range and environment with PCT 3151, which also has a dense canopy or sub-canopy of *Backhousia myrtifolia*, however tends to occur in cooler sites than that PCT. These 2 PCTs are floristically related, however PCT 3110 has a high frequency of vines *Geitonoplesium cymosum* and *Pandorea pandorana*. While both of these species are present in HTP-MS-75, they are not highly abundant within the plot, leaving this plot to be assigned to PCT 3151.

Patches within the subject land had a low canopy dominated by *Backhousia myrtifolia,* with *Eucalyptus deanei* as an emergent. The midstory included *Breynia oblongfolia, Bursaria spinosa* and *Pittosporum multiflorum*. The ground layer included *Doodia aspera, Oplismenus imbecillis* and *Pseuderanthemum variabile.*

4.2.6.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3151.

4.2.6.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3151.

4.2.7 PCT 3152 – Hunter Range Turpentine-Grey Myrtle Gully Forest

4.2.7.1 PCT overview

PCT 3152 – Hunter Range Turpentine-Grey Myrtle Gully Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a hardy mesophyll shrub layer and a ground layer of graminoids, climbers and small-leaved ferns found on sheltered Narrabeen sandstone slopes and gullies across Yengo National Park and adjoining ranges, northwest of Sydney. The tree canopy almost always includes a high cover of *Syncarpia glomulifera*, occasionally with blue gum eucalypts *Eucalyptus deanei* or *Eucalyptus saligna*, or *Angophora costata*, and in the Broken Back Range area, very localised stands are dominated by *Eucalyptus hypostomatica*. A layer of smaller trees commonly includes *Angophora floribunda* (NSW DCCEEW 2024c).

The mid-stratum is characterised the very frequent high cover of *Backhousia myrtifolia*, either as a taller layer of small trees or as part of the lower shrub layer, or both. A sparse layer of *Allocasuarina torulosa* is also commonly recorded in the taller mid-stratum. The lower shrub layer very frequently includes *Persoonia linearis*, *Myrsine variabilis* and *Denhamia silvestris*, commonly with *Breynia oblongifolia*, *Pittosporum revolutum*, *Astrotricha latifolia*, *Zieria smithii* and *Polyscias sambucifolia*. The ground layer is a mix of growth forms common to sheltered environments. Small climbers are very frequent including *Pandorea pandorana* subsp. *pandorana*, *Smilax australis* and *Eustrephus latifolius*. Small-leaved ferns are also diverse and very frequently include *Doodia aspera*, commonly *Adiantum aethiopicum*, and occasionally *Adiantum hispidulum* and *Asplenium flabellifolium* (NSW DCCEEW 2024c).

This PCT is widespread across the drier hinterland ranges (below 900 millimetres of mean annual rainfall) between the Hawkesbury River and Hunter valley, with easterly samples found in Pokolbin and Corrabare State forests. In this area the forest grades into coastal higher rainfall wet sclerophyll forests including PCT 3241 and PCT3242.

To the west of the Putty district, which marks the western limits of its distribution, this PCT is replaced by wetter forests such as PCT 3138, with increasing rainfall, elevation and more deeply dissected gullies (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.14 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3152 during the field survey presented in Table 4.15.

Table 4.14 PCT 3152 – Hunter Coast Ranges Turpentine Wet Forest

PCT ID	3152
PCT name	Hunter Range Turpentine-Grey Myrtle Gully Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	0.59
Extent within subject land (ha)	0.92 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.15 PCT 3152 – Hunter Coast Ranges Turpentine Wet Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora floribunda, Syncarpia glomulifera*
Shrubs	*Backhousia myrtifolia, Denhamia silvestris, Myrsine variabilis*
Ferns	*Adiantum aethiopicum, Adiantum hispidulum, Doodia aspera*
Grass & grasslike	*Lepidosperma laterale, Oplismenus imbecillis, Poa affinis*
Forbs	*Dianella caerulea, Lobelia purpurascens, Plectranthus parviflorus*
Other	*Eustrephus latifolius, Pandorea pandorana subsp. pandorana, Smilax australis*

4.2.7.2 Condition states

Within the subject land PCT 3152 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3152 Mod-good is depicted in Photo 4.37.



Photo 4.37 PCT 3152 Mod-good in Corrabare State Forest

4.2.7.3 Justification of PCT selection

PCT 3152 is known to occur on sheltered Narrabeen sandstone slopes and gullies across Yengo National Park and adjoining ranges, northwest of Sydney.

PCT reference plots for PCT 3152 occur west of the subject land with the PCT known to occur in the Yengo IBRA subregion. Within the subject land, PCT 3152 has been identified along Narrabeen sandstone slopes and gullies in Corrabare and Pokolbin State Forests.

PCT 3152 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as PCT 3152 within Corrabare State Forest.

The allocation of PCT 3152 relies on flora rapid points in the absence of plots. Patches within the subject land had a canopy dominated by *Syncarpia glomulifera*, with *Eucalyptus acmenoides* and *Eucalyptus agglomerata* present in some patches. The midstory was dominated by *Backhousia myrtifolia*, with *Acacia schinodies, Astrotricha floccosa, Commersonia fraseri* and *Pittosporum revolutum* also present. The ground layer consisted of a mix of *Calachinia dubia, Dianella cerulea, Lomandra longifolia* and *Smilax australis*.

4.2.7.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3152.

4.2.7.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3152.

4.2.8 PCT 3230 – Central Coast Escarpment Moist Forest

4.2.8.1 PCT overview

PCT 3230 – Central Coast Escarpment Moist Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a sparse mixed mesophyll and sclerophyll mid-stratum and a ground layer of ferns and grasses. This PCT occurs on Narrabeen sandstone slopes and escarpments of the lower Hawkesbury, Pittwater, Brisbane Waters and Watagan Ranges, Central Coast region. The tree canopy is variable in composition and no set of eucalypt species is consistently recorded with a high cover. *Angophora floribunda* and *Syncarpia glomulifera* are common, however maybe a member of the upper canopy or as a small tree, sometimes both. There are a range of canopy species that also have high cover, however each occur no more than occasionally or rarely across the distribution of the PCT. These include *Eucalyptus pilularis*, *Eucalyptus piperita*, *Eucalyptus saligna* or *Eucalyptus deanei*, *Eucalyptus paniculata*, *Angophora costata*, *Eucalyptus umbra* or *Eucalyptus punctata* (NSW DCCEEW 2024c).

A layer of small trees is almost always present and dominated by *Allocasuarina torulosa*, with a lower shrub layer very frequently including *Persoonia linearis*, commonly *Breynia oblongifolia*, occasionally with *Platysace lanceolatus*, *Myrsine variabilis* and *Synoum glandulosum* subsp. *glandulosum*. Occasionally there is a sparse cover of Livistona australis, typically with no more than 1 or 2 individuals. The ground layer is characterised by a high cover of ferns with *Pteridium esculentum* almost always present, commonly with a higher cover of *Calochlaena dubia* and occasionally *Blechnum cartilagineum*. Small mesic climbers are both diverse and very frequent including *Eustrephus latifolius*. Grasses also comprise a high proportion of the cover, very frequently including *Imperata cylindrica* and *Entolasia stricta*, commonly with *Microlaena stipoides*. Graminoids almost always include *Dianella caerulea* and very frequently *Lomandra longifolia* (NSW DCCEEW 2024c).

This PCT is primarily found at low elevation Narrabeen escarpments and hills, commonly on lower slopes above the flooded Hawkesbury and Pittwater valleys. It occurs typically on sheltered to intermediate easterly aspects or rarely on crests of the main range east of Gosford and in the Watagan Range, both identified as residual Hawkesbury Sandstone, however this may only be a thin layer above the Narrabeen stratum. A geological outlier occurs on a volcanic dyke at West Head in Kuring-Gai National Park. On Narrabeen shales in the Central Coast-Pittwater districts it is replaced by moist forest PCT 3234 on sheltered aspects or dry grassy forest PCT 3437 on drier aspects (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.16 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3230 during the field survey presented in Table 4.17.

Table 4.16 PCT 3230 – Central Coast Escarpment Moist Forest

PCT ID	3230
PCT name	Central Coast Escarpment Moist Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	24.52
Extent within subject land (ha)	70.46 (55.16 ha in the Wyong IBRA subregion and 15.30 ha in the Yengo IBRA subregion)

Table 4.17 PCT 3230 – Central Coast Escarpment Moist Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Angophora floribunda, Eucalyptus acmenoides, Eucalyptus agglomerate, Eucalyptus piperita, Eucalyptus pilularis, Eucalyptus punctata, Eucalyptus saligna, Glochidion ferdinandi, Syncarpia glomulifera subsp. glomulifera, Trochocarpa laurina*
Shrubs	*Acacia irrorata subsp. irrorata, Acacia parvipinnula, Acrotriche divaricate, Breynia oblongifolia, Cryptocarya rigida, Elaeocarpus reticulatus, Lasiopetalum ferrugineum var. cordatum, Leptospermum polygalifolium, Leucopogon juniperinus, Leucopogon lanceolatus, Persoonia linearis, Platysace lanceolata, Podolobium ilicifolium, Polyscias sambucifolia, Pomaderris ferruginea, Psychotria loniceroides, Rubus parvifolius, Rhodamnia rubescens, Synoum glandulosum subsp. glandulosum*
Ferns	*Adiantum aethiopicum, Doodia australis, Lindsaea microphylla, Pteridium esculentum*
Grass & grasslike	*Cyathochaeta diandra, Entolasia marginata, Entolasia stricta, Gahnia melanocarpa, Gahnia sieberiana, Imperata cylindrica, Lepidosperma laterale, Lomandra longifolia, Microlaena stipoides var. stipoides, Oplismenus imbecillis, Panicum simile, Schoenus melanostachys*
Forbs	*Achyranthes aspera, Centella asiatica, Dampiera stricta, Dichondra repens, Drosera spp., Dianella caerulea, Gonocarpus teucrioides, Goodenia heterophylla, Gymnostachys anceps, Hydrocotyle laxiflora, Lobelia purpurascens, Opercularia aspera, Opercularia varia, Patersonia glabrata, Pseuderanthemum variabile*
Other	*Amyema spp., Billardiera scandens, Calochlaena dubia, Cissus hypoglauca, Cordyline stricta, Hardenbergia violacea, Hibbertia dentata, Hibbertia scandens, Kennedia rubicunda, Passiflora herbertiana, Smilax australis, Smilax glyciphylla, Xanthorrhoea resinosa*

4.2.8.2 Condition states

Within the subject land PCT 3230 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good
- Plantation.

Examples of PCT 3230 Mod-good are depicted in Photo 4.38 and Photo 4.39.



Photo 4.38 PCT 3230 – Central Coast Escarpment Moist Forest in Olney State Forest



Photo 4.39 PCT 3230 in mod-good condition state

4.2.8.3 Justification of PCT selection

PCT 3230 is known to occur on Narrabeen sandstone slopes and escarpments of the lower Hawkesbury, Pittwater, Brisbane Waters and Watagan Ranges, Central Coast region.

PCT reference plots for PCT 3230 occur in close proximity to the subject land with the PCT known to occur in the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3230 has been identified along the Narrabeen sandstone slopes and escapements within Olney, Watagan and Corrabare State Forest.

PCT 3230 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as either PCT 0, 3176 or 3617.

The allocation of PCT 3230 relies on plots LCSM-03, LCSM-08, LCSM-11, LCSM-29, HTP-MS-13, HTP-MS-48, HTP-MS-60, HTP-MS-62 and TC-09 for mod-good condition and LC-12, LC-14, LC-17 and HTP-MS-57 for the plantation condition class. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a, or close to, centroid match with PCT 3230 (see Appendix D (Vegetation survey data)). Among these plots, the tool suggested several potential PCTs, with some of these not consider further since they weren't recognised to occur in the IBRA subregions that the plots resided in (e.g. TC-09 dismissed 3137, 3260 and 4036 since they don't occur in the Yengo IBRA subregion). The remaining potential PCTs that had a greater centroid match than 3230 included 3237 and 3258 for TC-09, and PCT 3621 for LC-08.

TC-09 is located near the crest of a slope in Corrabare State Forest, which makes it unlikely to be PCT 3237 (found in dry Narrabeen sandstone gullies) or PCT 3258 (found on alluvial creek flats in dissected sandstone plateaus). Unlike these PCTs, 3230 occurs on Narrabeen sandstone slopes and escarpments.

LC-08 is located on a gentle slope in Olney SF, which makes it unlikely to be PCT 3621 which mainly occurs on steep sheltered Hawkesbury Sandstone slopes and gullies on the Sydney hinterland plateaus. Unlike this PCT, 3230 occurs on Narrabeen sandstone slopes and escarpments.

The outputs from the Plot to PCT Assignment Tool for plots that were assigned to the plantation condition class weren't greatly considered due to the modified floristics in these areas. Instead, nearby areas of vegetation that weren't modified by forestry were utilized to assign the PCTs to these plots.

Patches within the subject land had canopies that included either *Eucalyptus piperita* or *Eucalyptus saligna*, with a small tree layer of *Allocasuarina torulosa* and *Syncarpia glomulifera*. The midstory often included *Astrotricha latifolia, Cryptocarya rigida* and *Persoonia linearis*. The ground layer often contained a mix of *Entolasia stricta, Lomandra longifolia, Pteridium esculentum* and *Smilax australis*.

4.2.8.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3230.

4.2.8.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3230.

4.2.9 PCT 3237 – Hunter Range Blue Gum Gully Forest

4.2.9.1 PCT overview

PCT 3237 – Hunter Range Blue Gum Gully Forest is described in the BioNet Vegetation Classification Database as a very tall to extremely tall sclerophyll open forest with a mixed sclerophyll and mesophyll shrub layer and ground layer of small-leaved ferns, graminoids and grasses. This PCT is found in dry Narrabeen sandstone gullies of the Hunter Range region between the Hunter valley and the Hawkesbury River. The tree canopy commonly includes a high cover of 1 of 2 blue gum eucalypt species, *Eucalyptus deanei* or rarely *Eucalyptus saligna*. These commonly occur with *Syncarpia glomulifera* and *Angophora floribunda* although the latter is most frequently recorded as a small tree. Other eucalypt species are commonly from either the stringybark or ironbark eucalypt groups, however individual species are rare, including *Eucalyptus prominula* and *Eucalyptus crebra* (NSW DCCEEW 2024c).

The mid-stratum is layered, with a taller cover of small trees that very frequently includes a sparse cover of *Allocasuarina torulosa*. The lower shrub layer very frequently includes *Persoonia linearis* and *Denhamia silvestris*, commonly with *Acacia parvipinnula*, *Myrsine variabilis* and *Polyscias sambucifolia*. The ground layer is a mid-dense cover, interrupted by rocky boulders and benches along creeks and lower slopes. The small fern *Adiantum aethiopicum* is very frequently the most abundant species, almost always with *Dianella caerulea*, very frequently *Plectranthus parviflorus*, commonly with *Doodia aspera* and *Microlaena stipoides* (NSW DCCEEW 2024c).

This PCT is widespread across north Yengo and northeast Wollemi national parks, extending east into Pokolbin State Forest and the western edges of the Watagan Range and Mangrove Creek Catchment. It occurs throughout mid-elevations of generally below 450 metres ASL, in the very dry rain shadow ranges of the Central Coast. This PCT is the driest of the Blue Mountains blue gum gully forests where mean annual rainfall has a median of only 820 millimetres. It grades into sheltered forest PCT 3152 in narrow protected gullies where dense *Backhousia myrtifolia* is characteristic, or into tall forest PCT 3258 on alluvial creek flats (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.18 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3237 during the field survey presented in Table 4.19.

Table 4.18 PCT 3237 – Hunter Range Blue Gum Gully Forest

PCT ID	3237
PCT name	Hunter Range Blue Gum Gully Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	0.59
Extent within subject land (ha)	5.46 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.19 PCT 3237 – Hunter Range Blue Gum Gully Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora euryphylla, Eucalyptus saligna, Eucalyptus sparsifolia, Syncarpia glomulifera*
Shrubs	*Acacia irrorata subsp. irrorata, Breynia oblongifolia, Phyllanthus gunnii, Psychotria loniceroides, Trema tomentosa var. aspera*
Ferns	*Adiantum aethiopicum, Doodia australis, Pteridium esculentum*
Grass & grasslike	*Entolasia marginata, Lepidosperma cf. laterale, Microlaena stipoides, Oplismenus imbecillis*
Forbs	*Dianella caerulea, Dichondra repens, Lobelia purpurascens, Plectranthus parviflorus, Pseuderanthemum variabile*
Other	*Cissus antarctica, Cissus hypoglauca, Clematis glycinoides, Geitonoplesium cymosum, Stephania japonica*

4.2.9.2 Condition states

Within the subject land PCT 3237 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3237 Mod-good is depicted in Photo 4.40 and Photo 4.41.



Photo 4.40 PCT 3237 – (Mod-good) as sampled in plot MS-78



Photo 4.41 PCT 3237 – (Mod-good) as sampled in plot MS-79

4.2.9.3 Justification of PCT selection

PCT 3237 is known to occur in dry Narrabeen sandstone gullies of the Hunter Range region between the Hunter valley and the Hawkesbury River.

PCT reference plots for PCT 3237 occur to the west of the subject land with the PCT known to occur in the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3237 has been identified along the Narrabeen sandstone gullies within Pokolbin State Forest.

PCT 3237 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 3237 or 3239.

The allocation of PCT 3237 relies on plots HTP-MS-78, HTP-MS-79 and HTP-MS-80. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3237 (see Appendix D (Vegetation survey data)).

Plot MS-78 received a greater centroid match to PCT 3242 than it did for PCT 3237, which can be floristically similar. MS-78 is located at the start of a gully near Pokolbin State Forest, which makes it less likely to be PCT 3242 (found on sheltered slopes of coastal hills and ranges) and more likely to be PCT 3237 (found in dry Narrabeen sandstone gullies).

Plot HTP-MS-79 received a greater centroid match to PCT 3258 than it did for PCT 3237. HTP-MS-78 is located at the start of a gully near Pokolbin State Forest, which makes it less likely to be PCT 3258 (found on sandy alluvial creek flats in dissected sandstone plateaus) and more likely to be PCT 3237 (found in dry Narrabeen sandstone gullies).

Plot HTP-MS-80 received a greater centroid match to PCT 3241 than it did for PCT 3237. HTP-MS-80 is located at the start of a sandstone gully in the Pokolbin State Forest, which is more characteristic of PCT 3237, than it is of PCT 3241, which occurs on drier slops than what was found in the plot.

Patches within the subject land had a canopy of *Eucalyptus saligna* and *Syncarpia glomulifera*, with *Allocasuarina torulosa* as a small tree layer. The shrub layer consisted of a mix *Acacia irrorata subsp. irrorata, Breynia oblongifolia, Denhamia silvestris* and *Phyllanthus gunnii*. The ground layer included a mix of *Dianella caerulea, Entolasia marginata, Geitonoplesium cymosum, Lobelia purpurascens* and *Plectranthus parviflorus*.

4.2.9.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3237.

4.2.9.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3237.

4.2.10 PCT 3238 – Hunter Range Colluvial Apple-Gum Forest

4.2.10.1 PCT overview

PCT 3238 – Hunter Range Colluvial Apple-Gum Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a mid-stratum of soft-leaved and dry species and grassy ground cover on sandy colluvial soils on flats and benches around the Hunter Range in the northern Sydney Basin IBRA bioregion. This PCT is reasonably widespread in the sandstone ranges of Wollemi and Yengo national parks, the Putty and Howes Valley area and the Central Coast hinterland. The canopy very frequently includes *Angophora floribunda*, commonly in association with *Eucalyptus punctata* and Stringybarks (*Eucalyptus eugenioides*, *Eucalyptus sparsifolia*), Ironbarks (*Eucalyptus crebra*, *Eucalyptus fibrosa*) and Red Gums (*Eucalyptus amplifolia*, *Eucalyptus tereticornis*). The mid-dense small tree layer almost always includes acacias such as *Acacia parvipinnula*, *Acacia parramattensis* or *Acacia implexa*, very frequently in association with *Exocarpos strictus* or commonly with *Allocasuarina torulosa*. The shrub layer is sparse however almost always includes *Persoonia linearis*.

The mid-dense ground layer is typically comprised of grasses, soft-leaved forbs, twiners and a hardy fern. *Microlaena stipoides* and *Cheilanthes sieberi* subsp. *sieberi* are almost always present with *Dichondra repens*, *Lobelia purpurascens*, *Vernonia cinerea* and *Billardiera scandens* all very frequent (NSW DCCEEW 2024c).

This PCT occurs in a dissected sandstone plateau below 330 metres ASL in a warm, moist climate. This PCT floristically overlaps with PCT 3634 which occurs on sandy soils near Quorrobolong however the *Leptospermum* and *Melaleuca* species that are prominent in PCT 3634 are rare in this PCT (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.20 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3238 during the field survey presented in Table 4.21.

Table 4.20 PCT 3238 – Hunter Range Colluvial Apple-Gum Forest

PCT ID	3238
PCT name	Hunter Range Colluvial Apple-Gum Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	4.14%
Extent within subject land (ha)	0.05 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.21 PCT 3238 – Hunter Range Colluvial Apple-Gum Forest (Benchmark)

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora floribunda, Eucalyptus punctata*
Shrubs	*Cassinia uncata, Exocarpos strictus, Persoonia linearis*
Ferns	*Adiantum aethiopicum, Cheilanthes sieberi subsp. sieberi, Pteridium esculentum*
Grass & grasslike	*Aristida vagans, Digitaria ramularis, Microlaena stipoides*
Forbs	*Dichondra repens, Lobelia purpurascens, Vernonia cinerea*
Other	*Billardiera scandens, Glycine clandestina, Glycine tabacina*

4.2.10.2 Condition states

Within the subject land PCT 3238 is present in the following broad condition states (equivalent to vegetation zones):

- Mod/good.

An example of PCT 3238 Mod-good is depicted in Photo 4.42.



Photo 4.42 PCT 3238 Mod-good fringing Congewai Creek in the Yengo IBRA subregion

4.2.10.3 Justification of PCT selection

PCT 3238 is known to occur on sandy colluvial soils on flats and benches around the Hunter Range in the northern Sydney Basin IBRA bioregion.

PCT reference plots for PCT 3238 occur to the east and west of the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3238 has been identified along the foothill south of Pokolbin State Forest.

PCT 3238 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 3238 or 3489.

The allocation of PCT 3238 relies on flora rapid points in the absence of plots. The patch within the subject land had a canopy *Angophora floribunda* and *Eucalyptus punctata*, with a small tree layer of *Allocasuarina torulosa* and *Alphitonia excelsa* present. The midstory included a mix of shrubs, including *Breynia oblongfolia* and *Persoonia linearis*. The ground layer was mainly comprised of *Dichondra repens* and *Microlaena stipoides*.

4.2.10.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3238.

4.2.10.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3238.

4.2.11 PCT 3239 – Hunter Range Sheltered Grey Gum Forest

4.2.11.1 PCT overview

PCT 3239 – Hunter Range Sheltered Grey Gum Forest is described in the BioNet Vegetation Classification Database as a very tall dry shrubby sclerophyll open forest with a grassy and herbaceous ground cover found on sheltered Narrabeen sandstone slopes and shale enriched crests across the Hunter Range, northern Sydney Basin. The tree canopy includes a variety of species however collectively they can be lumped into combinations of grey gum, turpentine, smooth-barked apple, ironbark and stringybark. The most frequently occurring tree species are *Eucalyptus punctata* and *Syncarpia glomulifera* however neither species consistently dominates the canopy.

Either *Angophora costata* or *Angophora euryphylla* may also have a high cover however are less frequent, similarly for *Eucalyptus crebra* and other ironbark species. *Eucalyptus sparsifolia* is most frequently recorded of the stringybarks, and the tall *Eucalyptus racemosa* is mainly restricted to stands in Pokolbin State Forest and Colo River gorge (NSW DCCEEW 2024c).

The mid-stratum is often layered with a sparse however very frequent layer of smaller trees dominated by *Allocasuarina torulosa*. A sparse to mid-dense lower layer of dry shrubs almost always includes *Persoonia linearis* and *Podolobium ilicifolium* with other common species including *Exocarpos strictus*, Platysace lanceolatus and *Myrsine variabilis*. The open ground layer is comprised of small forbs, climbers, ferns and grasses amongst rock boulders and benches. Very frequent species include *Entolasia stricta*, *Dianella caerulea*, *Pomax umbellata*, *Lobelia purpurascens* and *Microlaena stipoides* (NSW DCCEEW 2024c).

This PCT is extensively distributed across central the northern Hunter Range including eastern Wollemi and Yengo national parks and east to Pokolbin and Corrabare State forests. It becomes increasingly restricted toward the Hawkesbury River as the Narrabeen sediments are only exposed in gorges and valleys below thick layers of Hawkesbury Sandstone. It shares moderate floristic and environmental overlap with PCT 3605 into which it grades with increasing exposure on crests and slopes (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.22 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3239 during the field survey presented in Table 4.23.

Table 4.22 PCT 3239 – Hunter Range Sheltered Grey Gum Forest

PCT ID	3239
PCT name	Hunter Range Sheltered Grey Gum Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	0.59
Extent within subject land (ha)	109.97 (4.90 ha in the Wyong IBRA subregion, 99.26 ha in the Yengo IBRA subregion and 5.81 in the Hunter IBRA subregion)

Table 4.23 PCT 3239 – Hunter Range Sheltered Grey Gum Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia linearifolia, Acacia parramattensis, Allocasuarina torulosa, Angophora costata, Angophora euryphylla, Eucalyptus agglomerata, Eucalyptus crebra, Eucalyptus punctata, Eucalyptus sparsifolia, Syncarpia glomulifera subsp. glomulifera*
Shrubs	*Acacia parvipinnula, Acacia schinoides, Adiantum aethiopicum, Astrotricha latifolia, Bursaria spinosa, Cassinia cunninghamii, Daviesia ulicifolia, Exocarpus strictus, Hibbertia empetrifolia subsp. empetrifolia, Ozothamnus diosmifolius, Persoonia linearis, Pimelea linifolia subsp. linifolia, Platysace lanceolata, Podolobium ilicifolium*
Ferns	*Blechnum nudum, Lindsaea microphylla, Pteridium esculentum, Pyrrosia rupestris*
Grass & grasslike	*Cynodon dactylon, Echinopogon caespitosus var. caespitosus, Entolasia marginata, Entolasia stricta, Lomandra confertifolia subsp. rubiginosa, Lomandra cylindrica, Lomandra obliqua, Lomandra longifolia, Microlaena stipoides, Oplismenus aemulus, Panicum simile, Poa affinis, Rytidosperma pilosum*
Forbs	*Brachyscome multifida, Dianella caerulea, Gonocarpus tetragynus, Goodenia heterophylla, Plectranthus parviflorus, Pomax umbellata, Viola sieberiana*
Other	*Billardiera scandens, Calochlaena dubia, Eustrephus latifolius, Geitonoplesium cymosum, Glycine clandestina, Glycine latifolia, Grona varians, Hardenbergia violacea, Kennedia rubicunda, Macrozamia communis, Pandorea pandorana, Smilax australis, Xanthorrhoea resinosa*

4.2.11.2 Condition states

Within the subject land PCT 3239 is present in the following broad condition state (equivalent to vegetation zones):

- Mod-good.

Examples of PCT 3239 Mod-good are depicted in Photo 4.43 and Photo 4.44.



Photo 4.43 PCT 3239 in Mod-good condition



Photo 4.44 PCT 3239 in Mod-good condition

4.2.11.3 Justification of PCT selection

PCT 3239 is known to occur on sheltered Narrabeen sandstone slopes and shale enriched crests across the Hunter Range, northern Sydney Basin.

PCT reference plots for PCT 3239 occur in close proximity to the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3239 has been identified along the Narrabeen sandstone slopes within Watagan, Corrabare and Pokolbin State Forest.

PCT 3239 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as either PCT 3244 or 3605.

The allocation of PCT 3239 relies on plots DL-03, DL-19, DL-20, HTP-MS-18, HTP-MS-19, HTP-MS-25, LCSM-26, TS-17 and TS-18, with plots HTP-MS-76 and HTP-MS-77 sampling plantation condition class. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3239 (see Appendix D (Vegetation survey data)).

DL-19 had no matches with PCT 3239 however it contains the key diagnostic canopy species for PCT 3239, including *Angophora costata, Eucalyptus racemosa, Eucalyptus sparsifolia* and *Syncarpia glomulifera*. The midstory included *Allocasuarina torulosa*, *Persoonia linearis* and *Podolobium ilicifolium* with the ground layer frequently including *Entolasia stricta*, *Dianella caerulea* and *Microlaena stipoides*.

HTP-MS-18 had a higher centroid match with PCT 3263, than it did with PCT 3239. While MS-18 has a *Syncarpia glomulifera* dominated canopy that can occur in both of these PCTs, the white mahogany species that are characteristic to PCT 3263 are absent in this plot, indicating that this plot is likely to more representative of PCT 3263.

Plot TS-17 had a higher centroid match with PCT 3597 than it did with PCT 3239. TS-17 is located on a slope in Corrabare State Forest, which should rule out PCT 3597 (found on shallow rocky Narrabeen sandstone soils on exposed ridges and adjoining cliff edges) and assign 3239 (found on sheltered Narrabeen sandstone slopes and shale enriched crests) to this plot.

Patches within the subject land had a canopy of *Angophora costata/euryphylla, Eucalyptus punctata* and *Syncarpia glomulifera*, with *Eucalyptus racemosa* and *Eucalyptus sparsifolia* present in some patches. A small tree layer of *Allocasuarina torulosa* was also present, with *Persoonia linearis, Platysace lanceolata* and *Podolobium ilicifolium* common in most patches. The ground layer was variable, however usually contained *Entolasia stricta* and *Dianella caerulea*.

4.2.11.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3239.

4.2.11.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3239.

4.2.12 PCT 3241 – Lower North White Mahogany-Spotted Gum Moist Forest

4.2.12.1 PCT overview

PCT 3241 – Lower North White Mahogany-Spotted Gum Moist Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a sparse mid-stratum of soft-leaved shrubs and a grassy ground layer on dry slopes of the hinterland ranges of the Central Coast, Hunter valley and lower north coast. The tree canopy very frequently includes a high cover of *Eucalyptus acmenoides* and *Corymbia maculata*. These may rarely be replaced or accompanied by a range of other species typically from the ironbark, grey gum or mahogany eucalypt groups of which *Eucalyptus siderophloia*, *Eucalyptus punctata* and *Eucalyptus umbra* are most frequent. The mid-stratum is layered, with a sparse cover of small trees that are very frequently dominated by *Allocasuarina torulosa* occasionally with *Acacia implexa* or rarely *Angophora floribunda* or low-growing eucalypts. The sparse lower shrub layer very frequently includes *Breynia oblongifolia*, commonly *Denhamia silvestris* and *Notelaea longifolia*, occasionally with *Persoonia linearis*, *Pittosporum revolutum* or *Indigofera australis*. The mid-dense ground layer consists of grasses and small forbs, very frequently including *Imperata cylindrica* and *Microlaena stipoides*, commonly *Oplismenus imbecillis*, *Themeda triandra* and *Poa labillardierei* var. *labillardierei*, occasionally with *Entolasia marginata*. Forbs and vines very frequently or commonly include *Dichondra repens*, *Desmodium gunnii*, *Lobelia purpurascens, Eustrephus latifolius* and *Geitonoplesium cymosum* (NSW Department of Climate Change, Energy, the Environment and Water 2024c).

A widespread forest, this PCT is associated with Narrabeen sandstone south of the Hunter River, mainly on the drier margins of the Watagan and Hunter Ranges. North of the Hunter River it is common on the Carboniferous sediments on the eastern foothills of the Barrington Fall between Muswellbrook, Dungog and Gloucester. It extends north to the Port Macquarie district on a range of sedimentary substrates. Primarily located less than 400 metres ASL, this community spans a wide range of rainfall gradients from drier zones east of Muswellbrook to wetter coastal areas, as well as on dry slopes on the lower north coast. It grades into PCT 3242 on more sheltered slopes or in wetter areas, and into PCT 3244 on more exposed sites or those with more sandy soils (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.24 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3241 during the field survey presented in Table 4.25.

Table 4.24 PCT 3241 – Lower North White Mahogany-Spotted Gum Moist Forest

PCT ID	3241
PCT name	Lower North White Mahogany-Spotted Gum Moist Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	31.07
Extent within subject land (ha)	12.30 (10.21 ha in the Yengo IBRA subregion and 2.09 in the Hunter IBRA subregion)

Table 4.25 PCT 3241 – Lower North White Mahogany-Spotted Gum Moist Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Corymbia maculata, Eucalyptus acmenoides, Eucalyptus agglomerate, Eucalyptus punctata, Eucalyptus racemosa, Eucalyptus sparsifolia, Syncarpia glomulifera*
Shrubs	*Acacia schinoides, Astrotricha latifolia, Bursaria spinosa, Denhamia silvestris, Diospyros australis, Leucopogon lanceolatus, Platysace ericoides, Platysace lanceolata, Podolobium ilicifolium, Psychotria loniceroides, Rubus parvifolius*
Ferns	*Adiantum aethiopicum, Doodia aspera, Pellaea falcata*
Grass & grasslike	*Carex longebrachiata, Entolasia stricta, Gahnia melanocarpa, Lomandra longifolia, Oplismenus imbecillis, Poa affinis, Rytidosperma pallidum, Themeda triandra*
Forbs	*Dianella caerulea, Dianella revoluta, Goodenia hederacea, Goodenia heterophylla, Gymnostachys anceps, Hydrocotyle sibthorpioides, Pomax umbellata, Pseuderanthemum variabile*
Other	*Cissus antarctica, Cissus hypoglauca, Hardenbergia violacea, Hibbertia dentata, Hibbertia scandens, Kennedia rubicunda, Macrozamia reducta, Passiflora herbertiana subsp. herbertiana*

4.2.12.2 Condition states

Within the subject land PCT 3241 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-Good.

Examples of PCT 3241 Mod-good are depicted in Photo 4.45 and Photo 4.46.



Photo 4.45 PCT 3241 in Mod-good condition



Photo 4.46 PCT 3241 in Mod-good condition

4.2.12.3 Justification of PCT selection

PCT 3241 is known to occur on dry slopes of the hinterland ranges of the Central Coast, Hunter valley and lower north coast.

PCT reference plots for PCT 3241 occur in close proximity to the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3242 has been identified along the slopes of the Hunter Valley, within Pokolbin State Forest.

PCT 3241 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as either PCT 3604 or 3605.

The allocation of PCT 3241 relies on plots DL-67, HTP-MS-20, HTP-MS-81 and HTP-MS-82. These plots were run through the Plot to PCT Assignment Tool where plots DL-67 and MS-20 were identified to have a centroid match with PCT 3241 (see Appendix D (Vegetation survey data)).

DL-67 had a closer match for PCT 3236 and 3318 than it did for 3241. PCT 3318 only occurs within the Cumberland IBRA subregion, which is outside of the subject land. PCT 3236 grades into tall moist grassy forest PCT 3241 on less sheltered aspects. DL_67 has a more exposed aspect and lacks the high vine cover and abundance that would be present in PCT 3236.

HTP-MS-81 didn't have any matches with PCT 3241 however it did contain *Corymbia maculata* canopy that was co-dominant with *Angophora costata* and *Eucalyptus racemosa*. The spare midstory included *Denhamia silvestris, Indigofera australis* and *Persoonia linearis*. The low-density ground layer wasn't representative of PCT 3241, with *Lomandra obliqua* and *Rytidosperma pallidum* frequently occurring in this plot. While these groundcover species weren't characteristic of PCT 3241, recent fire activity may have influenced the presence and abundance of species more representative of PCT 3241. The closest reference plot to this plot is assigned to PCT 3241 and occurs on along a similar ridgeline.

HTP-MS-82 didn't have any matches with PCT 3241 however it did contain a high cover of *Corymbia maculata*, with *Eucalyptus punctata* also present. This plot contained a sparse midstory which included *Persoonia linearis*, with a mid-dense ground layer which included *Lobelia purpurascens*, *Microlaena stipoides* and *Themeda triandra*.

Patches within the subject land had a canopy that consisted of *Corymbia maculata* and/or *Eucalyptus acmenoides*, with *Eucalyptus punctata* present in some patches. A small tree layer that included *Allocasuarina torulosa, Angophora costata* and *Angophora floribunda* were also present. The midstory included *Acacia implexa, Breynia oblongifolia, Denhamia silvestris*, *Persoonia linearis* and *Pittosporum multiflorum*. The ground layer often included *Dianella caerulea, Entolasia marginata, Geitonoplesium cymosum, Microlaena stipoides var. stipoides* and *Oplismenus imbecillis*.

4.2.12.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3241.

4.2.12.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3241.

4.2.13 PCT 3242 – Lower North Ranges Turpentine Moist Forest

4.2.13.1 PCT overview

PCT 3242 – Lower North Ranges Turpentine Moist Forest is described in the BioNet Vegetation Classification Database as a very tall to extremely tall sclerophyll open forest with a mesophyll shrub layer and moist ground layer of ferns, climbers and grasses. This PCT is found on the sheltered slopes of coastal hills and ranges between Gosford and Taree, Hunter and lower north coasts. The tree canopy is variable in composition, however very frequently includes a high cover of Syncarpia glomulifera however is rarely dominant. There is very frequently a high cover of a suite of other eucalypt species, commonly from 1 or more of the mahogany, blue gum and ironbark eucalypt groups. The most frequent species in each of these groups are *Eucalyptus acmenoides*, *Eucalyptus saligna* and *Eucalyptus paniculata* however there may be up to 3 or 4 species recorded in each group. Other distinctive members of the canopy can include *Corymbia maculata* and *Eucalyptus pilularis* however are rare (NSW DCCEEW 2024c).

The mid-stratum is layered, with a taller sparse cover of small trees very frequently dominated by *Allocasuarina torulosa* and *Syncarpia glomulifera*, occasionally with *Angophora floribunda* and tall Acacia species such as *Acacia maidenii*. A lower mid-dense layer of shrubs very frequently includes *Breynia oblongifolia*, commonly with *Synoum glandulosum* subsp. *glandulosum*, *Rhodamnia rubescens*, *Denhamia silvestris* and *Persoonia linearis*, occasionally with *Glochidion ferdinandi* and a sparse cover of *Livistona australis*. The mid-dense ground stratum is layered and has a diversity of

mesic climbers that very frequently include Smilax australis, *Geitonoplesium cymosum*, *Pandorea pandorana* subsp. *pandorana*, *Eustrephus latifolius* and *Dioscorea transversa*. These occur with ferns and graminoids, that very frequently include *Lomandra longifolia*, *Doodia aspera* and *Gymnostachys anceps*, commonly *Pteridium esculentum*, occasionally with *Adiantum aethiopicum* and *Calochlaena dubia* (NSW DCCEEW 2024c).

South of the Hunter River this PCT is common on low to mid-elevation Narrabeen sediments throughout the Watagan Range between Gosford and Mount Sugarloaf, all of which receive high coastal rainfall. West of Kulnura, where mean annual rainfall is lower, the distribution is restricted to incised gullies and the community grades into gully forest PCT 3237. North of the Hunter River it extends across the Carboniferous sediments southeast of Gloucester on the mid-elevations of the Myall Ranges. In coastal districts it grades into moist forest PCT 3241 on drier aspects or in lower rainfall zones (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.26 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3242 during the field survey presented in Table 4.27.

Table 4.26 PCT 3242 – Lower North Ranges Turpentine Moist Forest

PCT ID	3242
PCT name	Lower North Ranges Turpentine Moist Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	13.27
Extent within subject land (ha)	36.50 (25.93 ha in the Wyong IBRA subregion and 10.57 ha in the Yengo IBRA subregion)

Table 4.27 PCT 3242 – Lower North Ranges Turpentine Moist Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Clerodendrum tomentosum, Ehretia acuminata var. acuminata, Eucalyptus acmenoides, Eucalyptus agglomerate, Eucalyptus deanei, Eucalyptus pilularis, Eucalyptus piperita, Eucalyptus punctata, Eucalyptus saligna, Syncarpia glomulifera subsp. glomulifera*
Shrubs	*Acacia irrorata subsp. irrorata, Acacia parvipinnula, Acrotriche divaricate, Astrotricha latifolia, Backhousia myrtifolia, Commersonia fraseri, Cryptocarya rigida, Diospyros australis, Duboisia myoporoides, Elaeocarpus reticulatus, Indigofera australis, Melicope micrococca, Prostanthera incisa, Psychotria loniceroides, Rhodamnia rubescens, Rubus moluccanus, Rubus rosifolius, Solanum stelligerum, Synoum glandulosum subsp. glandulosum, Zieria smithii*
Ferns	*Adiantum aethiopicum, Adiantum silvaticum, Asplenium flabellifolium, Doodia australis, Lastreopsis decomposita, Pellaea falcata, Pteridium esculentum, Pyrrosia rupestris*
Grass & grasslike	*Cyathochaeta diandra, Entolasia marginata, Entolasia stricta, Gahnia microstachya, Gahnia sieberiana, Imperata cylindrica, Lepidosperma laterale, Lomandra longifolia, Oplismenus imbecillis, Ottochloa gracillima, Panicum simile, Poa labillardierei var. labillardierei*
Forbs	*Dianella caerulea, Dichondra repens, Hydrocotyle sibthorpioides, Lobelia purpurascens, Plectranthus parviflorus, Pseuderanthemum variabile, Senecio linearifolius, Sigesbeckia orientalis subsp. orientalis, Solanum prinophyllum, Xerochrysum bracteatum*

Growth form	Species recorded
Other	*Calochlaena dubia, Cissus antarctica, Cissus hypoglauca, Geitonoplesium cymosum, Hibbertia dentata, Hibbertia scandens, Passiflora herbertiana, Smilax australis, Smilax glyciphylla, Stephania japonica, Xanthorrhoea spp.*

4.2.13.2 Condition states

Within the subject land PCT 3242 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

Examples of PCT 3242 Mod-good are depicted in Photo 4.47 and Photo 4.48.



Photo 4.47 PCT 3242 in Mod-good condition



Photo 4.48 PCT 3242 in Mod-good condition

4.2.13.3 Justification of PCT selection

PCT 3242 is known to occur on the sheltered slopes of coastal hills and ranges between Gosford and Taree, Hunter and lower north coasts.

PCT reference plots for PCT 3242 occur in close proximity to the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3242 has been identified along the sheltered slopes in Watagan and Corrabare State Forest.

PCT 3242 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as either 3150, 3241 or 3242.

The allocation of PCT 3242 relies on plots LCSM-28, HTP-MS-11, HTP-MS-17, HTP-MS-46, HTP-MS-54, HTP-MS-55, HTPMS-83 and TC-11. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3242 (see Appendix D (Vegetation survey data)).

HTP-MS-11 had a closer match to PCTs 3170 and 3241 than it did to PCT 3242. PCT 3170 doesn't occur in the Sydney Basin IBRA bioregion. PCT 3241 and PCT 3242 are floristically similar, with a key difference being that PCT 3242 occurs on more sheltered slopes or in wetter areas, and PCT 3241 occurring on drier aspects or in lower rainfall zones. HTP-MS-11 occurs on a sheltered southeast facing slope within Corrabare State Forest and is unlikely to be assigned to PCT 3241.

HTP-MS-54 had a closer match to PCTs 3170 and 3201 than it did to PCT 3242, however PCT 3170 and 3201 don't occur in the Sydney Basin IBRA bioregion.

HTP-MS-55 had a closer match to PCT 3170 than it did to PCT 3242, however PCT 3170 doesn't occur in the Sydney Basin IBRA bioregion.

HTP-MS-83 had no matches to PCT 3242, however it was located along a sheltered slope with a canopy dominated by *Eucalyptus punctata*, with *Eucalyptus deanei* and *Syncarpia glomulifera* also present. The understory had been disturbed by intense fire, with disturbance species like *Astrotricha latifolia* and *Prostanthera incisa* being highly abundant in the shrub layer, with regrowth of *Backhousia myrtifolia* and *Synoum glandulosum subsp. glandulosum* observed in this plot. The disturbed ground layer frequently included *Entolasia marginata, Oplismenus imbecillis* and *Panicum simile*, and with a poor regrowth of ferns. The characteristic diversity of mesic climbers had started to return, including *Pandorea pandorana* and *Smilax australis*.

TC-11 had a closer match to PCT 3164 than it did to PCT 3242, however PCT 3164 only occurs in the Wollemi IBRA subregion.

Patches within the subject land had a canopy that consisted of *Eucalyptus acmenoides* and *Eucalyptus agglomerata*, with a small tree layer of *Allocasuarina torulosa*, *Angophora floribunda* and *Syncarpia glomulifera* subsp. *glomulifera* present. The midstory included *Acacia irrorata* subsp. *irrorata*, *Breynia oblongifolia*, *Denhamia silvestris* and *Psychotria loniceroides*. The ground layer usually consisted of *Cissus antarctica*, *Entolasia stricta*, *Lomandra longifolia* and *Smilax australis*.

4.2.13.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3242.

4.2.13.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3242.

4.2.14 PCT 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest

4.2.14.1 PCT overview

PCT 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a mid-stratum of dry and soft-leaved shrubs or small trees and a ground cover of grasses and graminoids on lower slopes in the escarpment foothills of the lower north coast. The canopy includes a diverse mix of trees, which very frequently includes *Corymbia maculata*, and a suite of other eucalypts which individually occur occasionally or rarely. Collectively, mahoganies and ironbarks are almost always present and grey gums are common. The more frequent mahoganies, ironbarks and grey gums are *Eucalyptus siderophloia*, *Eucalyptus acmenoides*, *Eucalyptus umbra* and *Eucalyptus punctata*, with *Eucalyptus propinqua*, *Eucalyptus carnea*, *Eucalyptus paniculata* and *Eucalyptus canaliculata* less regularly present (NSW DCCEEW 2024c).

The mid-stratum is layered and almost always includes 1 or more Acacia species of varying stature, of which the most frequent are *Acacia implexa* and *Acacia ulicifolia*. Taller species in the mid-stratum very frequently include *Allocasuarina torulosa*, while shorter species very frequently include *Persoonia linearis*, commonly with *Breynia oblongifolia* and a *Leucopogon* (*Leucopogon juniperinus* or *Leucopogon lanceolatus*). The mid-dense ground layer typically includes graminoids, twiners, forbs and a hardy fern. *Imperata cylindrica* is almost always present and very frequent species include *Lobelia purpurascens*, *Dianella caerulea*, *Desmodium rhytidophyllum*, *Entolasia stricta*, *Lomandra longifolia*, *Themeda triandra* and *Hardenbergia violacea* (NSW DCCEEW 2024c).

This PCT primarily occurs between the Watagan Ranges and Taree, with scattered occurrences further north to the Macleay Valley. It occurs on low-elevation, wet coastal foothills, where mean annual rainfall typically exceeds 1000 millimetres and elevation is below 260 metres ASL. This PCT primarily occurs on sediments, with its southern occurrences often associated with clay rich Narrabeen or Permian sediments, however it is also known from acid volcanics. It is floristically and spatially related to PCT 3433 which tends to occur in drier parts of the Central and Hunter coasts and includes Eucalyptus fibrosa rather than ironbarks with a more coastal distribution. It is also floristically related to PCT 3249, which has an overlapping distribution north of Taree, however differs in that *Corymbia intermedia* is common and Corymbia maculata is rare in its canopy (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.28 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3244 during the field survey presented in Table 4.29.

Table 4.28 PCT 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest

PCT ID	3244
PCT name	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	39.18
Extent within subject land (ha)	1.62 (1.31 ha in the Wyong IBRA subregion and 0.31 in the Yengo IBRA subregion)

Table 4.29 PCT 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Corymbia gummifera, Eucalyptus sieberi, Syncarpia glomulifera*
Shrubs	*Acrotriche divaricate, Banksia spinulosa var. collina, Leucopogon lanceolatus*
Ferns	*Cheilanthes sieberi, Pteridium esculentum*
Grass & grasslike	*Caustis flexuosa, Entolasia stricta, Lepidosperma laterale*
Forbs	*Dianella caerulea var. caerulea, Dichondra repens, Viola sieberiana*
Other	*Hibbertia scandens, Smilax australis, Xanthorrhoea resinosa*

4.2.14.2 Condition states

Within the subject land PCT 3244 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-Good.

Examples of PCT 3244 Mod-good are depicted in Photo 4.49 and Photo 4.50.



Photo 4.49 PCT 3244 in Mod-good condition



Photo 4.50 PCT 3244 in Mod-good condition

4.2.14.3 Justification of PCT selection

PCT 3244 occurs on the escarpment foothills of the lower north coast.

PCT reference plots for PCT 3244 occur within close proximity and to the east of the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions Within the subject land, PCT 3244 has been identified on the escapement foothills in Pokolbin State Forest.

PCT 3244 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 3244 or 3604.

The allocation of PCT 3244 relies on plots DL-18 and MS-53. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a low distance to centroid values that suggests a strong match to PCT 3244 (see Appendix D (Vegetation survey data)).

Patches within the subject land had a canopy consisting of *Corymbia maculata* and *Eucalyptus punctata*, with *Allocasuarina torulosa* present as a small tree layer. The midstory included *Acacia implexa, Acacia ulicifolia, Breynia oblongifolia* and *Persoonia linearis*. The ground layer consisted of a mix of *Entolasia stricta, Dianella caerulea, Imperata cylindrica, Lobelia purpurascens* and *Themeda triandra.*

4.2.14.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3244.

4.2.14.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3244.

4.2.15 PCT 3250 – Northern Foothills Blackbutt Grassy Forest

4.2.15.1 PCT overview

PCT 3250 – Northern Foothills Blackbutt Grassy Forest is described in the BioNet Vegetation Classification Database as a very tall to extremely tall, grassy or occasionally shrub-grass sclerophyll open forest, which occurs extensively on the coast, coastal ranges and foothills ranges between Grafton and Gosford, with limited outlying occurrences near Woodburn and Wollongong. The canopy very frequently includes *Eucalyptus pilularis* dominating with the highest cover and commonly *Eucalyptus microcorys*, sometimes with locally high cover. Other canopy species occasionally include *Corymbia intermedia* and *Syncarpia glomulifera*, rarely with *Angophora costata*, *Eucalyptus resinifera* and *Eucalyptus propinqua*. *Allocasuarina torulosa* occurs very frequently and occasionally forms a mid-dense sub-canopy. The shrub *Polyscias sambucifolia* is very frequently present, commonly with vine Billardiera scandens, usually as scattered individuals. *Polyscias sambucifolia* is sometimes locally abundant and forms thickets in less frequently burnt sites. The grassy ground layer almost always includes a high cover of *Imperata cylindrica*, very frequently with *Pteridium esculentum*, *Lomandra longifolia*, *Entolasia stricta* and *Themeda triandra*, all usually with low cover (NSW DCCEEW 2024c).

This PCT occurs mainly in warm, wet locations receiving 1200–1580 millimetres mean annual rainfall, at low to mid-elevations of 10-370 metres ASL. It occurs mainly on clay-rich sedimentary or meta-sedimentary substrates, occasionally higher-quartz sediments, on ridge to mid-slope sites which are frequently burnt. Its range overlaps with that of PCT 3248, which has a similar canopy composition however a more mesic shrub mid-stratum. It may grade into that PCT in some areas, however PCT 3248 occurs in more sheltered, less frequently burnt sites or on more fertile soils (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.30 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3250 during the field survey presented in Table 4.31.

Table 4.30 PCT 3250 – Northern Foothills Blackbutt Grassy Forest

PCT ID	3250
PCT name	Northern Foothills Blackbutt Grassy Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	29.60
Extent within subject land (ha)	2.02 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.31 PCT 3250 – Northern Foothills Blackbutt Grassy Forest (Benchmark)

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Eucalyptus pilularis, Eucalyptus siderophloia*
Shrubs	*Acacia floribunda, Acacia implexa, Acacia ulicifolia, Exocarpos cupressiformis, Persoonia linearis, Pimelea linifolia, Synoum glandulosum subsp. glandulosum*
Ferns	*Adiantum aethiopicum, Cheilanthes sieberi, Doodia australis, Pteridium esculentum*
Grass & grasslike	*Entolasia stricta, Imperata cylindrica, Lomandra longifolia, Poa labillardierei var. labillardierei, Themeda triandra*
Forbs	*Dianella caerulea, Lagenophora stipitata, Lobelia purpurascens, Pomax umbellata, Pseuderanthemum variabile*
Other	*Billardiera scandens, Geitonoplesium cymosum, Glycine clandestina, Hibbertia dentata, Hibbertia scandens, Parsonsia straminea, Passiflora herbertiana*

4.2.15.2 Condition states

Within the subject land PCT 3250 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

Examples of PCT 3250 Mod-good are depicted in Photo 4.51 and Photo 4.52.



Photo 4.51 PCT 3250 in Mod-good condition



Photo 4.52 PCT 3250 in Mod-good condition

4.2.15.3 Justification of PCT selection

PCT 3250 is known to occur extensively on the coast, coastal ranges and foothills ranges between Grafton and Gosford, with limited outlying occurrences near Woodburn and Wollongong.

PCT reference plots for PCT 3250 occur in close proximity to the subject land with the PCT known to occur in the Wyong and Hunter IBRA subregions. Within the subject land, PCT 3250 has been identified along the coastal foothills near Jilliby State Conservation Area.

PCT 3250 within the subject land is restricted to the Wyong IBRA subregion and occurs in areas mostly mapped by SVTM as 3250.

The allocation of PCT 3250 relies on plots TC-14 and TC-15. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a low distance to centroid values that suggests a strong match to PCT 3250.

Patches within the subject land had a canopy dominated by *Eucalyptus pilularis,* often with *Angophora costata* and *Eucalyptus punctata* also present within the canopy. Allocasuarina torulosa was also present as a small tree, with *Acacia floribunda, Acacia ulicifolia, Persoonia linearis* and *Podolobium ilicifolium* present in the sparse shrub layer. The ground layer was usually dominated by *Imperata cylindrica*, with *Themeda triandra, Poa labillardierei* and *Dianella caerulea* present in most patches.

4.2.15.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3250.

4.2.15.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3250.

4.2.16 PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest

4.2.16.1 PCT overview

PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a mixed sclerophyll and mesophyll shrub layer and moist ground layer of grasses, graminoids and climbers found on dry Narrabeen sandstone slopes and crests along the Watagan Range, Central Coast. The tree canopy very frequently includes a high cover of *Syncarpia glomulifera* together with either of the white mahogany species *Eucalyptus umbra* or *Eucalyptus acmenoides*. Other eucalypt species that occasionally or rarely occur are ironbarks, most frequently *Eucalyptus fergusonii* or *Eucalyptus paniculata*, or grey gums, most frequently *Eucalyptus propinqua* or *Eucalyptus punctata*. Other eucalypts such as *Eucalyptus pilularis* or *Corymbia maculata* are rare (NSW DCCEEW 2024c).

The mid-stratum is layered, with a sparse cover of small trees that very frequently includes Allocasuarina torulosa, occasionally smaller eucalypts, *Angophora floribunda* and tall acacias such as *Acacia implexa*. A sparse lower layer of dry shrubs very frequently includes *Persoonia linearis*, commonly *Denhamia silvestris* and *Podolobium ilicifolium*, occasionally with *Breynia oblongifolia*. The ground layer is characterised by a mid-dense cover of grasses and graminoids that almost always includes *Dianella caerulea*, *Entolasia stricta* and Lomandra longifolia, very frequently *Imperata cylindrica* and commonly *Microlaena stipoides*. Climbers are also very diverse, commonly including Smilax australis, *Pandorea pandorana* subsp. *pandorana*, *Geitonoplesium cymosum* and *Hibbertia scandens* (NSW DCCEEW 2024c).

This PCT is common across the low to mid-elevation slopes of Jilliby State Conservation Area and Ourimbah State Forest west of Wyong and north into Watagan National Park. It occurs on exposed sites in warm and wet coastal climates, and grades into moist shrub forest PCT 3242 on more sheltered sites with increased fern and mesic shrub species (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.32 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3263 during the field survey presented in Table 4.33.

Table 4.32 PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest

PCT ID	3263
PCT name	Watagan Range Turpentine-Mahogany Grassy Forest
Vegetation formation	KF_CH2A Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Per cent cleared value (%)	9.97
Extent within subject land (ha)	39.10 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.33 PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Corymbia maculata, Eucalyptus agglomerate, Eucalyptus capitellata, Eucalyptus eugenioides, Eucalyptus globoidea, Eucalyptus pilularis, Eucalyptus piperita, Eucalyptus punctata, Eucalyptus saligna, Syncarpia glomulifera*
Shrubs	*Acacia irrorata subsp. irrorata, Acacia parvipinnula, Acacia schinoides, Acrotriche divaricate, Astrotricha latifolia,* Elaeocarpus reticulatus, *Exocarpos strictus, Leptomeria acida, Leptospermum juniperinum, Myrsine howittiana, Persoonia linearis, Pimelea latifolia, Platysace lanceolata, Podolobium ilicifolium, Psychotria loniceroides, Synoum glandulosum subsp. glandulosum, Zieria smithii*
Ferns	*Cheilanthes sieberi subsp. sieberi, Davallia solida var. pyxidate, Doodia aspera, Lindsaea linearis, Pteridium esculentum, Pyrrosia rupestris*
Grass & grasslike	*Austrostipa spp., Cymbopogon refractus, Entolasia marginata, Entolasia stricta, Gahnia microstachya, Imperata cylindrica,* Lepidosperma laterale, *Lomandra cylindrica, Lomandra filiformis, Lomandra longifolia, Poa affinis., Themeda triandra*
Forbs	*Alpinia caerulea, Dampiera stricta, Dendrobium speciosum, Dianella caerulea, Dianella revoluta, Gonocarpus teucrioides, Goodenia heterophylla, Lobelia purpurascens, Pomax umbellata, Pseuderanthemum variabile, Solanum prinophyllum, Vernonia cinerea*
Other	*Billardiera scandens, Cissus hypoglauca, Glycine clandestine, Hardenbergia violacea, Hibbertia dentata, Hibbertia scandens, Kennedia rubicunda, Parsonsia straminea, Passiflora herbertiana, Smilax australis, Xanthorrhoea arborea*

4.2.16.2 Condition states

Within the subject land PCT 3263 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-Good.

Examples of PCT 3263 Mod-good are depicted in Photo 4.53 and Photo 4.54.



Photo 4.53 PCT 3263 in Mod-good condition in the Watagan State Forest



Photo 4.54 PCT 3263 in Mod- good condition in the Watagan State Forest

4.2.16.3 Justification of PCT selection

PCT 3263 is found on dry Narrabeen sandstone slopes and crests along the Watagan Range, Central Coast.

PCT reference plots for PCT 3263 occur in close proximity to the subject land with the PCT known to occur in the Wyong IBRA subregions Within the subject land, PCT 3263 has been identified on the Narrabeen sandstone slopes and crests throughout the Olney and Watagan State Forests.

PCT 3263 within the subject land is restricted to the Wyong IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 3241, 3263 or 3617.

The allocation of PCT 3263 relies on plots LCSM-21, LCSM-24, LCSM-25, HTP-MS-12 and HTP-MS-16. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a low distance to centroid values that suggests a strong match to PCT 3263 (see Appendix D (Vegetation survey data)).

LCSM-24 had a closer match for PCT 3606 than it did for PCT 3263, however LCSM-24 is located along the upper slope near a crest in Corrabare State Forest, unlike PCT 3606 which only occurs in gullies and neighbouring slopes. PCT 3606 also frequently has a high cover *Eucalyptus piperita*, which is absent from the canopy in LCSM-24.

Patches within the subject land had a canopy consisting of *Syncarpia glomulifera* and *Eucalyptus punctata,* often with *Corymbia maculata* and *Eucalyptus agglomerata* also present within the canopy. Allocasuarina torulosa was also abundant as a small tree, with *Acacia schinoides, Astrotricha latifolia, Persoonia linearis* and *Podolobium ilicifolium* present in the shrub layer. The ground layer was usually dominated by *Entolasia stricta*, with *Lomandra longifolia* and *Dianella caerulea* present in most patches.

4.2.16.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3263.

4.2.16.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3263.

4.2.17 PCT 3314 – Central Hunter Slopes Grey Box Forest

4.2.17.1 PCT overview

PCT 3314 – Central Hunter Slopes Grey Box Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest or woodland with a sparse cover of soft-leaved shrubs and a grassy ground cover that occurs on hilly country across central and upper parts of the Hunter valley and on surrounding ranges, predominantly between Broke, Denman, Muswellbrook and Scone districts and with scattered records in the ranges toward Barrington Tops. The canopy is very frequently dominated by *Eucalyptus moluccana* (and/or its hybrid with *Eucalyptus albens*), with other eucalypts only occasionally present (*Eucalyptus crebra* being the most frequent of these). The mid-stratum cover is sparse, and very frequently includes the small tree *Brachychiton populneus*, almost always with the shrub *Notelaea microcarpa* and commonly with *Psydrax odorata*. One or more Acacia species are commonly present, with *Acacia salicina* and *Acacia decora* recorded most frequently. Other occasional shrubs include *Myoporum montanum*, *Bursaria spinosa* and *Cassinia quinquefaria*. The mid-dense ground layer is mainly comprised of grasses, forbs, twiners and graminoids with some hardy ferns and low-growing shrubs. *Dichondra repens*, *Aristida ramosa*, *Cymbopogon refractus*, *Glycine tabacina*, *Calotis lappulacea*, *Chloris ventricosa*, *Austrostipa scabra* and *Oxytes brachypoda* are all very frequently recorded (NSW DCCEEW 2024c).

This PCT occurs in warm, dry environments with a mean annual rainfall typically below 700 millimetres and with most records at elevations below 550 metres ASL. On Permian sediments in the Hunter Valley it occupies areas of high topographic relief such as the slopes of Ogilvies Hill and Mount Arthur in the Muswellbrook district as well as some escarpment foot slopes and benches.

It also occurs on clay-enriched soils derived from Carboniferous metasediments in the ranges east of Scone, on exposed steep slopes and crests. Other areas on crests and ridges west of Manobalai Nature Reserve carry small local areas of this PCT where a thin cover of basalt soils overlies Narrabeen sandstone. It is related both floristically and spatially to several other grassy forest and woodland PCTs in the central Hunter. PCT 3431 is also widespread on the Permian sediments but occupies areas of lower relief and is very frequently dominated by *Eucalyptus crebra*. PCT 3485 may not be easy to distinguish because it shares many of the ground cover species in a similar topographic position, however it differs in that *Eucalyptus dawsonii* is very frequently recorded with a high foliage cover and is almost absent from this PCT. On the Carboniferous sediments it grades into PCT 3525 (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.34 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3314 during the field survey presented in Table 4.35.

Table 4.34 PCT 3314 – Central Hunter Slopes Grey Box Forest

PCT ID	3314
PCT name	Central Hunter Slopes Grey Box Forest
Vegetation formation	KF_CH3 Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	70.71
Extent within subject land (ha)	77.88 (within the subject land this PCT is restricted to the Hunter IBRA subregion)

Table 4.35 PCT 3314 – Central Hunter Slopes Grey Box Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia salicina, Allocasuarina luehmannii*, *Eucalyptus moluccana, Eucalyptus tereticornis, Geijera salicifolia, Notelaea microcarpa*
Shrubs	*Acacia falcata, Acacia implexa, Bursaria spinosa subsp. spinosa, Cassinia quinquefaria, Enchylaena tomentosa, Eremophila debilis, Maireana microphylla, Pimelea curviflora, Psydrax odorata, Sclerolaena muricata var. villosa, Solanum cinereum, Teucrium junceum*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida calycina, Aristida vagans, Aristida ramosa,* Austrostipa rudis subsp. rudis, *Austrostipa verticillate, Bothriochloa biloba, Bothriochloa decipiens, Bothriochloa macra, Chloris truncata, Chloris ventricose, Cynodon dactylon, Cymbopogon refractus, Dichanthium sericeum, Lomandra confertifolia, Microlaena stipoides, Sporobolus creber*
Forbs	*Asperula conferta,* Brunoniella australis, Calotis lappulacea, Chrysocephalum apiculatum, *Dichondra repens, Einadia nutans, Euchiton sphaericus, Goodenia hederacea, Mentha satureioides, Plantago turrifera, Pseuderanthemum variabile, Sida corrugate, Sida hackettiana,* Vernonia cinerea, *Wahlenbergia communis*
Other	*Clematis glycinoides, Convolvulus erubescens, Glycine clandestine, Glycine tabacina, Xanthorrhoea acaulis*

4.2.17.2 Condition states

Within the subject land PCT 3314 is present in the following broad condition states (equivalent to vegetation zones):

- Thinned
- Poor
- Disturbed grassland.

An example of PCT 3314 Thinned is depicted in Photo 4.55 and Photo 4.56.



Photo 4.55 PCT 3314 Thinned



Photo 4.56 PCT 3314 Thinned

4.2.17.3 Justification of PCT selection

PCT 3314 is known to occur on hilly country across central and upper parts of the Hunter valley and on surrounding ranges, predominantly between Broke, Denman, Muswellbrook and Scone districts and with scattered records in the ranges toward Barrington Tops.

PCT reference plots for PCT 3314 occur to the north and west of the subject land with the PCT known to occur in the Yengo and Hunter IBRA subregions. Within the subject land, PCT 3314 has been identified along the hills in the central Hunter Valley.

PCT 3314 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 0, 3314 or 3431.

The allocation of PCT 3314 relies on plots DL-37, DR-07, MS-03, MS-05, MS-88, NE-01 and TC-08. Plots that were assigned the disturbed grassland condition class (MS-23, NE-2, TS-12 and TS-13) weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3314 (see Appendix D (Vegetation survey data)).

DL-37 had no centroid matches with PCT 3314 however it consists of a canopy dominated by *Eucalyptus moluccana* with a heavy regrowth of *Allocasuarina luehmannii* in the midstory. Other potential communities for this plot include PCT 3431 and 3485, which share similar features with PCT 3314. However, the canopy recorded in DL-37 only consists of *Eucalyptus moluccana*, with other diagnostic canopy species for PCT 3431 (*E. crebra*) and PCT 3485 (*E. dawsonii*) absent from the plot and its respective patch.

MS-05 had a higher centroid match with PCT 3404, 3431, 3485 and 4015, than it did with PCT 3314. MS-05 had a canopy that consisted of *Eucalyptus moluccana* with heavy regrowth of *Allocasuarina luehmannii* in the midstory. The mid-dense ground layer was mainly comprised of *Austrostipa verticillata, Cymbopogon refractus* and *Sporobolus creber*. It doesn't represent PCT 3404, which commonly includes a high cover of *Eucalyptus conica,* occasionally with *Eucalyptus melliodora*.

It doesn't represent PCT 4015, which commonly consists of a high cover of *Casuarina glauca* either exclusively or in combination with a sparse cover of red gums. PCT 3485 isn't easy to distinguish from PCT 3314 and 3431 because it shares many of the ground cover species in a similar topographic position, however it differs in that *Eucalyptus dawsonii* is very frequently recorded with a high foliage cover and is almost absent from PCT 3314 and 3431. Similar to PCT 3431, PCT 3314 is also widespread on the Permian sediments but is associated with rises and areas of greater relief and is generally shrubbier and only rarely includes *Eucalyptus crebra*, which is similar to what was recorded in MS-05.

MS-88 had a higher centroid match with PCT 3404 and 3431, than it did with PCT 3314. MS-88 had a canopy that consisted of *Eucalyptus moluccana* with a very sparse cover of shrubs. The ground layer consisted of a mix of native and exotic plants, with *Aristida ramosa* being the more abundant species in this plot. It doesn't represent PCT 3404, which commonly includes a high cover of *Eucalyptus conica,* occasionally with *Eucalyptus melliodora*. Similar to PCT 3431, PCT 3314 is also widespread on the Permian sediments but is associated with rises and areas of greater relief and is generally shrubbier and only rarely includes *Eucalyptus crebra,* which is similar to what was recorded in MS-88.

NE-01 had a higher centroid match with PCT 4121 than it did with PCT 3314, however PCT 4121 only occurs in the Kerrabee IBRA subregion.

TC-08 received a very low centroid score, which was likely due to the poor condition that the plot area was in, with any diagnostic species likely absent due to the high cover of exotic vegetation. Using nearby patches of more intact vegetation as reference, this plot was assigned to PCT 3314 instead of PCT 3431, due to the similar topography that was present in this community.

Patches within the subject land usually consisted of a canopy of *Eucalyptus moluccana*, with a small tree layer of *Acacia salicina*, *Allocasuarina luehmannii* and *Notelaea microcarpa* usually present. The shrub layer included *Bursaria spinosa subsp. spinosa, Cassinia quinquefaria* and *Psydrax odorata.* The ground layer mainly consisted of *Aristida vagans, Austrostipa verticillata* and *Cymbopogon refractus.*

4.2.17.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3314 is part of the Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act. PCT 3314 is also part of the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. This TEC is listed as Critically Endangered under the BC Act.

These TECs are discussed further in section 4.3.

4.2.17.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3314 is part of the Central Hunter Valley eucalypt forest and woodland TEC. This TEC is listed as Critically Endangered under the EPBC Act. PCT 3314 is also part of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. This TEC is listed as Critically Endangered under the EPBC Act.

These TECs are discussed further in section 4.3.

4.2.18 PCT 3315 – Central Hunter Ironbark-Spotted Gum Forest

4.2.18.1 PCT overview

PCT 3315 – Central Hunter Ironbark-Spotted Gum Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with dry shrubs and a ground cover of grasses and graminoids occurring on moderately fertile soils on lower slopes of hills in the central Hunter valley to the west of Newcastle from North Rothbury to Lake Liddell. The canopy almost always includes ironbarks (*Eucalyptus crebra* or *Eucalyptus fibrosa*), very frequently in association with *Corymbia maculata*.

The sparse small tree layer almost always includes 1 or more *Acacia* species, of which *Acacia parvipinnula* and *Acacia falcata* are most frequent and abundant. Sparsely spaced individuals of the shrubs *Lissanthe strigosa* and *Daviesia ulicifolia* also commonly occur. The mid-dense ground layer typically includes a diverse array of graminoids, forbs and a hardy fern. *Cymbopogon refractus*, *Lomandra multiflora* subsp. *multiflora* and *Cheilanthes sieberi* subsp. *sieberi* are almost always present and *Aristida ramosa*, *Aristida vagans*, *Dianella revoluta* and *Microlaena stipoides* are very frequent (NSW DCCEEW 2024c).

This PCT occurs at low elevations in a hot, dry climate with a mean annual rainfall below 780 millimetres. It mostly occurs on Permian sediments however there are some occurrences on the folded sediments and volcanics of the Tamworth belt. At higher elevations on Tamworth Belt substrates, it grades into PCT 3446 which differs in that *Breynia oblongifolia*, *Leucopogon juniperinus*, *Persoonia linearis* and *Notelaea longifolia* are very frequent to common in its mid-stratum. On Permian sediments in areas to the east with higher rainfall, it grades into PCT 3444 which differs in that *Eucalyptus fibrosa* is the most frequent ironbark. This PCT has been extensively cleared and remaining patches are often fragmented and weedy. While this PCT primarily occurs on private land, a small sample is present in Belford National Park (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.36 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3315 during the field survey presented in Table 4.37.

Table 4.36 PCT 3315 – Central Hunter Ironbark-Spotted Gum Forest

PCT ID	3315
PCT name	Central Hunter Ironbark-Spotted Gum Forest
Vegetation formation	KF_CH3 Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	77.7
Extent within subject land (ha)	26.30 (within the subject land this PCT is restricted to the Hunter IBRA subregion)

Table 4.37 PCT 3315 – Central Hunter Ironbark-Spotted Gum Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia pendula, Allocasuarina luehmannii, Corymbia maculata, Eucalyptus crebra, Eucalyptus moluccana, Eucalyptus paniculata*
Shrubs	*Acacia amblygona, Acacia implexa, Bursaria spinosa, Eremophila debilis, Grevillea montana, Olearia elliptica, Persoonia linearis, Phyllanthus gunnii, Solanum stelligerum, Styphelia spp., Trema tomentosa var. aspera*
Ferns	*Cheilanthes distans, Cheilanthes sieberi*
Grass & grasslike	*Aristida ramosa, Aristida vagans, Carex inversa, Cymbopogon refractus, Cynodon dactylon, Entolasia stricta, Gahnia aspera, Microlaena stipoides, Sporobolus creber*
Forbs	*Chrysocephalum apiculatum, Dichondra repens, Einadia hastata, Lobelia purpurascens, Oxalis perennans, Pomax umbellata, Solenogyne bellioides, Veronica plebeia*
Other	*Amyema pendula, Glycine microphylla, Glycine tabacina, Muellerina eucalyptoides*

4.2.18.2 Condition states

Within the subject land PCT 3315 is present in the following broad condition states (equivalent to vegetation zones):

- Thinned
- Derived.

An example of PCT 3315 Thinned and Derived is depicted in Photo 4.57 and Photo 4.58.



Photo 4.57 PCT 3315 Thinned



Photo 4.58 PCT 3315 Derived

4.2.18.3 Justification of PCT selection

PCT 3315 is known to occur on moderately fertile soils on lower slopes of hills in the central Hunter valley to the west of Newcastle from North Rothbury to Lake Liddell.

PCT reference plots for PCT 3315 occur to the north, east and west of the subject land with the PCT known to occur in the Hunter IBRA subregion. Within the subject land, PCT 3315 has been identified on the foothills of the central Hunter Valley.

PCT 3315 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 0 or 3431.

The allocation of PCT 3315 relies on plots DL-64, DL-74 and DL-77. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a centroid match with PCT 3315 (see Appendix D (Vegetation survey data)). Plots that were assigned the disturbed grassland condition class (DL-75, DL-76 and DL-78) weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation.

DL-64 had a higher centroid match with PCT 3319, 3329, 3431 and 3446, than it did for 3315. PCT 3319 and 3329 don't occur within the Hunter IBRA subregion. DL-64 consisted of a canopy dominated by *Eucalyptus moluccana,* with *E. crebra* and *Corymbia maculata* also present. The sparse midstory included 3 species of Acacia (*A. implexa, A. linearifolia* and *A. parramattensis*) with *Solanum stelligerum* being the most abundant. The dense ground layer had a diverse mix of grasses and forbs, with *Cymbopogon refractus* and *Sporobolus creber* having the greatest cover. PCT 3446 differs from PCT 3315, in that PCT 3446 very frequently has *Breynia oblongifolia*, *Leucopogon juniperinus*, *Persoonia linearis* and *Notelaea longifolia* its mid-stratum, which isn't the case in DL-64, with only *Breynia oblongifolia* present at a very low abundance. While DL-64 has a canopy that's difficult to distinguish between PCT 3315 and 3431, the absence of *Allocasuarina luehmannii* in the plot likely reduces the potential of it belonging to PCT 3431.

DL-77 had a higher centroid match with PCT 3431 and 4015 than it did with PCT 3315. The output from this plot was likely affected due to the plot also consisting of planted *Eucalyptus paniculata*, with *Corymbia maculata* absent from the plot. This plot was assigned to PCT 3315 due to neighbouring vegetation being assigned to PCT 3315 (thinned) and PCT 3315 (derived).

Patches within the subject land usually consisted of *Eucalyptus crebra* or *Eucalyptus paniculata*, often with *Corymbia maculata* present. The mid story often contained *Acacia implexa*, *Allocasuarina luehmannii* and *Bursaria spinosa*. The ground layer consisted of mainly *Aristida ramosa, Cymbopogon refractus,* and *Sporobolus creber*.

4.2.18.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3315 is equivalent to the Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.18.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3315 is part of the Central Hunter Valley eucalypt forest and woodland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.19 PCT 3328 – Lower Hunter Red Gum – Paperbark Riverflat Forest

4.2.19.1 PCT overview

PCT 3328 – Lower Hunter Red Gum – Paperbark Riverflat Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a sub-canopy of *Melaleuca* trees and a grassy ground layer found on low-lying alluvial soils in the lower Hunter valley. The tree canopy very frequently includes a high cover of *Eucalyptus amplifolia* which is rarely replaced by *Eucalyptus tereticornis*. Other rarely occurring eucalypts include *Eucalyptus moluccana*, hybrid *Eucalyptus canaliculata - punctata*, or *Eucalyptus siderophloia*. The mid-stratum is characterised by a sparse to mid-dense cover of mid-high *Melaleuca* trees, including commonly, *Melaleuca nodosa*, occasionally *Melaleuca linariifolia* and *Melaleuca styphelioides* and rarely *Melaleuca decora*. A lower layer of shrubs very frequently includes *Bursaria spinosa*, commonly *Breynia oblongifolia* or occasionally *Acacia parvipinnula*. The ground layer has a mid-dense to dense and diverse cover of grasses, forbs, twiners and small ferns. *Cheilanthes sieberi* subsp. *sieberi* is almost always present, very frequently with *Microlaena stipoides*, *Oxalis perennans, Glycine tabacina*, *Themeda triandra* and *Lobelia purpurascens*, commonly with *Aristida ramosa* and *Cymbopogon refractus* (NSW DCCEEW 2024c).

This PCT occurs in drier and warmer environments than coastal river flat eucalypt forests to the east (PCT 4042) which share some structural and species characteristics, however have more mesophyll species because of the higher rainfall. It occurs on creek-lines draining low-elevation Permian sediments, generally at elevations of less than 130 metres ASL and is currently restricted to small isolated remnants, or narrow creek flats in larger patches in the Cessnock district. Native vegetation on alluvial soils in the region has been depleted and current remnants are likely to represent a small proportion of the original extent in the wider lower Hunter valley (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.38 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3328 during the field survey presented in Table 4.39.

Table 4.38 PCT 3328 – Lower Hunter Red Gum – Paperbark Riverflat Forest

PCT ID	3328
PCT name	Lower Hunter Red Gum – Paperbark Riverflat Forest
Vegetation formation	KF_CH3 Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	83.92%
Extent within subject land (ha)	0.45 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.39 PCT 3328 – Lower Hunter Red Gum – Paperbark Riverflat Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	–
Shrubs	*Melaleuca linariifolia, Melaleuca styphelioides, Myoporum montanum*
Ferns	–
Grass & grasslike	*Cynodon dactylon, Oplismenus imbecillis, Juncus subsecundus*
Forbs	*Commelina cyanea, Persicaria hydropiper, Sigesbeckia australiensis*
Other	–

4.2.19.2 Condition states

Within the subject land PCT 3328 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3328 Mod-good is depicted in Photo 4.59 and Photo 4.60.



Photo 4.59 PCT 3328 in Mod-good condition



Photo 4.60 PCT 3328 in Mod-good condition

4.2.19.3 Justification of PCT selection

PCT 3328 is known to occur on creek-lines draining low-elevation Permian sediments, generally at elevations of less than 130 metres ASL and is currently restricted to small isolated remnants, or narrow creek flats in larger patches in the Cessnock district.

PCT reference plots for PCT 3328 occur to the east of the subject land with the PCT known to occur in the Hunter IBRA subregion. Within the subject land, PCT 3328 has been identified along the creek flats near Congewai Creek.

PCT 3328 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 4058.

The allocation of PCT 3328 relies on plot DL-32. This plot was run through the Plot to PCT Assignment Tool where it was identified to not have a centroid match with PCT 3328 (see Appendix D (Vegetation survey data)). While the eucalypt canopy was absent, the characteristic *Melaleuca* sub-canopy was present, mainly as *Melaleuca styphelioides*, with *Melaleuca linariifolia* also present. The ground layer contained a mix of mainly *Cynodon dactylon*, *Oplismenus imbecillis* and *Persicaria praetermissa*.

4.2.19.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3328 is part of the Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions TEC. PCT 3328 is also part of the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions TEC. Both of these TECs are listed as Endangered under the BC Act.

These TECs are discussed further in section 4.3.

4.2.19.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3328 is part of the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.20 PCT 3431 – Central Hunter Ironbark Grassy Woodland

4.2.20.1 PCT overview

PCT 3431 – Central Hunter Ironbark Grassy Woodland is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest or woodland with a sparse cover of dry shrubs and a mid-dense grassy ground layer that occurs mainly on the undulating floor of the central Hunter valley with scattered areas on adjoining ranges. The canopy very frequently includes *Eucalyptus crebra* with a high foliage cover, either exclusively or occasionally in association with *Eucalyptus moluccana* (and or its hybrid with *Eucalyptus albens*). *Allocasuarina luehmannii* is common, either in the mid-stratum or as a member of the canopy where eucalypt species are regenerating. The mid-stratum very frequently includes only a sparse cover, with occasional *Notelaea microcarpa* or *Maireana microphylla* and rarely the lower growing chenopod shrub *Enchylaena tomentosa*. Taller species of *Acacia*, such as *Acacia salicina* and *Acacia falcata*, are rare. The mid-dense ground layer is mainly comprised of a high diversity of grasses and forbs with some graminoids, twiners, hardy ferns, low-growing shrubs and sedges. The layer very frequently includes *Aristida ramosa*, *Glycine tabacina*, *Cymbopogon refractus*, *Cheilanthes sieberi* subsp. *sieberi*, Dichondra repens and the prostrate shrub *Eremophila debilis*. Other common grasses include *Eragrostis leptostachya*, *Microlaena stipoides*, *Austrostipa scabra* and *Bothriochloa decipiens* var. *decipiens* (NSW DCCEEW 2024c).

This PCT is most extensively distributed on low-gradient Permian sediments across the central Hunter valley between the Rothbury, Muswellbrook and Wybong districts, where it primarily occurs in small, often disturbed patches in a landscape dominated by agriculture and coal mining.

It is also found in small areas on the low hills that rise northeast from Muswellbrook on Carboniferous sediments but only on exposed slopes and crests below around 400 metres ASL. Across its range the PCT occupies warm, dry environments with a mean annual rainfall typically below 750 millimetres. This PCT is related both floristically and spatially to several other grassy forest and woodland PCTs in the central Hunter. PCT 3314 also is widespread on the Permian sediments but is associated with rises and areas of greater relief, is generally shrubbier and only rarely includes *Eucalyptus crebra*. PCT 3485 shares many of the ground cover species in a similar topographic position however differs in that *Eucalyptus dawsonii* is very frequently recorded with a high foliage cover and is almost absent from this PCT. On the Carboniferous sediments it grades into PCT 3525 (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.40 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3431 during the field survey presented in Table 4.41.

Table 4.40 PCT 3431 – Central Hunter Ironbark Grassy Woodland

PCT ID	3431
PCT name	Central Hunter Ironbark Grassy Woodland
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	86.47
Extent within subject land (ha)	118.86 (within the subject land this PCT is restricted to the Hunter IBRA subregion)

Table 4.41 PCT 3431 – Central Hunter Ironbark Grassy Woodland diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia parramattensis, Acacia salicina, Allocasuarina luehmannii, Angophora floribunda, Brachychiton populneus, Eucalyptus blakelyi x camaldulensis, Eucalyptus crebra, Eucalyptus moluccana, Eucalyptus tereticornis, Notelaea microcarpa var. microcarpa*
Shrubs	*Breynia oblongifolia, Callistemon linearis, Cassinia quinquefaria, Enchylaena tomentosa, Eremophila debilis, Exocarpos strictus, Maireana microphylla, Myoporum montanum, Phyllanthus gunnii, Sclerolaena muricata var. villosa*
Ferns	*Cheilanthes sieberi subsp. sieberi*
Grass & grasslike	*Aristida ramosa, Aristida vagans, Bothriochloa biloba, Bothriochloa macra, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Dichanthium sericeum, Entolasia stricta, Eragrostis leptostachya, Gahnia aspera, Juncus usitatus, Microlaena stipoides, Sporobolus creber*
Forbs	*Asperula conferta, Brunoniella australis, Calotis lappulacea, Centella asiatica, Chrysocephalum apiculatum, Dichondra repens, Euchiton sphaericus, Lobelia purpurascens, Mentha satureioides, Oxalis perennans, Oxytes brachypoda, Plantago turrifera, Pseuderanthemum variabile, Rumex brownii, Sida corrugata, Vernonia cinerea, Wahlenbergia communis*
Other	*Amyema pendula subsp. pendula, Convolvulus erubescens, Desmodium varians, Glycine clandestina, Glycine tabacina*

4.2.20.2 Condition states

Within the subject land PCT 3431 is present in the following broad condition states (equivalent to vegetation zones):

- Thinned
- Poor
- Disturbed grassland
- Plantation.

An example of PCT 3431 Thinned and Poor is depicted in Photo 4.61 and Photo 4.62.



Photo 4.61 PCT 3431 Thinned



Photo 4.62 PCT 3431 Poor

4.2.20.3 Justification of PCT selection

PCT 3431 is known to occur mainly on the undulating floor of the central Hunter valley with scattered areas on adjoining ranges.

PCT reference plots for PCT 3431 occur within and to the east and west of the subject land with the PCT known to occur in the Hunter IBRA subregion. Within the subject land, PCT 3431 has been identified along the floor of the central Hunter Valley.

PCT 3431 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3431, with some small areas mapped as PCT 3315.

The allocation of PCT 3431 relies on plots DL-30, DL-45, DL-46, DL-47, DR-06 (thinned), HTP-MS-02, DL-26, DL-52 (poor), DR-01, DR-04, DR-05, DL-40 (disturbed grassland), DR-02, DR-03 and HTP-MS-01 (plantation). These plots were run through the Plot to PCT Assignment Tool where they were mostly identified to have a centroid match with PCT 3431 (see Appendix D (Vegetation survey data)). Plots that were assigned the disturbed grassland and plantation condition class weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation.

DL-30 had a higher centroid match with PCT 3459 and 4120, than it did with 3431 however those PCTs don't occur in the Sydney Basin IBRA bioregion.

HTP-MS-02 had a higher centroid match with PCT 3404 and 3485, than it did with 3431. This plot consists of mid-story regrowth of *Allocasuarina luehmannii* and *Acacia salicina*, with no other tree species present. The grassy ground layer is mainly dominated by *Aristida ramosa, Chloris ventricosa* and *Sporobolus creber*, with *Cheilanthes sieberi*. The absence of a canopy made it difficult to distinguish these 3 PCTs, with neighbouring vegetation used to determine what the dominant canopy species may have been. Since there was a dominance of *Eucalyptus crebra* nearby and a complete absence of *Eucalyptus conica* (3404) and *Eucalyptus dawsonii* (3485), HTP-MS-02 was assigned to PCT 3431.

DL-52 had a higher centroid match with PCT 3462, than it did with 3431 however this PCT doesn't occur in the Sydney Basin IBRA bioregion.

Patches within the subject land had a canopy containing *Eucalyptus crebra* and *Eucalyptus moluccana*, often with a small tree layer of *Allocasuarina luehmannii* and *Notelaea microcarpa*. The sparse shrub layer included *Eremophila debilis*, *Maireana microphylla* and *Myoporum montanum*. The ground layer often included *Aristida ramosa, Cymbopogon refractus*, *Dichondra repens* and *Entolasia stricta*.

4.2.20.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3431 is part of the Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.20.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3431 is part of the Central Hunter Valley eucalypt forest and woodland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.21 PCT 3438 – Hunter Escarpment Footslopes Ironbark Forest

4.2.21.1 PCT overview

PCT 3438 – Hunter Escarpment Footslopes Ironbark Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with dry and soft-leaved shrubs and a patchy ground cover of grasses and graminoids that is restricted to Permian sediments on escarpment footslopes near Singleton, in a dry part of the central Hunter valley to the west of Newcastle. *Eucalyptus crebra* is almost always present in the canopy, with occasional occurrences of *Corymbia maculata* or *Eucalyptus moluccana*. There is commonly a small tree layer, and where it occurs on the low gradient parts of the valley it can be characterised by mid-dense stands of *Melaleuca decora* together with scattered individuals of *Allocasuarina luehmannii*. The mid-dense shrub layer almost always includes 1 or more *Acacia* species, of which *Acacia amblygona* is the most frequent and abundant. In addition, *Olearia elliptica* subsp. *elliptica* and *Dodonaea viscosa* occur very frequently, and *Bursaria spinosa*, and *Breynia oblongifolia* are common. The ground cover typically includes a suite of grasses and hardy ferns with forbs being less frequent. *Lomandra confertifolia* and *Cymbopogon refractus* are almost always present, *Aristida vagans* and *Aristida ramosa* are both very frequent while *Lomandra multiflora* subsp. *multiflora*, *Lomandra filiformis*, *Cheilanthes sieberi* subsp. *sieberi* and *Cheilanthes distans* are common (NSW DCCEEW 2024c).

This PCT occurs in a hot, dry climate with a mean annual rainfall below 760 millimetres and elevation below 230 metres ASL. There are some occurrences within Wollemi National Park, however it generally occurs on private land. This PCT shares little floristic overlap with nearby PCTs, however as altitude decreases it grades into PCT 3315 and PCT 3431, both of which occur on the floor of the Hunter valley. PCT 3315 differs in that *Corymbia maculata* is very frequent and PCT 3431 rarely includes the shrubs that are present in this PCT (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.42 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3438 during the field survey presented in Table 4.43.

Table 4.42 PCT 3438 – Hunter Escarpment Footslopes Ironbark Forest

PCT ID	3438
PCT name	Hunter Escarpment Footslopes Ironbark Forest
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	24.0
Extent within subject land (ha)	12.19 (1.97 ha in the Yengo IBRA subregion and 10.22 in the Hunter IBRA subregion)

Table 4.43 PCT 3438 – Hunter Escarpment Footslopes Ironbark Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia parramattensis, Corymbia maculata, Eucalyptus crebra, Eucalyptus moluccana, Eucalyptus punctata*
Shrubs	*Acacia amblygona, Acacia falcata, Bursaria spinosa,* Dodonaea viscosa subsp. cuneata, *Melichrus urceolatus, Olearia elliptica*
Ferns	*Cheilanthes austrotenuifolia, Cheilanthes distans, Cheilanthes sieberi*
Grass & grasslike	*Aristida ramosa, Cymbopogon refractus, Cyperus gracilis, Digitaria parviflora, Entolasia stricta, Gahnia aspera,* Sporobolus creber, *Themeda triandra*
Forbs	*Desmodium rhytidophyllum, Dianella prunina, Dichondra repens, Lagenophora stipitata, Lobelia pratioides, Lobelia purpurascens*
Other	*Glycine clandestina, Glycine microphylla, Glycine tabacina, Grona varians, Hardenbergia violacea, Macrozamia communis*

4.2.21.2 Condition states

Within the subject land PCT 3438 is present in the following broad condition states (equivalent to vegetation zones):

- Moderate/Good.

An example of PCT 3438 Mod-good is depicted in Photo 4.63 and Photo 4.64.

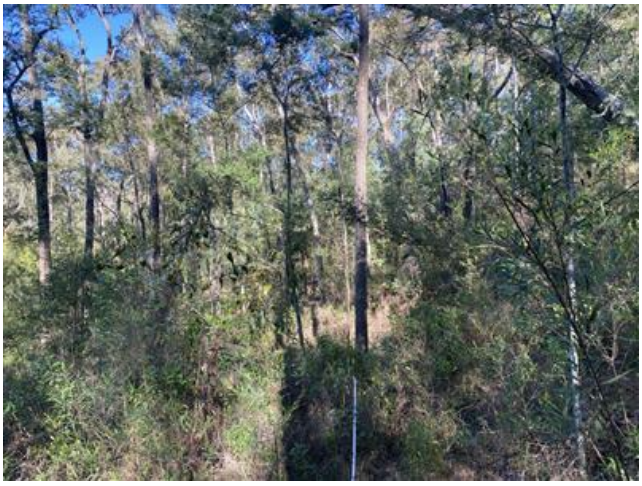


Photo 4.63 PCT 3438 in Mod-good condition



Photo 4.64 PCT 3438 in Mod-good condition

4.2.21.3 Justification of PCT selection

PCT 3438 is known to be restricted to Permian sediments on escarpment footslopes near Singleton, in a dry part of the central Hunter valley to the west of Newcastle.

PCT reference plots for PCT 3438 occur to the east and west of the subject land with the PCT known to occur in the Yengo and Hunter IBRA subregions. Within the subject land, PCT 3438 has been identified to occur in the Permian sediments in the northern escapement footslopes of Pokolbin State Forest.

PCT 3438 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as PCT 3438.

The allocation of PCT 3438 relies on plots DL-63, DL-66 and DL-73. These plots were run through the Plot to PCT Assignment Tool where it was identified to have a centroid match with PCT 3438 (see Appendix D (Vegetation survey data)).

DL-63 had a higher centroid match with PCT 3446 and 4157 than it did for PCT 3438. It's unlikely to be PCT 4157, since it only occurs on the north-facing lower escarpment below Pokolbin State Forest where it forms small patches on shallow to skeletal soils. While PCT 3438 and PCT 3446 share similar canopy species, its shrub layer is more characteristic of PCT 3438, with *Acacia amblygona, Breynia oblongifolia, Bursaria spinosa* and *Olearia elliptica* present in the plot.

DL-73 had a higher centroid match with PCT 3319, 3446 and 3489 than it did for PCT 3438. PCT 3319 only occurs in the Burragorang and Cumberland IBRA subregions. DL-73 is unlikely to be part of PCT 3489 since this PCT occurs along steep escarpment slopes, unlike the plot, which is located along the flatter, lower slopes. While PCT 3438 and PCT 3446 share similar canopy species, its shrub layer is more characteristic of PCT 3438, with *Breynia oblongifolia, Bursaria spinosa, Dodonaea viscosa* and *Olearia elliptica* present in the plot.

Patches within the subject land had a canopy comprised of *Corymbia maculata* and *Eucalyptus crebra*. The sparse mid story included *Breynia oblongifolia, Bursaria spinosa* and *Olearia elliptica*. The ground layer included *Aristida ramosa, Cymbopogon refractus* and *Themeda triandra*, with *Cheilanthes sieberi* and *Lomandra multiflora subsp. multiflora* also present.

4.2.21.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3438.

4.2.21.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3438 is part of the Central Hunter Valley eucalypt forest and woodland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.22 PCT 3439 – Hunter Escarpment Grey Gum Sheltered Forest

4.2.22.1 PCT overview

PCT 3439 – Hunter Escarpment Grey Gum Sheltered Forests is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with soft-leaved shrubs and forbs occurring on Narrabeen sandstone in sheltered locations on the escarpment of the upper Hunter valley from Broke to Wybong to the west of Newcastle, or on isolated, quartz-rich Permian sediments. *Eucalyptus punctata* is very frequently present in the canopy with occasional *Eucalyptus crebra* and *Corymbia maculata* in localised areas (NSW DCCEEW 2024c).

The mid-dense mid-stratum is layered and includes soft-leaved small trees and shrubs. *Notelaea microcarpa* is very frequent and scattered individuals of *Brachychiton populneus* are common and together form the tallest component of the mid-stratum. The very frequently occurring shrubs and smaller trees are *Breynia oblongifolia*, *Bursaria spinosa* and 1 or more *Acacias*, of which *Acacia implexa* and *Acacia binervia* are the most frequent and abundant. The ground layer is also mid-dense and typically includes forbs, ferns, vines, twiners and grasses.

Dichondra repens is almost always present, *Desmodium varians*, *Cheilanthes sieberi* subsp. *sieberi* and *Clematis glycinoides* are very frequent while the ferns *Adiantum aethiopicum* and *Asplenium flabellifolium* are common (NSW DCCEEW 2024c).

This PCT typically occurs in a warm, dry environment with mean annual rainfall below 760 millimetres. It shares little floristic overlap with other nearby PCTs, however at lower slope positions it grades into PCT 3314 which often occurs near the interface with Permian sediments and *Eucalyptus moluccana* is very frequent in its canopy (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.44 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3439 during the field survey presented in Table 4.45.

Table 4.44 PCT 3439 – Hunter Escarpment Grey Gum Sheltered Forest

PCT ID	3439
PCT name	Hunter Escarpment Grey Gum Sheltered Forests
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	58.06
Extent within subject land (ha)	1.62 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.45 PCT 3439 – Hunter Escarpment Grey Gum Sheltered Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Angophora floribunda, Eucalyptus acmenoides, Eucalyptus punctata*
Shrubs	*Breynia oblongifolia, Exocarpos cupressiformis, Trema tomentosa var. aspera*
Ferns	*Adiantum aethiopicum*
Grass & grasslike	*Cyperus gracilis, Gahnia aspera, Microlaena stipoides*
Forbs	*Commelina cyanea, Dichondra repens, Lobelia purpurascens*
Other	*Clematis aristata, Glycine latifolia, Stephania japonica*

4.2.22.2 Condition states

Within the subject land PCT 3439 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-Good.

An example of PCT 3439 Mod-good is depicted in Photo 4.65 and Photo 4.66.



Photo 4.65 PCT 3439 in Mod-good condition



Photo 4.66 PCT 3439 in Mod-good condition

4.2.22.3 Justification of PCT selection

PCT 3439 is known to occur primarily on Narrabeen sandstone in sheltered locations on the escarpment of the upper Hunter valley from Broke to Wybong to the west of Newcastle, or on isolated, quartz-rich Permian sediments.

PCT reference plots for PCT 3439 occur to the west and north of the subject land with the PCT known to occur in the Yengo and Hunter IBRA subregions. Within the subject land, PCT 3439 has been identified to occur on Narrabeen sandstone, below the northern escapement of Pokolbin State Forest.

PCT 3439 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3239.

The allocation of PCT 3439 relies on plot DL-61. These plots were run through the Plot to PCT Assignment Tool where plot DL-61 was identified to have a first centroid match with PCT 3439 (see Appendix D (Vegetation survey data)).

Patches within the subject land had a canopy that included *Eucalyptus punctata,* often with *Corymbia maculata* and *Eucalyptus crebra*. The midstory included a mix of *Breynia oblongifolia, Bursaria spinosa,* and *Notelaea longifolia*. The ground layer was comprised of *Imperata cylindrica, Dichondra repens* and *Glycine clandestina*.

4.2.22.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3439.

4.2.22.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3439.

4.2.23 PCT 3444 – Lower Hunter Spotted Gum-Ironbark Forest

4.2.23.1 PCT overview

PCT 3444 – Lower Hunter Spotted Gum-Ironbark Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with a mid-stratum of dry and soft-leaved plants and a ground cover of grasses and graminoids that occurs primarily on coarser grained Permian sediments between the footslopes of the Sugarloaf Range and Broke, on undulating to hilly terrain in the lower Hunter valley to the west of Newcastle. The canopy is almost always comprised of ironbarks (*Eucalyptus fibrosa*, *Eucalyptus crebra* or *Eucalyptus fergusonii*) and *Corymbia maculata*. *Eucalyptus punctata* is occasionally present in localised areas. There is a sparse however diverse mid-stratum, which almost always includes 1 or more *Acacia* species, of which *Acacia parvipinnula* and *Acacia elongata* are the most frequent and abundant. In addition, *Bursaria spinosa* and *Daviesia ulicifolia* are very frequent. The mid-dense ground layer is characteristically grass-like however also includes hardy forbs, ferns and twiners. Species that occur very frequently are Entolasia stricta, *Lomandra filiformis*, *Pomax umbellata*, *Dianella revoluta*, *Lomandra multiflora* subsp. *multiflora*, *Aristida vagans*, *Cheilanthes sieberi* subsp. *sieberi*, *Lepidosperma laterale* and *Themeda triandra* (NSW DCCEEW 2024c).

This PCT typically occurs at elevations below 200 metres ASL in a hot, moist climate on Permian sediments, often with a moderately high quartz content. It has been heavily cleared however does occur in the reserves around Cessnock and in Belford National Park. Floristically and spatially, it grades into PCT 3433 which occurs in higher rainfall areas to the east and commonly includes mahogany species in its canopy, and to PCT 3443 which occurs in close proximity however is characterised by a suite of harder-leaved shrubs (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.46 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3444 during the field survey presented in Table 4.47.

Table 4.46 PCT 3444 – Lower Hunter Spotted Gum-Ironbark Forest

PCT ID	3444
PCT name	Lower Hunter Spotted Gum-Ironbark Forest
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	62.33
Extent within subject land (ha)	37.87 (1.21 ha in the Yengo IBRA subregion and 36.66 in the Hunter IBRA subregion)

Table 4.47 PCT 3444 – Lower Hunter Spotted Gum-Ironbark Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia parramattensis, Allocasuarina luehmannii, Allocasuarina torulosa, Callitris glaucophylla, Corymbia maculata,* Eucalyptus crebra, *Eucalyptus fibrosa, Eucalyptus moluccana, Eucalyptus punctata*
Shrubs	*Acacia cultriformis,* Acacia implexa, *Bursaria spinosa, Correa reflexa, Dodonaea viscosa subsp. angustifolia, Dodonaea sinuolata, Exocarpos strictus, Melaleuca nodosa, Melichrus urceolatus, Olearia elliptica, Persoonia linearis, Podolobium ilicifolium*
Ferns	*Cheilanthes distans, Cheilanthes sieberi*
Grass & grasslike	*Aristida vagans, Cymbopogon refractus, Digitaria parviflora,* Entolasia stricta, *Eragrostis brownii, Lepidosperma cf. laterale, Lomandra filiformis subsp. filiformis, Lomandra multiflora subsp. multiflora*
Forbs	*Brunoniella australis, Dianella prunina, Dianella revoluta, Dianella tasmanica,* Dichondra repens, Gonocarpus tetragynus, *Lobelia purpurascens,* Oxytes brachypoda, Pseuderanthemum variabile, *Solenogyne bellioides, Vernonia cinerea*
Other	*Cassytha glabella, Eustrephus latifolius, Glycine clandestina,* Glycine microphylla, Glycine tabacina, *Hardenbergia violacea, Muellerina eucalyptoides,* Parsonsia straminea, *Xanthorrhoea spp.*

4.2.23.2 Condition states

Within the subject land PCT 3444 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good
- Derived.

An example of PCT 3444 Mod-good is depicted in Photo 4.67 and Photo 4.68.



Photo 4.67 PCT 3444 in Mod-good condition



Photo 4.68 PCT 3444 in Mod-good condition

4.2.23.3 Justification of PCT selection

PCT 3444 is known to occur primarily on coarser grained Permian sediments between the footslopes of the Sugarloaf Range and Broke, on undulating to hilly terrain in the lower Hunter valley to the west of Newcastle.

PCT reference plots for PCT 3444 occur in close proximity to the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3444 has been identified to occur in the Central Hunter Footslopes and Foothills landscapes.

PCT 3444 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as PCT 3444.

The allocation of PCT 3444 relies on plots DL-43, DL-44, DL-62 and DL-70. These plots were run through the Plot to PCT Assignment Tool where they were identified to have a low distance to centroid values that suggests a strong match to PCT 3444 (see Appendix D (Vegetation survey data)).

The only plot that did not have a first centroid or low distance match was DL-43 where 3315 was the first match with PCT 3444 being the second match. This plot was allocated to PCT 3444 due to the presence of *Eucalyptus fibrosa* in the canopy.

Patches within the subject land had a canopy dominated by a mix of *Corymbia maculata, Eucalyptus fibrosa* and *Eucalyptus punctata*. The mid story often contained *Bursaria spinosa, Grevillea montana* and *Persoonia linearis*, with the ground layer dominated by either *Aristida vagans* or *Entolasia stricta*.

4.2.23.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3444 is part of the Lower Hunter Spotted Gum Ironbark Forests in the Sydney Basin and NSW North Coast Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.23.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3444.

4.2.24 PCT 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest

4.2.24.1 PCT overview

PCT 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with a mid-stratum of dry and soft-leaved species and a grassy ground cover on the foothills of the lower north coast and lower Hunter valley, from Quorrobolong to Stratford. The canopy very frequently includes *Corymbia maculata*, commonly with an ironbark (*Eucalyptus crebra* or *Eucalyptus siderophloia*), *Eucalyptus tereticornis* or *Eucalyptus moluccana*, which may be prominent in localised areas. The sparse mid-stratum commonly includes taller *Acacia* species, with *Acacia falcata* and *Acacia implexa* most frequently recorded. Smaller shrubs *Breynia oblongifolia*, *Leucopogon juniperinus*, *Notelaea longifolia* and *Persoonia linearis* are also common in the mid-stratum. The mid-dense ground layer is typically comprised of a diverse suite of grasses, soft-leaved forbs, twiners and a hardy fern. *Cymbopogon refractus*, *Lobelia purpurascens* and *Cheilanthes sieberi* subsp. *sieberi* are almost always present while *Themeda triandra*, *Microlaena stipoides*, *Dichondra repens*, *Lomandra multiflora* subsp. *multiflora* and *Glycine tabacina* are very frequent (NSW DCCEEW 2024c).

This PCT typically occurs on sedimentary (lithic sandstone, conglomerate, siltstone) and volcanic substrates (ignimbrites, tuffs) in a hot, moist climate, with most samples from elevations below 300 metres ASL but with scattered instances up to 600 metres ASL on northern Hunter valley slopes. It overlaps floristically with PCT 3329 which differs in that red gums are almost always present and *Corymbia maculata* and ironbarks are rare and it occurs on more fertile substrates on the floor of the rain shadow valleys of the lower north coast (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.48 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3446 during the field survey presented in Table 4.49.

Table 4.48 PCT 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest

PCT ID	3446
PCT name	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	74.93
Extent within subject land (ha)	1.37 (1.35 ha in the Yengo IBRA subregion and 0.02 in the Hunter IBRA subregion)

Table 4.49 PCT 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina littoralis, Corymbia maculata, Eucalyptus crebra, Eucalyptus punctata*
Shrubs	*Acrotriche divaricata, Correa reflexa, Exocarpos strictus, Melichrus urceolatus, Olearia elliptica*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida vagans, Cymbopogon refractus, Entolasia stricta, Eragrostis leptostachya, Microlaena stipoides*
Forbs	*Dichondra repens, Gonocarpus tetragynus,* Lobelia purpurascens, *Pomax umbellata, Pseuderanthemum variabile*
Other	*Glycine clandestina, Glycine latifolia, Glycine tabacina, Hardenbergia violacea, Macrozamia communis*

4.2.24.2 Condition states

Within the subject land PCT 3446 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3446 Mod-good is depicted in Photo 4.69 and Photo 4.70.



Photo 4.69 PCT 3446 in Mod-good condition



Photo 4.70 PCT 3446 in Mod-good condition

4.2.24.3 Justification of PCT selection

PCT 3446 is known to occur on the foothills of the lower north coast and lower Hunter valley, from Quorrobolong to Stratford.

PCT reference plots for PCT 3446 occur in close proximity to the subject land with the PCT known to occur in the Wyong, Yengo and Hunter IBRA subregions. Within the subject land, PCT 3446 has been identified to occur along the foothills in the Singleton Military Area, in the Hunter Valley.

PCT 3446 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3438.

The allocation of PCT 3446 relies on plots DL-39. These plots were run through the Plot to PCT Assignment Tool where it was identified to have a low distance to centroid value (0.683) that suggests a strong match to PCT 3446 (see Appendix D (Vegetation survey data)).

Patches within the subject land had a canopy of *Corymbia maculata* and *Eucalyptus crebra*, with *Allocasuarina littoralis* also present. The sparse shrub layer often contained *Acacia implexa, Breynia oblongifolia* and *Persoonia linearis*. The mid-dense ground layer often contained *Cymbopogon refractus*, *Entolasia stricta* and *Aristida vagans*, with *Cheilanthes sieberi* and *Dichondra repens* present at a lower abundance.

4.2.24.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3446 is part of the Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.24.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3446 is part of the Central Hunter Valley eucalypt forest and woodland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.25 PCT 3489 – Hunter Escarpment Grey Box Forest

4.2.25.1 PCT overview

PCT 3489 – Hunter Escarpment Grey Box Forest is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with a diverse mid-stratum of a soft-leaved species and a ground cover of grasses and graminoids on moderately fertile soils on the steep escarpment slopes of the southern Hunter valley to the west of Newcastle, from Broke through the northern part of Wollemi National Park to Bylong. The canopy almost always includes box eucalypts (*Eucalyptus moluccana*, *Eucalyptus albens*), commonly associated with *Eucalyptus punctata* and ironbarks (*Eucalyptus sideroxylon*, *Eucalyptus caleyi* or *Eucalyptus fergusonii*). A shrub to small tree layer is prominent and almost always includes *Olearia elliptica* subsp. *elliptica*, *Bursaria spinosa* and 1 of more *Acacia* species, of which *Acacia parvipinnula* is the most frequent and abundant. *Choretrum* sp. A is very frequent and *Melichrus urceolatus*, *Pimelea latifolia* subsp. *elliptifolia*, *Breynia oblongifolia*, *Denhamia silvestris* and *Macrozamia communis* are all common. The ground layer is typically comprised of graminoids, forbs, vines and a hardy fern, with *Cheilanthes sieberi* subsp. *sieberi*, *Dichondra repens*, *Cymbopogon refractus*, *Gahnia aspera* and *Aristida vagans* all very frequent. Common ground covers include *Clematis glycinoides*, *Lomandra confertifolia*, *Microlaena stipoides*, *Brunoniella australis*, *Plantago debilis*, *Aristida ramosa* and *Lepidosperma gunnii* (NSW DCCEEW 2024c).

This PCT occurs either on Triassic sandstone or the underlying Permian sandstones, siltstones and mudstones. It is typically found in sheltered locations in a warm, dry climate with a mean annual of rainfall of less than 790 millimetres. This PCT has been subject to some clearing on the gentle grades of the escarpment footslopes, while occurrences on steeper slopes are mostly in reserves. This PCT grades into PCT 3438 on lower slopes at the eastern end of its distribution, which differs in that *Eucalyptus crebra* is very frequent, *Allocasuarina luehmannii* is common and *Eucalyptus moluccana* is rare (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in Table 4.50 with detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3489 during the field survey presented in Table 4.51.

Table 4.50 PCT 3489 – Hunter Escarpment Grey Box Forest

PCT ID	3489
PCT name	Hunter Escarpment Grey Box Forest
Vegetation formation	KF_CH5A Dry Sclerophyll Forests (shrub/grass sub-formation)
Vegetation class	Central Gorge Dry Sclerophyll Forests
Per cent cleared value (%)	1.5
Extent within subject land (ha)	5.67 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.51 PCT 3489 – Hunter Escarpment Grey Box Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia linearifolia, Allocasuarina torulosa, Eucalyptus moluccana*
Shrubs	*Breynia oblongifolia, Melichrus urceolatus, Phyllanthus gunnii*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Cymbopogon refractus, Cyperus gracilis, Themeda triandra*
Forbs	*Asperula conferta, Dichondra repens, Lobelia purpurascens*
Other	*Glycine clandestina, Glycine latifolia, Glycine microphylla*

4.2.25.2 Condition states

Within the subject land PCT 3489 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3489 Mod-good is depicted in Photo 4.71 and Photo 4.72.



Photo 4.71 PCT 3489 in Mod-good condition



Photo 4.72 PCT 3489 in Mod-good condition

4.2.25.3 Justification of PCT selection

PCT 3489 is known to occur on moderately fertile soils on the steep escarpment slopes of the southern Hunter valley to the west of Newcastle, from Broke through the northern part of Wollemi National Park to Bylong.

PCT reference plots for PCT 3489 occur in close proximity and to the west of the subject land with the PCT known to occur in the Yengo and Hunter IBRA subregions.

PCT 3489 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as either PCT 3489 or 3605.

The allocation of PCT 3489 relies on plot DL-31. This plot was run through the Plot to PCT Assignment Tool where it was identified to not have a centroid match with PCT 3489 (see Appendix D (Vegetation survey data)).

All 5 centroid matches for this plot were greater than 0.695 with high distance to centroid values. Of the PCTs identified 3319, 3264, 3484 and 3320 all do not occur in any of the IBRA subregions that the subject land resides in.

PCT 3446 was considered for this vegetation patch however the canopy in this plot was dominated by *Eucalyptus moluccana*, with the ironbark *E. crebra* also present. The mid story frequently included *Breynia oblongifolia, Bursaria spinosa* and *Melichrus urceolatus*, with the ground layer mainly consisting of *Themeda triandra* and *Cymbopogon refractus*. PCT 3439 can also grade into PCT 3438 on lower slopes at the eastern end of its distribution, which differs in that *Eucalyptus crebra* is very frequent, *Allocasuarina luehmannii* is common and *Eucalyptus moluccana* is rare, which isn't the case in DL-31.

Patches within the subject land usually were dominated by *Eucalyptus moluccana,* with *Eucalyptus punctata* and *Eucalyptus crebra* also present. The mid story often included *Bursaria spinosa, Acacia linearifolia, Breynia oblongifolia* and *Melichrus urceolatus*, with the ground layer often containing *Cymbopogon refractus* and *Themeda triandra*.

4.2.25.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, there is no BC Act listed TEC associated with PCT 3489.

4.2.25.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, there is no EPBC Act listed TEC associated with PCT 3489.

4.2.26 PCT 3581 – Hunter Coast Foothills Apple Forest

4.2.26.1 PCT overview

PCT 3581 – Hunter Coast Foothills Apple Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with dry shrub layer and a grassy ground cover mainly found on enriched sedimentary hills and rises on the coastal plains between Gosford and Wallis Lake on the Lower North and Hunter coasts. The tree canopy almost always includes a high cover of *Angophora costata*, very frequently with *Corymbia gummifera* and commonly *Eucalyptus piperita*. Occasionally other eucalypts may be associated with or replace these species including *Eucalyptus umbra* or *Eucalyptus pilularis*. The mid-stratum is layered with a very frequent tall sparse layer of *Allocasuarina littoralis* or *Allocasuarina torulosa*. Lower dry shrubs are also typically sparse with *Persoonia linearis*, *Podolobium ilicifolium* commonly recorded, occasionally with *Persoonia levis*, *Breynia oblongifolia*, *Leptospermum polygalifolium* or a range of *Acacia spp* (NSW DCCEEW 2024c).

The ground layer is mid-dense to dense and is comprised of grasses of which *Entolasia stricta*, *Themeda australis* and *Imperata cylindrica* are the most frequently recorded. Graminoid species are also very frequent and add to the grass like appearance of the ground layer. *Dianella caerulea*, *Lepidosperma laterale* and *Lomandra longifolia* are the most common examples. The fern *Pteridium esculentum* is almost always present however generally a low cover. Very common on Narrabeen sandstone, including a southern outlier in Pittwater and extending north through Kincumber, Gosford and western Lake Macquarie and the foothills of the Watagan Escarpment. Mainly occurs below 160 metres ASL, however may reach over 350 metres on highest peaks. Found on Permian sandstones north and northeast of Lake Macquarie, Carboniferous sandstone in the Medowie and Karuah districts and a small area on Nerong Volcanics either side of the Karuah River. This PCT grades into PCT 3582 and PCT 3583 with declining soil fertility and elevation and into PCT 3432 with increased soil fertility (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.52. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3581 during the field survey presented in Table 4.53.

Table 4.52 PCT 3581 – Hunter Coast Foothills Apple Forest

PCT ID	3581
PCT name	Hunter Coast Foothills Apple Forest
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Coastal Dry Sclerophyll Forests
Per cent cleared value (%)	26.09
Extent within subject land (ha)	0.67 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.53 PCT 3581 – Hunter Coast Foothills Apple Forest – Benchmark

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Corymbia gummifera, Eucalyptus pilularis*
Shrubs	*Acacia floribunda, Acacia ulicifolia, Persoonia linearis, Pimelea linifolia, Rubus parvifolius*
Ferns	*Cheilanthes sieberi, Lindsaea microphylla, Pteridium esculentum*
Grass & grasslike	*Imperata cylindrica, Lomandra longifolia, Themeda triandra*
Forbs	*Dianella caerulea, Goodenia heterophylla, Hybanthus monopetalus, Oxalis perennans, Pomax umbellata, Pseuderanthemum variabile*
Other	*Glycine clandestina, Hibbertia dentata, Hibbertia scandens, Smilax australis, Xanthorrhoea spp.*

4.2.26.2 Condition states

Within the subject land PCT 3581 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3581 Mod-good is depicted in Photo 4.73 and Photo 4.74.



Photo 4.73 PCT 3581 in Mod-good condition



Photo 4.74 PCT 3581 in Mod-good condition

4.2.26.3 Justification of PCT selection

PCT 3581 is known to occur on enriched sedimentary hills and rises on the coastal plains between Gosford and Wallis Lake on the Lower North and Hunter coasts.

PCT reference plots for PCT 3581 occur within and to the east of the subject land, with the PCT known to occur in the Wyong and Hunter IBRA subregions. Within the subject land, PCT 3581 has been identified to occur along the enriched sedimentary hills in Jilliby State Conservation Area.

PCT 3581 within the subject land is restricted to the Wyong IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3581.

The allocation of PCT 3581 relies on plot TC-16. This plot was run through the Plot to PCT Assignment Tool where it was identified to have a low distance to centroid value (0.636) that suggests a strong match to PCT 3581 (see Appendix D (Vegetation survey data)).

Patches within the subject land had a canopy often dominated by *Angophora costata,* often with *Corymbia gummifera* and *Eucalyptus pilularis* also present within the canopy. *Allocasuarina torulosa* was also present as a small tree, with *Acacia floribunda, Polyscias sambucifolia, Persoonia linearis* and *Breynia oblongifolia* present in the shrub layer. The ground layer usually consisted of *Imperata cylindrica, Lomandra longifolia, Themeda triandra, Dianella caerulea* and *Pteridium esculentum* in most patches.

4.2.26.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database PCT 3581 relates to the NSW Kincumber Scribbly Gum Forest TEC where it occurs within Gosford LGA (LGA boundary as at date of Final Determination) mainly in the area defined by Bell 2004 (Unit E102) as per paragraph 6 of the Final Determination, and/or includes the constituent canopy eucalypts as per paragraph 4.

No part of the subject land occurs within the former Gosford LGA (now part of the amalgamated Central Coast LGA) and as such NSW Kincumber Scribbly Gum Forest TEC does not correspond to PCT 3581 within the subject land.

4.2.26.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3581.

4.2.27 PCT 3599 – Blue Mountains Peppermint Shrub Forest

4.2.27.1 PCT overview

PCT 3599 – Blue Mountains Peppermint Shrub Forest is described in the BioNet Vegetation Classification Database as a tall to very tall dry shrubby sclerophyll open forest found on Narrabeen sandstone ridges with deeper soils and on slopes with exposed to intermediate aspects of the Wollemi plateau and Hunter Range. Southern outliers occur on colluvial gorge slopes of the Grose and Jamison valleys in the Blue Mountains National Park where sandstone talus overlies Permian strata. The tree canopy very frequently includes *Eucalyptus piperita* with a high foliage cover commonly in association with *Angophora costata*, *Eucalyptus sparsifolia* or *Syncarpia glomulifera*. Other occasional eucalypt species include *Eucalyptus punctata* and *Corymbia gummifera*. A dry shrub layer of variable cover is consistently recorded and almost always includes *Persoonia linearis*, *Lomatia silaifolia* and *Podolobium ilicifolium*, and on the Wollemi plateau commonly with *Gompholobium latifolium* and *Acacia terminalis*. The ground layer is typically sparse with a very frequent low cover of the grass *Entolasia stricta*, graminoids *Dianella caerulea*, *Lomandra obliqua*, *Lomandra filiformis* and *Patersonia glabrata* and the fern *Pteridium esculentum* (NSW DCCEEW 2024c).

This PCT is extensive across the broad flat ridges and upper slopes of central and eastern Wollemi National Park, an area that includes a low cover of rock outcropping. An eastern outlier also occurs on the highest ridgelines of Corrabare State Forest east of Wollombi in the lower Hunter valley region. It grades into heathy lower woodlands found on shallower rocky soils PCT 3627 and taller shrub forests PCTs 3695 or 3606 on sheltered slopes (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.54. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3599 during the field survey presented in Table 4.55.

Table 4.54 PCT 3599 – Blue Mountains Peppermint Shrub Forest

PCT ID	3599
PCT name	Blue Mountains Peppermint Shrub Forest
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Per cent cleared value (%)	0.2
Extent within subject land (ha)	7.24 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.55 PCT 3599 – Blue Mountains Peppermint Shrub Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia difformis, Allocasuarina torulosa, Angophora costata, Eucalyptus piperita, Eucalyptus scias, Syncarpia glomulifera*
Shrubs	*Acacia parvipinnula, Acacia terminalis subsp. angustifolia, Diospyros australis, Ozothamnus diosmifolius, Pimelea ligustrina, Podolobium ilicifolium*
Ferns	*Pteridium esculentum*
Grass & grasslike	*Entolasia stricta, Lomandra obliqua*
Forbs	*Actinotus helianthi, Goodenia heterophylla, Pomax umbellata, Xanthosia pilosa*
Other	*Billardiera scandens, Cassytha pubescens, Hardenbergia violacea, Xanthorrhoea arborea*

4.2.27.2 Condition states

Within the subject land PCT 3599 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3599 Mod-good is depicted in Photo 4.75 and Photo 4.76.



Photo 4.75 PCT 3599 in Mod-good condition



Photo 4.76 PCT 3599 in Mod-good condition

4.2.27.3 Justification of PCT selection

PCT 3599 is known to occur on Narrabeen sandstone ridges with deeper soils and on slopes with exposed to intermediate aspects of the Wollemi plateau and Hunter Range.

PCT reference plots for PCT 3599 occur in close proximity to the subject land with the PCT known to occur in the Yengo IBRA subregion. Within the subject land, PCT 3599 has been identified to occur on the Narrabeen sandstone ridgelines within Corrabare State Forest.

PCT 3599 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as 3599.

The allocation of PCT 3599 relies on plot TC-05. This plot was run through the Plot to PCT Assignment Tool where it was identified to have centroid matches with PCT 3599 (see Appendix D (Vegetation survey data)).

Plot TC-17 carried a greater centroid match to PCT 3617 than it did for PCT 3599, with both being floristically similar. While the species in this plot could be representative of either of these PCTs, the exposed slope that TC-17 resides on is more characteristic of PCT 3599, than the more sheltered slopes of PCT 3617. Furthermore, reference plots for PCT 3599 are significantly closer to TC-17 than are reference plots for PCT 3617.

Patches within the subject land usually had *Angophora costata*, *Eucalyptus piperita* and *Syncarpia glomulifera*, with *Eucalyptus sparsifolia* present in some patches. The mid story was dominated by *Acacia terminalis*, with *Podolobium ilicifolium* and *Persoonia linearis* usually present. The ground layer usually consisted of a low cover of *Entolasia stricta*, *Lomandra obliqua* and *Pteridium esculentum*.

4.2.27.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3599.

4.2.27.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3599.

4.2.28 PCT 3605 – Hunter Range Ironbark Forest

4.2.28.1 PCT overview

PCT 3605 – Hunter Range Ironbark Forest is described in the BioNet Vegetation Classification Database as a tall to very tall sclerophyll open forest with a dry shrubby mid-stratum and a ground cover of grasses and graminoids found on transitional Narrabeen formation shale-sandstone soils on crests and exposed slopes across the Hunter Range, northern Sydney Basin. The canopy includes a mix of species although collectively it very frequently includes ironbarks (*Eucalyptus crebra*, *Eucalyptus fibrosa* and *Eucalyptus beyeriana*), stringybarks (*Eucalyptus sparsifolia* and *Eucalyptus prominula*) and grey gum (*Eucalyptus punctata*) with Angophora costata also occasionally recorded. The sparse to mid-dense mid-stratum almost always includes Persoonia linearis, very frequently *Podolobium ilicifolium*, *commonly Acacia parvipinnula*, *Exocarpos strictus* and occasionally *Allocasuarina torulosa*, *Jacksonia scoparia* and Bursaria spinosa. The sparse to mid-dense ground layer has a grass-like appearance and consists of grasses and graminoids that very frequently include *Themeda triandra*, *Entolasia stricta* and *Microlaena stipoides*, *Dianella revoluta* and *Lepidosperma laterale* (NSW DCCEEW 2024c).

This PCT is distributed extensively across the Hunter Range between Doyles Range in Wollemi National Park, Putty area, northern Yengo National Park and east to Pokolbin and Corrabare State forests. It is limited to exposed Narrabeen sandstone gorge slopes in the southern part of its range. This PCT has moderate floristic overlap with other shrub grass forests across the warm temperatures and moderate rainfall of the Sydney hinterland plateau. These include dry shrub forests PCT 3239 and PCT 3444 in the Hunter River catchment and on the margins of the Cumberland Plain PCT 3321 (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.56. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3605 during the field survey presented in Table 4.57.

Table 4.56 PCT 3605 – Hunter Range Ironbark Forest

PCT ID	3605
PCT name	Hunter Range Ironbark Forest
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Per cent cleared value (%)	1.93
Extent within subject land (ha)	57.10 (within the subject land this PCT is restricted to the Yengo IBRA subregion)

Table 4.57 PCT 3605 – Hunter Range Ironbark Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia parramattensis, Allocasuarina torulosa, Angophora euryphylla, Corymbia maculata, Eucalyptus agglomerata, Eucalyptus globoidea, Eucalyptus punctata, Eucalyptus racemosa, Eucalyptus sparsifolia*
Shrubs	*Acacia parvipinnula, Bursaria spinosa, Daviesia ulicifolia, Exocarpos strictus, Grevillea spp., Persoonia linearis, Platysace lanceolata, Podolobium ilicifolium, Polyscias sambucifolia*
Ferns	*Blechnum nudum, Lindsaea microphylla, Pteridium esculentum*
Grass & grasslike	*Austrostipa pubescens, Entolasia marginata, Entolasia stricta, Lepidosperma laterale, Lomandra longifolia, Lomandra obliqua, Microlaena stipoides, Panicum simile, Poa labillardierei var. labillardierei*
Forbs	*Dianella caerulea, Dianella longifolia, Dianella revoluta, Goodenia heterophylla, Goodenia rotundifolia, Plectranthus parviflorus, Pomax umbellata*
Other	*Billardiera scandens, Desmodium spp., Geitonoplesium cymosum, Glycine clandestina, Hardenbergia violacea, Kennedia rubicunda, Macrozamia communis, Pandorea pandorana, Smilax australis*

4.2.28.2 Condition states

Within the subject land PCT 3605 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3605 Mod-good is depicted in Photo 4.77 and Photo 4.78.



Photo 4.77 PCT 3605 in Mod-good condition



Photo 4.78 PCT 3605 in Mod-good condition

4.2.28.3 Justification of PCT selection

PCT 3605 is known to occur on transitional Narrabeen formation shale-sandstone soils on crests and exposed slopes across the Hunter Range, northern Sydney Basin.

PCT reference plots for PCT 3605 occur in close proximity to the subject land with the PCT known to occur in both the Yengo and Hunter IBRA subregions. Within the subject land, PCT 3605 has been identified to occur on Narrabeen sandstone soils on crests and slopes.

PCT 3605 within the subject land is restricted to the Yengo IBRA subregion and occurs in areas mostly mapped by SVTM as 3605.

The allocation of PCT 3605 relies on plots DL-04, DL-21, DL-22, HTP-MS-15 and HTP-MS-26. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 3605 (see Appendix D (Vegetation survey data)).

DL-04 had a higher centroid match with PCT 3604 than it did with PCT 3605, which have a moderate floristic overlap with each other. While the canopies of these PCTs are difficult to differentiate, the mid-story in DL-04 was more representative of PCT 3605 than it was of PCT 3604. This mid-story included *Acacia parvipinnula, Exocarpus strictus* and *Podolobium ilicifolium*, with the ground layer consisting of a mix of *Dianella longifolia, Entolasia stricta* and *Lepidosperma laterale*.

DL-21 had a higher centroid match with PCT 3239 than it did with PCT 3605, which have a moderate floristic overlap with each other, with PCT 3605 being more prevalent on more exposed crests and slopes. DL-21 is located along an exposed slope in Pokolbin State Forest, with a canopy dominated by *Eucalyptus sparsifolia*, which is more representative of PCT 3605 than PCT 3239, which is found on more sheltered slopes with either *E. punctata* or *Syncarpia glomulifera* dominant in the canopy.

HTP-MS-15 had a higher centroid match with PCT 4158 than it did with PCT 3605. The canopy of HTP-MS-15 mainly consisted of *Eucalyptus sparsifolia, Eucalyptus punctata* and *Angophora costata*, which is more characteristic of PCT 3605 than PCT 4158, which frequently consists of *Eucalyptus calidissima* and *Corymbia maculata*.

HTP-MS-26 had a higher centroid match with PCT 3239 than it did with PCT 3605, which have a moderate floristic overlap with each other, with PCT 3605 being more prevalent on more exposed crests and slopes. Since HTP-MS-26 is located along an exposed slope in Corrabare State Forest and is dominated by a stringybark (*E. agglomerata*), its likely that this plot is more representative of PCT 3605 than it is of PCT 3239, which is found on more sheltered slopes with either *E. punctata* or *Syncarpia glomulifera* dominant in the canopy.

Patches within the subject land usually had *Eucalyptus crebra, Eucalyptus sparsifolia, Eucalyptus punctata* and *Angophora costata* within the canopy. The mid story often contained *Acacia parvipinnula, Allocasuarina torulosa, Persoonia linearis* and *Podolobium ilicifolium*. The ground layer was usually dominated by *Entolasia stricta*.

4.2.28.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3605.

4.2.28.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3605.

4.2.29 PCT 3617 – Sydney Hinterland Peppermint-Apple Forest

4.2.29.1 PCT overview

PCT 3617 – Sydney Hinterland Peppermint-Apple Forest is described in the BioNet Vegetation Classification Database as a tall to very tall dry shrubby sclerophyll open forest found on slopes and occasionally crests across the lower to mid-elevation Hawkesbury Sandstone plateaus of the lower Blue Mountains and north and northwestern Sydney. The tree canopy almost always includes a high cover of *Eucalyptus piperita* and *Angophora costata* with *Corymbia gummifera* and *Syncarpia glomulifera* recorded less frequently. The sparse to mid-dense shrub layer consists of heath and dry shrub species that very frequently include *Banksia spinulosa*, *Leptospermum trinervium*, *Persoonia levis* and the lower growing *Platysace linearifolia* and *Lomatia silaifolia*. The ground layer is comprised of a sparse to mid-dense cover of ferns, forbs and grasses, commonly including Entolasia stricta, *Pteridium esculentum*, *Lomandra obliqua* and *Phyllanthus hirtellus* (NSW DCCEEW 2024c).

This PCT is extensively distributed and occurs in a wide environmental range at elevations of 60–560 metres ASL and with 840–1320 millimetres mean annual rainfall. Typically, it occupies dry slopes often broken by sandstone benches and outcrops, however it also occasionally occurs on deeper sandy soils found on crests and saddles. Disjunct and localised outliers occur on residual Hawkesbury Sandstone outcropping on the Hunter Range and east to Corrabare State Forest. This community grades into PCT 3621 with increasing shelter and is characterised by more frequent and abundant hardy mesic shrubs and climbers and soft ferns (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.58. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3617 during the field survey presented in Table 4.59.

Table 4.58 PCT 3617 – Sydney Hinterland Peppermint-Apple Forest

PCT ID	3617
PCT name	Sydney Hinterland Peppermint-Apple Forest
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Per cent cleared value (%)	2.13
Extent within subject land (ha)	35.56 (33.65 ha in the Wyong IBRA subregion and 1.91 in the Yengo IBRA subregion)

Table 4.59 PCT 3617 – Sydney Hinterland Peppermint-Apple Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Allocasuarina torulosa, Angophora costata, Angophora euryphylla, Banksia serrata, Corymbia gummifera, Eucalyptus piperita, Eucalyptus sieberi, Eucalyptus sparsifolia, Syncarpia glomulifera*
Shrubs	*Acacia longifolia, Acrotriche divaricate, Banksia spinulosa, Leucopogon lanceolatus, Lomatia silaifolia, Persoonia levis, Persoonia linearis, Platysace lanceolata, Polyscias sambucifolia, Zieria smithii*
Ferns	*Adiantum spp., Blechnum nudum, Cheilanthes sieberi, Lindsaea linearis,* Lindsaea microphylla, *Pteridium esculentum, Schizaea bifida*
Grass & grasslike	*Caustis flexuosa, Cyathochaeta diandra, Entolasia stricta, Lepidosperma laterale, Lomandra longifolia, Microlaena stipoides, Oplismenus aemulus, Panicum simile, Poa labillardierei var. labillardierei*
Forbs	*Chiloglottis reflexa, Dampiera stricta, Dianella caerulea,* Dichondra repens, *Goodenia heterophylla, Patersonia glabrata, Plectranthus parviflorus, Viola sieberiana*
Other	*Cassytha glabella, Desmodium spp., Hardenbergia violacea, Hibbertia dentata, Hibbertia scandens, Macrozamia communis, Smilax australis, Xanthorrhoea latifolia, Xanthorrhoea resinosa*

4.2.29.2 Condition states

Within the subject land PCT 3617 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3617 Mod-good is depicted in Photo 4.79 and Photo 4.80.



Photo 4.79 PCT 3617 in Mod-good condition



Photo 4.80 PCT 3617 in Mod-good condition

4.2.29.3 Justification of PCT selection

PCT 3617 is known to occur on slopes and occasionally crests across the lower to mid-elevation Hawkesbury Sandstone plateaus of the lower Blue Mountains and north and northwestern Sydney. Disjunct and localised outliers occur on residual Hawkesbury Sandstone outcropping on the Hunter Range and east to Corrabare State Forest.

PCT reference plots for PCT 3617 occur to east and west of the subject land with the PCT known to occur in both the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3617 has been identified to occur on Hawkesbury Sandstone in the Wyong IBRA subregion and Narrabeen Sandstone in the Yengo IBRA subregion.

PCT 3617 within the subject land is restricted to the Wyong and Yengo IBRA subregions and occurs in areas mostly mapped by SVTM as mostly PCT 0 and PCT 3176 in the Wyong IBRA subregion, and mostly PCT 3617 and PCT 3599 in the Yengo IBRA subregion.

The allocation of PCT 3617 relies on plots HTP-MS-65, LCSM-05, LCSM-06, TC-18 and TS-04. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 3617 (see Appendix D).

LCSM-06 had a higher centroid match with PCT 3589 than it did with PCT 3617 however PCT 3589 doesn't occur in any of the IBRA subregions that the subject land resides in.

HTP-MS-65 had a higher centroid match with PCT 3598 than it did with PCT 3617 however PCT 3598 doesn't occur in any of the IBRA subregions that the subject land resides in.

TC-18 had no close centroid matches for PCT 3617 however this plot occurs on sandy soils near a crest in Corrabare State Forest. Its canopy is consistent with PCT 3617, with a high canopy cover of *Angophora costata* and *Eucalyptus piperita*, with *Syncarpia glomulifera* also present. The mid-story consisted of characteristic species that included *Banksia spinulosa, Platysace linearifolia* and *Lomatia silaifolia*, with the ground layer consisting of *Entolasia stricta, Pteridium esculentum* and *Lomandra obliqua*.

Patches within the subject land usually had a dominant cover of *Eucalyptus piperita*, with *Corymbia gummifera* and *Syncarpia glomulifera* also present in the canopy. The midstory often contained *Banksia spinulosa, Persoonia levis* and *Platysace linearifolia,* with the groundcovers *Entolasia stricta, Dampiera purpurea* and *Pteridium esculentum* usually present.

4.2.29.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3617.

4.2.29.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3617.

4.2.30 PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest

4.2.30.1 PCT overview

PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest is described in the BioNet Vegetation Classification Database as a tall to very tall shrubby sclerophyll open forest mainly occupying steep sheltered Hawkesbury Sandstone slopes and gullies on the Sydney hinterland plateaus. The tree canopy very frequently includes a high cover of *Angophora costata* and *Syncarpia glomulifera* with *Eucalyptus piperita* also common. A sparse tall layer of small trees very frequently includes *Elaeocarpus reticulatus*, *Allocasuarina torulosa* and *Ceratopetalum gummiferum*. The mid-dense shrub layer very frequently includes *Persoonia linearis* and *Lomatia silaifolia* with *Gompholobium latifolium*, *Pultenaea flexilis* and *Xanthorrhoea arborea* also common. The ground cover is strongly characterised by the ferns *Pteridium esculentum*, *Calochlaena dubia*, *Lindsaea microphylla* and occasionally *Blechnum cartilagineum*. Twiners and climbers are also very frequently recorded with *Smilax glyciphylla*, *Billardiera scandens* and *Pandorea pandorana* found in descending order of frequency (NSW DCCEEW 2024c).

This PCT occupies similar environmental attributes to PCT 3620 however is more common at higher elevations of above 350 metres ASL and is generally found in more incised and sheltered topographic positions. Both PCTs can be recorded near one another and attentiveness to the understorey attributes are most helpful in distinguishing them. This community extends from the lower and mid-elevations of the Lower Blue Mountains north to the Hawkesbury and Colo plateaus, Yengo National Park and east to the Watagan Ranges in the Central Coast (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.60. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3621 during the field survey presented in Table 4.61.

Table 4.60 PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest

PCT ID	3621
PCT name	Sydney Hinterland Turpentine-Apple Gully Forest
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Per cent cleared value (%)	3.46
Extent within subject land (ha)	4.86 (within the subject land this PCT is restricted to the Wyong IBRA subregion)

Table 4.61 PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Corymbia gummifera, Eucalyptus piperita, Syncarpia glomulifera*
Shrubs	*Acacia ulicifolia, Acrotriche divaricata,* Amperea xiphoclada, *Banksia marginata, Elaeocarpus reticulatus*
Ferns	*Lindsaea linearis, Pteridium esculentum*
Grass & grasslike	*Caustis flexuosa, Entolasia marginata, Entolasia stricta, Lepyrodia scariosa, Lomandra longifolia*
Forbs	*Dampiera purpurea, Dianella caerulea, Logania pusilla, Polygalaceae indeterminate, Pseuderanthemum variabile, Viola silicestris*
Other	*Cassytha glabella, Hibbertia dentata, Parsonsia straminea, Smilax australis, Smilax glyciphylla, Xanthorrhoea glauca*

4.2.30.2 Condition states

Within the subject land PCT 3621 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 3621 Mod-good is depicted in Photo 4.81 and Photo 4.82.



Photo 4.81 PCT 3621 in Mod-good condition



Photo 4.82 PCT 3621 in Mod-good condition

4.2.30.3 Justification of PCT selection

PCT 3621 is known to mainly occupy steep sheltered Hawkesbury Sandstone slopes and gullies on the Sydney hinterland plateaus. This community extends from the lower and mid-elevations of the Lower Blue Mountains north to the Hawkesbury and Colo plateaus, Yengo National Park and east to the Watagan Ranges in the Central Coast.

PCT reference plots for PCT 3621 occur to the west of the subject land with the PCT known to occur in both the Wyong and Yengo IBRA subregions. Within the subject land, PCT 3621 has been identified to occur on Hawkesbury Sandstone slopes within the Olney State Forest.

PCT 3621 within the subject land is restricted to the Wyong IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 0. The allocation of PCT 0 this area is likely due to the historic forestry operations that have occurred in the areas that these patches reside in.

The allocation of PCT 3621 relies on plots LCSM-04, LCSM-07 and LCSM-10. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 3621 (see Appendix D (Vegetation survey data)).

LCSM-07 did have a higher centroid match with PCT 3589 than it did with PCT 3621 however this PCT doesn't occur within the IBRA subregions that the subject land resides in. The second centroid match for this plot was PCT 3621 that occurs with a low distance centroid value less than 0.695.

Patches within the subject land were dominated by *Syncarpia glomulifera* and *Eucalyptus piperita*, with *Corymbia gummifera* often present in the canopy. The mid story often included *Allocasuarina torulosa*, *Elaeocarpus reticulatus* and *Persoonia linearis*, with *Pteridium esculentum* present throughout these patches.

4.2.30.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 3621.

4.2.30.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 3621.

4.2.31 PCT 3636 – Warkworth Sands Woodland

4.2.31.1 PCT overview

PCT 3636 – Warkworth Sands Woodland is described in the BioNet Vegetation Classification Database as a tall sclerophyll open forest with a Banksia and bracken prominent in the small tree and ground strata that is restricted to Quaternary sands (possibly alluvial terrace deposits), adjacent to Wollombi Brook at Warkworth in the central Hunter valley. The canopy almost always includes *Angophora floribunda* with a high cover, occasionally with red gum eucalypts (*Eucalyptus tereticornis* or *Eucalyptus blakelyi*). A sparse mid layer of smaller trees very frequently includes *Banksia integrifolia*, *Acacia* species (most frequently *Acacia filicifolia*) and occasional, scattered *Allocasuarina luehmannii*. The sparse shrub layer very frequently includes *Pimelea linifolia*, *Breynia oblongifolia* and *Hibbertia linearis*. The mid-dense ground layer is typically comprised of grasses, graminoids, twiners and a hardy fern. A high cover of *Pteridium esculentum* with more patchy *Microlaena stipoides*, *Glycine clandestina* and either *Lomandra multiflora* subsp. *multiflora* or *Lomandra longifolia* are very frequent. This PCT is floristically distinct from all other PCTs in eastern New South Wales (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.62. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 3636 during the field survey presented in Table 4.63.

Table 4.62 PCT 3636 – Warkworth Sands Woodland

PCT ID	3636
PCT name	Warkworth Sands Woodland
Vegetation formation	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Sand Flats Dry Sclerophyll Forests
Per cent cleared value (%)	61.44
Extent within subject land (ha)	22.08 (within the subject land this PCT is restricted to the Hunter IBRA subregion and comprises of 7.51 ha of thinned condition and 14.57 ha of disturbed grassland condition)

Table 4.63 PCT 3636 – Warkworth Sands Woodland diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Acacia salicina, Allocasuarina luehmannii, Angophora floribunda, Eucalyptus crebra*
Shrubs	*Acacia amblygona, Acacia falcata, Breynia oblongifolia, Hibbertia diffusa,* Maireana microphylla, *Pomaderris spp.*
Ferns	*Cheilanthes distans, Cheilanthes sieberi*
Grass & grasslike	*Aristida calycina, Aristida ramosa, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Echinopogon caespitosus, Enteropogon acicularis, Lachnagrostis filiformis, Microlaena stipoides var. stipoides, Sporobolus creber*
Forbs	*Calotis lappulacea, Chrysocephalum semipapposum, Einadia hastata,* Einadia nutans subsp. linifolia, *Goodenia rotundifolia, Laxmannia gracilis,* Murdannia graminea, Oxalis radicosa, Phyllanthus virgatus, Plantago varia, *Veronica plebeia,* Wahlenbergia communis, *Wahlenbergia gracilis*
Other	*Glycine clandestina, Glycine tabacina, Grona varians*

4.2.31.2 Condition states

Within the subject land PCT 3636 is present in the following broad condition states (equivalent to vegetation zones):

- Thinned
- Disturbed grassland.

An example of PCT 3636 Thinned is depicted in Photo 4.83 and Photo 4.84.



Photo 4.83 PCT 3636 in Thinned condition



Photo 4.84 PCT 3636 in Thinned condition

4.2.31.3 Justification of PCT selection

PCT 3636 is known to occur on is restricted to Quaternary sands (possibly alluvial terrace deposits), adjacent to Wollombi Brook at Warkworth in the central Hunter valley.

PCT reference plots for PCT 3636 occur in close proximity to the subject land with the PCT being restricted to the Hunter IBRA subregion. Within the subject land, PCT 3636 has been identified to occur in alluvial sands close to the Wollombi Brook.

PCT 3636 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 3636.

The allocation of PCT 3636 relies on plots TB-01, TB-02 and HTP-MS-31 for the thinned condition class, and HTP-MS-33, HTP-MS-36, HTP-MS-37 and HTP-MS-38 for the disturbed grassland condition class. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 3636 (see Appendix D (Vegetation survey data)). Plots that were assigned the derived condition class weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation.

TB-01 had a higher centroid match for PCT 3431, than it did for PCT 3636. While TB-01 consists of species characteristic of both PCT 3431 and 3636, including a *Eucalyptus crebra* canopy with *Angophora floribunda* and *Allocasuarina luehmannii*, the presence of the alluvial sands throughout the plot area suggests that this plot is more representative of PCT 3636.

TB-02 had a higher centroid match for PCT 3315, 3431 and 3438, than it did for PCT 3636. PCT 3438 is restricted to the Permian sediments on escarpment footslopes near Singleton. While TB-02 consists of species characteristic of PCT 3315, 3431 and 3636, including a *Eucalyptus crebra* canopy with *Angophora floribunda* and *Allocasuarina luehmannii*, the presence of the alluvial sands throughout the plot area suggests that this plot is more representative of PCT 3636.

HTP-MS-31 had no centroid matches for 3636, however it was located on alluvial sands near the Wollombi Brook. While the structure of the vegetation in this plot has been disturbed, characteristic species including *Acacia amblygona, Acacia salicina, Allocasuarina luehmannii* and *Eucalyptus crebra* are present throughout the plot area.

Plots that were assigned the disturbed grassland class weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation and the presence of the alluvial sands.

Patches within the subject land had a high cover of *Angophora floribunda* in the canopy, with the mid layer often dominated by *Allocasuarina luehmannii*. Patches also contained a high abundance of younger *Eucalyptus crebra*.

All of these patches in the subject land have had experienced previous land clearing disturbances, likely resulting in the dominance of *Allocasuarina luehmannii* in the mid story.

4.2.31.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 3636 is equivalent to the Warkworth Sands Woodland in the Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act. Within the subject land only thinned condition vegetation meets the final determination listing for this TEC.

This TEC is discussed further in section 4.3.

4.2.31.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 3636 is equivalent to the Warkworth Sands Woodland of the Hunter Valley TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.32 PCT 4015 – Central Hunter Riparian Forest

4.2.32.1 PCT overview

PCT 4015 – Central Hunter Riparian Forest is described in the BioNet Vegetation Classification Database as a tall Casuarina open forest or occasionally a eucalypt forest or woodland with a mid-stratum with chenopods and acacias and a grassy ground layer that occurs on creek flats in the undulating terrain of the central and upper Hunter valley. The canopy commonly consists of a high cover of *Casuarina glauca* either exclusively or in combination with a sparse cover of eucalypts that commonly include red gums *Eucalyptus blakelyi* or *Eucalyptus tereticornis*. Occasionally *Casuarina glauca* may be absent altogether. The mid-stratum is sparse and almost always includes chenopods such as *Maireana microphylla* and *Enchylaena tomentosa* or occasionally a taller *Acacia* such as *Acacia salicina*. The mid-dense ground layer is mainly comprised of grasses and forbs with some twiners, hardy ferns and low-growing shrubs, almost always including *Dichondra repens* and *Austrostipa verticillata* with *Glycine tabacina*, *Microlaena stipoides* and *Cheilanthes sieberi* subsp. *sieberi* (NSW DCCEEW 2024c).

This PCT occurs in a restricted area of the Hunter valley from the Singleton district north to Dartbrook and west toward Sandy Hollow. It occurs in warm, dry environments with a mean annual rainfall typically below 710 millimetres. The strong association with drainage channels make this PCT distinguishable from other PCTs. It has only moderate floristic overlap with PCT 3431 which occurs on the gentle hills and rises. *Eucalyptus crebra*, *Eucalyptus moluccana* and a diverse grass and forb ground cover are characteristic of that PCT. However a related riparian forest occurs immediately to the east in higher rainfall areas of the Hunter valley. Here it grades into PCT 4023 which is also commonly dominated by *Casuarina glauca* however typically lacks the shrubby chenopods that are almost always present in PCT 4015 (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.64. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 4015 during the field survey presented in Table 4.65.

Table 4.64 PCT 4015 – Central Hunter Riparian Forest

PCT ID	4015
PCT name	Central Hunter Riparian Forest
Vegetation formation	KF_CH9 Forested Wetlands
Vegetation class	Coastal Floodplain Wetlands
Per cent cleared value (%)	87.87
Extent within subject land (ha)	9.82 (within the subject land this PCT is restricted to the Hunter IBRA subregion)

Table 4.65 PCT 4015 – Central Hunter Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Angophora floribunda, Casuarina glauca, Eucalyptus crebra, Eucalyptus tereticornis*
Shrubs	*Acacia implexa, Eremophila debilis, Phyllanthus gunnii*
Ferns	*Cheilanthes distans, Cheilanthes sieberi, Marsilea drummondii*
Grass & grasslike	*Aristida ramosa, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Juncus continuus, Lachnagrostis filiformis, Microlaena stipoides, Sporobolus creber*
Forbs	*Alternanthera denticulata, Chrysocephalum apiculatum, Commelina cyanea, Dichondra repens, Oxalis perennans, Veronica plebeia*
Other	–

4.2.32.2 Condition states

Within the subject land PCT 4015 is present in the following broad condition states (equivalent to vegetation zones):

- Thinned
- Derived.

An example of PCT 4015 Thinned is depicted in Photo 4.85 and Photo 4.86.



Photo 4.85 PCT 4015 in Thinned condition



Photo 4.86 PCT 4015 in Thinned condition

4.2.32.3 Justification of PCT selection

PCT 4015 is known to occur on creek flats in the undulating terrain of the central and upper Hunter valley.

PCT reference plots for PCT 4015 occur in close proximity to the subject land with the PCT being known to occur in Hunter IBRA subregion. Within the subject land, PCT 4039 has been identified to occur along creek flats and drainage channels, and often in close proximity to PCT 3431.

PCT 4015 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 4015.

The allocation of PCT 4015 relies on plots DL-27 and DL-50 for the derived condition class, and DL-29, DL-72 and HTP-MS-39 for the thinned condition class. These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 4015 (see Appendix D (Vegetation survey data)). Plots that were assigned the derived condition class weren't processed further with this tool and instead were assigned a PCT based on nearby areas of intact vegetation. All plots for the thinned condition class for PCT 4015 received first centroid matches for this PCT through the Plot to PCT Assignment Tool.

Occurrences of this PCT were usually dominated by *Casuarina glauca*, often with *Angophora floribunda* or *Eucalyptus dawsonii* also present. The understory of these patches also often contained *Acacia salicina*, *Enchylaena tomentosa* and *Maireana microphylla*.

4.2.32.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 4015.

4.2.32.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 4015 may form part of the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community TEC. This TEC is listed as Endangered under the EPBC Act.

This TEC is discussed further in section 4.3.

4.2.33 PCT 4039 – Hunter Range Creekflat Apple-Red Gum Forest

4.2.33.1 PCT overview

PCT 4039 – Hunter Range Creekflat Apple-Red Gum Forest is described in the BioNet Vegetation Classification Database as a tall to extremely tall sclerophyll open forest with a very grassy ground layer found on sandy clay alluvial soils in gullies and perched flats that drain the sandstone hills of the Hunter Range, south of the Hunter valley. The tree canopy is very frequently dominated by *Angophora floribunda*, commonly with red gum eucalypts either Eucalyptus tereticornis or *Eucalyptus amplifolia*. Other eucalypts are rare, including *Eucalyptus punctata* and rarely there is a sub-canopy of dense stands of *Melaleuca linariifolia*. The mid-stratum is layered and consists of a taller mid-dense however patchy cover of 1 or more *Acacia* species, of which *Acacia filicifolia* is common. The lower shrub layer is typically sparse. The ground layer is almost always dominated by a high cover of *Microlaena stipoides* although a diverse range of other forbs and grasses are present, almost always including Dichondra repens, very frequently Lobelia purpurascens and *Pteridium esculentum*, commonly with *Echinopogon ovatus*, *Oxalis perennans* and *Veronica plebeia* (NSW DCCEEW 2024c).

This PCT occurs in low to mid-elevation dry rain shadow environments of the northern Sydney Basin that receive less than 800 millimetres mean annual rainfall. Its primary distribution occurs in the Putty and Howes valleys on the gentle gradient alluviums, however it is also common on narrow creek lines that accumulate sandy material eroded from the surrounding ranges including the lower reaches of the Capertee and Wolgan rivers. Several outliers occur north of the main distribution near Wybong in the Hunter valley, below residual sandstone ranges and near Broke, beneath the Hunter escarpment. This community grades into tall forest PCT 3258 on alluvial soils that are in more incised gullies or where soils are richer. Clearing of alluvial soils within the main part of the distribution is likely to have significantly depleted the original extent of this PCT (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.66. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 4039 during the field survey presented in Table 4.67.

Table 4.66 PCT 4039 – Hunter Range Creekflat Apple-Red Gum Forest

PCT ID	4039
PCT name	Hunter Range Creekflat Apple-Red Gum Forest
Vegetation formation	KF_CH9 Forested Wetlands
Vegetation class	Coastal Floodplain Wetlands
Per cent cleared value (%)	40.16
Extent within subject land (ha)	0.91 (0.07 ha in the Yengo IBRA subregion and 0.84 in the Hunter IBRA subregion)

Table 4.67 PCT 4039 – Hunter Range Creekflat Apple-Red Gum Forest

Growth form	Species recorded
Trees	*Eucalyptus punctata, Eucalyptus tereticornis, Melia azedarach*
Shrubs	*Acacia implexa, Breynia oblongifolia, Trema tomentosa var. aspera*
Ferns	–
Grass & grasslike	*Cynodon dactylon, Gahnia aspera, Oplismenus aemulus*
Forbs	*Dichondra repens, Lobelia purpurascens, Solanum prinophyllum*
Other	*Desmodium varians, Glycine tabacina, Muehlenbeckia gracillima*

4.2.33.2 Condition states

Within the subject land PCT 4039 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 4039 Mod-good is depicted in Photo 4.87 and Photo 4.88.



Photo 4.87 PCT 4039 Mod/Good condition BAM plot DL-51



Photo 4.88 PCT 4039 Mod/Good condition with *Eucalyptus tereticornis* as a dominant tree species

4.2.33.3 Justification of PCT selection

PCT 4039 is known to occur on sandy clay alluvial soils in gullies and perched flats that drain the sandstone hills of the Hunter Range, south of the Hunter valley.

PCT reference plots for PCT 4039 occur in close proximity to the subject land with the PCT being known to occur in both the Yengo and Hunter IBRA subregions. Within the subject land, PCT 4039 has been identified to occur in the sandy clay alluvial soils in the gullies beneath the Hunter escarpment.

PCT 4039 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs in areas mostly mapped by SVTM as PCT 4039.

The allocation of PCT 4039 relies on plot DL-41 and DL-51. These plots were run through the Plot to PCT Assignment Tool where these plots were identified to have centroid matches with PCT 4039 (see Appendix D (Vegetation survey data)).

DL-41 had no centroid matches with PCT 4039 however it was located on the sandy alluvial soils along the flats that drain the sandstone slopes of Pokolbin State Forest. The canopy of this plot was mainly dominated by *Eucalyptus tereticornis,* with *Eucalyptus punctata* also present. The mid-story consisted of a mix of *Acacia implexa, Breynia oblongifolia* and *Trema tomentosa var. aspera*, with the grassy ground layer including *Cynodon dactylon, Gahnia aspera, Microlaena stipoides* and *Oplismenus aemulus*.

DL-51 had a higher centroid match with PCT 4025, 4073 and 4138, than it did for PCT 4039. DL-51 is unlikely to be part of PCT 4025, since this PCT is restricted to alluvial flats alongside streams that drain the Cumberland Plain or rarely along the broad alluvial flats of the Hawkesbury and Nepean River systems to the west of Sydney. DL-51 is more likely to be PCT 4039 due to *Eucalyptus tereticornis* being the dominant canopy species, unlike PCT 4073, which is usually dominated by *Casuarina cunninghamiana subsp. cunninghamiana*. PCT 3138 is restricted to the South East Corner IBRA bioregion.

Occurrences of PCT 4039 in the subject land were dominated by *Eucalyptus tereticornis* and *Angophora floribunda* with *Eucalyptus punctata*. The midstory included *Acacia implexa, Breynia oblongifolia* and *Trema tomentosa var. aspera*. The ground layer included *Cynodon dactylon, Gahnia aspera* and *Oplismenus aemulus*.

4.2.33.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 4039 is part of the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.33.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database, PCT 4039 is part of the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria TEC. This TEC is listed as Critically Endangered under the EPBC Act. PCT 4039 is also part of the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions. This TEC is listed as Endangered under the EPBC Act, however isn't applicable to the vegetation in the subject land due to this TEC being restricted to the NSW North Coast and South East Queensland bioregions.

River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria TEC is discussed further in section 4.3.

4.2.34 PCT 4072 – Hunter River Oak Mesic Forest

4.2.34.1 PCT overview

PCT 4072 – Hunter River Oak Mesic Forest is described in the BioNet Vegetation Classification Database as a tall to very tall Casuarina open forest with a mesic mid-stratum and grassy ground layer on the floodplain of the lower Hunter River and its tributaries between Greta and Broke to the west of Newcastle. *Casuarina cunninghamiana* subsp. *cunninghamiana* is almost always present in the canopy, commonly associated with *Melia azedarach*. The sparse mid-stratum includes a range of soft-leaved shrubs and small trees. *Backhousia myrtifolia* and *Acacia* species are almost always present and *Breynia oblongifolia* and *Phyllanthus gunnii* are very frequent. *Acacia filicifolia* and *Acacia parvipinnula* are the most frequent of the *Acacias*. *Clerodendrum tomentosum*, *Bursaria spinosa* and the scrambler *Rubus parvifolius* are commonly present. The mid-dense to dense ground cover typically includes a high cover of grasses with scattered graminoids, soft-leaved forbs and vines. The prominent species are *Oplismenus aemulus* which is almost always present and *Microlaena stipoides*, *Entolasia marginata*, *Stephania japonica* var. *discolor* and *Cayratia clematidea* which are very frequent. Groundcovers that are common to occasional include *Commelina cyanea*, *Lomandra longifolia*, *Urtica incisa*, *Echinopogon ovatus*, *Juncus usitatus* and *Rumex brownii* (NSW DCCEEW 2024c).

This PCT typically occurs below 120 metres ASL in a warm, moist environment. Its remaining examples occur as narrow ribbons adjacent to streams on largely cleared floodplains. This PCT is only defined from a small number of plots and the assemblage and environment of any new plots should be carefully evaluated before they are assigned to it. On the streams of the north coast hinterland, it is replaced by PCT 4079, which is also a *Casuarina* riverine forest which differs in so far as it includes a more prominent suite of ferns than this PCT (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.68. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 4072 during the field survey presented in Table 4.69.

Table 4.68 PCT 4072 – Hunter River Oak Mesic Forest

PCT ID	4072
PCT name	Hunter River Oak Mesic Forest
Vegetation formation	KF_CH9 Forested Wetlands
Vegetation class	Eastern Riverine Forests
Per cent cleared value (%)	65.83
Extent within subject land (ha)	0.21 (0.07 ha in the Yengo IBRA subregion and 0.14 in the Hunter IBRA subregion)

Table 4.69 PCT 4072 – Hunter River Oak Mesic Forest

Growth form	Species recorded
Trees	*Brachychiton populneus, Casuarina cunninghamiana subsp. cunninghamiana*
Shrubs	*Acacia implexa, Breynia oblongifolia, Rubus moluccanus var. moluccanus*
Ferns	–
Grass & grasslike	*Austrostipa verticillata, Oplismenus aemulus*
Forbs	*Einadia hastata, Geranium solanderi, Urtica incisa*
Other	*Cayratia clematidea, Stephania japonica*

4.2.34.2 Condition states

Within the subject land PCT 4072 is present in the following broad condition states (equivalent to vegetation zones):

- Mod-good.

An example of PCT 4039 Mod-good is depicted in Photo 4.89 and Photo 4.90.



Photo 4.89 PCT 4072 in Mod-good condition



Photo 4.90 PCT 4072 in Mod-good condition

4.2.34.3 Justification of PCT selection

PCT 4072 is known to occur on the floodplain of the lower Hunter River and its tributaries between Greta and Broke to the west of Newcastle. This PCT typically occurs below 120 metres ASL in a warm, moist environment. Its remaining examples occur as narrow ribbons adjacent to streams on largely cleared floodplains.

PCT reference plots for PCT 4072 occur within the tributary that the subject land and PCT reside in, and nearby in both Yengo and Hunter IBRA subregions.

PCT 4072 within the subject land is restricted to the Yengo and Hunter IBRA subregions and occurs mostly in areas mapped by SVTM as PCT 4072.

The allocation of PCT 4072 relies on plots DL-68 in the Hunter IBRA subregion. This plot was run through the Plot to PCT Assignment Tool where the plot was identified to have first centroid match with PCT 4072 although a high distance to centroid value occurs (see Appendix D (Vegetation survey data)).

Occurrences of this PCT within the Singleton Military Area were dominated by *Casuarina cunninghamiana* subsp. *cunninghamiana* with shrub species including *Acacia implexa* and *Breynia oblongifolia*.

4.2.34.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database there is no BC Act listed TEC associated with PCT 4072.

4.2.34.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 4072.

4.2.35 PCT 4089 – Namoi-Upper Hunter River Red Gum Forest

4.2.35.1 PCT overview

PCT 4089 – Namoi-Upper Hunter River Red Gum Forests described in the BioNet Vegetation Classification Database as a very tall sclerophyll and Casuarina forest to open forest or woodland with a mid-stratum that is absent or sparse and a grassy ground layer, found on alluvial floodplains of the upper Hunter and Namoi river catchments. The canopy almost always includes *Eucalyptus camaldulensis*, rarely with *Casuarina cunninghamiana* subsp. *cunninghamiana*. There is usually no mid-stratum in this PCT. The dense ground layer is mainly comprised of grasses and forbs, almost always including *Cynodon dactylon* with high cover, and occasionally *Rumex brownii*, *Alternanthera denticulata*, *Austrostipa verticillata*, *Urtica incisa* and *Paspalidium constrictum* (NSW DCCEEW 2024c).

This PCT primarily occurs along the Hunter River and its tributaries between Singleton and Scone, and tributaries of the Namoi River around Gunnedah and Tamworth including the Peel and Mooki rivers. This PCT occurs in hot, dry climates receiving less than 650 millimetres mean annual rainfall. The riverine forests in this region have been extensively cleared and this PCT occurs in small patches in an agricultural landscape. Surviving patches are frequently disturbed and subject to ongoing weed invasion and grazing pressure. The median native species richness of the plots comprising this PCT is less than 10 species, which is lower than comparable riverine PCTs. In the Hunter catchment, the riverine forest PCT 4073 which includes *Casuarina cunninghamiana* subsp. *cunninghamiana* however lacks *Eucalyptus camaldulensis* is present in reasonably close proximity to this PCT. In the Namoi catchment, riverine forests that also include *Eucalyptus camaldulensis*, however lack *Casuarina cunninghamiana* subsp. *cunninghamiana* generally occur downstream of this PCT (NSW DCCEEW 2024c).

An overview of the PCT as outlined in the BioNet Vegetation Classification Database is presented in with Table 4.70. detailed description of each species per growth form recorded from BAM plots undertaken in PCT 4089 during the field survey presented in Table 4.71.

Table 4.70 PCT 4089 – Namoi-Upper Hunter River Red Gum Forest

PCT ID	4089
PCT name	Namoi-Upper Hunter River Red Gum Forest
Vegetation formation	KF_CH9 Forested Wetlands
Vegetation class	Inland Riverine Forests
Per cent cleared value (%)	94.33%
Extent within subject land (ha)	11.14 (restricted to the Hunter IBRA subregion)

Table 4.71 PCT 4089 – Namoi-Upper Hunter River Red Gum Forest diagnostic species recorded within the subject land

Growth form	Species recorded
Trees	*Eucalyptus camaldulensis, Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana, Casuarina glauca*
Shrubs	–
Ferns	*Marsilea drummondii*
Grass & grasslike	*Aristida ramosa, Austrostipa verticillata, Cynodon dactylon, Juncus continuus, Lachnagrostis filiformis*
Forbs	*Commelina cyanea, Einadia nutans subsp. linifolia, Rumex brownii, Urtica incisa*
Other	–

4.2.35.2 Condition states

Within the subject land PCT 4089 is present in the following broad condition states (equivalent to vegetation zones):

- Poor
- Derived.

An example of PCT 4089 Porr and Derived condition is depicted in Photo 4.91 and Photo 4.92.



Photo 4.91 PCT 4089 - Poor condition with Eucalyptus camaldulensis occurring along the banks of Wollombi Creek



Photo 4.92 PCT 4089 – Derived condition with *Austrostipa verticillata* dominating the ground stratum

4.2.35.3 Justification of PCT selection

PCT 4089 is known to occur on alluvial floodplains of the upper Hunter and Namoi River catchments.

PCT reference plots for PCT 4089 occur along the Hunter River near the subject land, with the PCT known to occur within the Hunter IBRA subregion. Within the subject land, PCT 4089 has been identified to occur in the alluvial floodplains along the Hunter River.

PCT 4089 within the subject land is restricted to the Hunter IBRA subregion and occurs in areas mostly mapped by SVTM as PCT 4089.

The allocation of PCT 4089 relies on plots MS-68 (Poor), HTP-MS-69 (Derived), HTP-MS-70 (Derived), HTP-MS-73 (Poor) and Q46-Umwelt (Derived). These plots were run through the Plot to PCT Assignment Tool where each plot was identified to have centroid matches with PCT 4089 (see Appendix D (Vegetation survey data)).

For poor condition sampling HTP-MS-68 had a higher centroid match to PCT 3042 and 3079, than it did for PCT 4089, however neither of these PCTs occur within the Hunter IBRA subregion. This plot has a third highest centroid match to PCT 4089 although the due to the highly disturbed nature of the vegetation a high distance to centroid value occurs. For HTP-MS-73 the first centroid match was PCT 4089.

The sampling plots for PCT 4089 in derived condition included HTP-MS-69 which had a higher centroid match to PCT 4081, than it did for PCT 4089, however this PCT doesn't occur within the Hunter IBRA subregion. The second highest match for this plot was PCT 4089 although again due to the highly altered nature of this vegetation a high distance to centroid value occurs. Plot Q46 (Umwelt) was not run through the Plot to PCT Assignment Tool.

Occurrences of PCT 4089 along the Hunter River were dominated by *Casuarina cunninghamiana subsp. cunninghamiana*, with *Eucalyptus camaldulensis* almost always present.

Patches in derived native grassland were considered against PCT 4073 where *Eucalyptus camaldulensis* was absent, although plot analysis using the Plot to PCT Assignment Tool showed this plot having a stronger centroid relationship to PCT 4089 than PCT 4073.

4.2.35.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification Database, PCT 4089 is part of the Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in section 4.3.

4.2.35.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification Database there is no EPBC Act listed TEC associated with PCT 4089.

4.3 Threatened ecological communities

4.3.1 BC Act listed threatened ecological communities

Based on the PCT association, there are 7 BC Act listed (all as Endangered) threatened ecological communities (TECs) that have been identified to occur in the subject land. These include:

- Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion.

A summary of these TECs and associated PCTs are listed in Table 4.72 and their extent is shown on Figure 14.11.

Table 4.72 BC Act listed TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	SAII Status	IBRA subregion	Associated vegetation zones within the subject land	Total area within subject land (ha)
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	20126	E	No	Hunter	3314_Thinned (38.46 ha) 3314_Poor (19.40 ha) 3431_Thinned (63.42 ha) 3431_Poor (5.20 ha) 3431_Plantation (14.90 ha)	141.38
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	20127	E	No	Hunter	3315_Thinned (8.86 ha)	8.86

TEC name	Profile ID (from TBDC)	BC Act status	SAII Status	IBRA subregion	Associated vegetation zones within the subject land	Total area within subject land (ha)
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	10942	E	No	Yengo Hunter	3444_Mod-good (37.56) 3444_Derived (0.31 ha)	37.87
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	20141	E	Yes	Hunter	4089_Poor (4.22 ha)	4.22
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	10416	E	No	Yengo Hunter	3446_Mod-good (1.37 ha)	1.37
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	10787	E	No	Yengo Hunter	3328_Mod-good (0.45 ha) 4039_Mod-good (0.91 ha)	1.36
Warkworth Sands Woodland in the Sydney Basin Bioregion	10833	E	Yes	Hunter	3636_Thinned (7.51 ha) 3636_Disturbed Grassland (4.86 ha)	12.37
Total						**207.43**

In addition to these TECs, PCT 3314 has been assessed against the BC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions TEC, since it can form part of this TEC. PCT 3314 didn't meet the description of this TEC and was instead assigned to the Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions TEC.

4.3.1.1 Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 3314 and PCT 3431 are both part of the BC Act listed Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 3314_Thinned, 3314_Poor, 3431_Thinned, 3431_Poor and 3431_Plantation to this TEC are deemed suitable given they conform with the following locality, floristics landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2010a):

- occur on Permian sediments in the Hunter Valley
- formed an open woodland or open forest on slopes and undulating hills
- contained characteristic species representative Central Hunter Grey Box-Ironbark Woodland as listed under Paragraph 2 of the NSW Scientific Determination including a canopy dominated by *Eucalyptus moluccana* (Grey Box) and/or *Eucalyptus crebra* (Narrow-leaved Ironbark)

- above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers
- occurred within the Muswellbrook and Singleton LGA, and Sydney Basin IBRA bioregion.

PCT 3314_Disturbed grassland and 3431_Disturbed grassland are not assigned to this TEC as they do not exhibit woodland to low woodland structure and do not generate a vegetation integrity score (>17) that warrants an offset under the NSW Biodiversity Offset Scheme. Further, the final determination for Central Hunter Grey Box-Ironbark Woodland does not make specific mention of including disturbed grassland as part of the listing unlike other final determinations such as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

4.3.1.2 Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 3315 is equivalent of the BC Act listed Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 3315 to this TEC is deemed suitable given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2010b):

- Central Hunter Ironbark – Spotted Gum – Grey Box Forest typically forms an open forest to woodland structure
- occur on Permian sediments in the Hunter Valley
- characteristic species representative of Central Hunter Ironbark-Spotted Gum-Grey Box Forest as listed under Paragraph 2 of the NSW Scientific Determination including a canopy dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *Eucalyptus moluccana* (Grey Box)
- above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers
- occurred within the Singleton Military Area, Singleton LGA in the Sydney Basin IBRA bioregion.

PCT 3315_Derived is not assigned to this TEC as it does not exhibit open forest to woodland structure, and it does not include any tree species listed in Paragraph 2 of the final determination. Further, the final determination for Central Hunter Grey Box-Ironbark Woodland does not make specific mention of including disturbed grassland as part of the listing unlike other final determinations such as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

4.3.1.3 Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 3444 is part of the BC Act listed Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 3444_Mod-good and PCT 3444_Derived to the TEC is deemed suitable given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2019a):

- occurs on Permian sediments in the Hunter Valley
- contained characteristic species representative Lower Hunter Spotted Gum Ironbark Forest as listed under Paragraph 1.1 of the NSW Scientific Determination including a canopy dominated by *Corymbia maculata* (Spotted Gum) and *Eucalyptus fibrosa* (Broad-leaved Ironbark), with *Eucalyptus punctata* (Grey Gum) and *Eucalyptus crebra* (Grey Ironbark) also present
- above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers
- occurs within Singleton LGA in the Sydney Basin IBRA bioregion.

The inclusion of PCT 3444_Derived has been assigned to this TEC based on Paragraph 2.2 of the final determination where it is stated 'It is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded, and independent of their condition) that occur within these bioregions be covered by this determination.'

4.3.1.4 Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 4089 is part of the BC Act listed Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 4089_Poor condition to the TEC is deemed suitable for given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2011a):

- Hunter Floodplain Red Gum Woodland typically forms a tall to very tall (18–35 metres) woodland
- occurs on floodplains and associated floodplain rises along the Hunter River
- characteristic species representative of Hunter Floodplain Red Gum Woodland as listed under Paragraph 2 of the NSW Scientific Determination including canopy species *Eucalyptus camaldulensis* (River Red Gum) and *Casuarina cunninghamiana* subsp. *cunninghamiana* (River Oak). Dominant groundcovers included *Cynodon dactylon* (Couch), *Austrostipa verticillata* (Slender Bamboo Grass) and *Urtica incisa* (Stinging Nettle)
- at any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers
- occurs within the Muswellbrook and Singleton LGAs in the Sydney Basin IBRA bioregion.

PCT 4089_Derived is not assigned to this TEC as it does not exhibit a tall to very tall woodland structure and was not recorded to contain any regenerating diagnostic canopy species.

4.3.1.5 Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregion

As outlined in the BioNet Vegetation Classification Database, PCT 3446 is part of the BC Act listed Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregion TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 3446_Mod-good condition to the TEC is deemed suitable for given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2024e):

- occurs on the gentle slopes arising from depressions on permian sediments of the Hunter Valley
- even if above ground individuals of some species may be absent at some time, they are considered likely to be present below ground in the seed bank
- typically formed a tall woodland that contained characteristic species representative of Hunter Lowland Redgum Forest as listed under Paragraph 2 of the NSW Scientific Determination including canopy species *Corymbia maculata, Eucalyptus crebra* and *Eucalyptus punctata,* with *Eucalyptus tereticornis* present near the drainage areas
- occurred within the Singleton LGA and Sydney Basin IBRA bioregion.

4.3.1.6 River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 3328 and 4039 are part of the BC Act listed River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 3328_Mod-good and 4039_Mod-good condition to the TEC is deemed suitable given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2011b):

- the structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees
- occur on alluvial flats and drainage lines on that don't occur over 250 metres above sea level
- contained characteristic species representative River-Flat Eucalypt Forest as listed above Paragraph 2 of the NSW Scientific Determination including *Angophora floribunda, Casuarina glauca, Eucalyptus tereticornis, Melaleuca linariifolia, Melaleuca styphelioides* and *Melia azedarach*
- at any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers
- occurs within the Sydney Basin IBRA bioregion.

4.3.1.7 Warkworth Sands Woodland in the Sydney Basin Bioregion

As outlined in the BioNet Vegetation Classification Database, PCT 3636 is associated to the BC Act listed Warkworth Sands Woodland in the Sydney Basin Bioregion TEC. The TEC is listed as Endangered under the BC Act.

Assignment of PCT 3636_Thinned condition to the TEC is deemed suitable given it conforms with the following locality, floristics, landscape and geological characteristics as detailed in the NSW Scientific Committee Final Determination (NSW Scientific Committee 2011c):

- occurs on aeolian sand deposits in the Hunter Valley
- even if above ground individuals of some species may be absent at some time, they are considered likely to be present below ground in the seed bank
- Warkworth Sands Woodland is generally of woodland to low woodland structure with trees of *Angophora floribunda* and *Banksia integrifolia*, and shrubs and ground species including *Acacia filicifolia*, *Pteridium esculentum*, *Imperata cylindrica*, *Brachyloma daphnoides* and*Melaleuca thymifolia*
- occurs within the Singleton LGA in the Sydney Basin IBRA bioregion.

PCT 3636_Disturbed grassland is not assigned to this TEC as it does not exhibit woodland to low woodland structure, does not include any of the key diagnostic native species listed under Paragraph 4 of the final determination and does not generate a vegetation integrity score (>17) that warrants an offset under the NSW Biodiversity Offset Scheme. Further, the final determination for Warkworth Sands Woodland in the Sydney Basin Bioregion does not make specific mention of including disturbed grassland as part of the listing unlike other final determinations such as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Whilst the final determination does not make specific mention of including disturbed grassland as part of the listing the EPBC Act conservation advice applies the listing to grasslands where they occur within 30 metres of a woodland patch that exceed 0.1 hectares in size. Given this a 30 metre buffer has been applied to these woodland patches and 4.86 hectares of disturbed grassland has been applied to the TEC listing.

4.3.1.8 White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions

As outlined in the BioNet Vegetation Classification Database, PCT 3314 is associated with both the BC Act listed Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregion and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (Box Gum TEC). The Box Gum TEC is listed as Critically Endangered under the BC Act.

Assignment of PCT 3314 to the Box Gum TEC has been discounted given the absence of key characteristic canopy species *Eucalyptus albens, Eucalyptus blakelyi* and *Eucalyptus melliodora*, required to be the dominant or codominant under the final determination by the NSW Scientific Committee (2020).

The Commonwealth listing for this community goes further to confirm "*Coastal Grey Box (E. moluccana) without Yellow Box, White Box or Blakely's Red Gum as co-dominants are not considered to be part of the ecological community, except in the Nandewar Bioregion",* (Threatened Species Scientific Committee 2006).

Patches of this PCT within the subject land have a canopy almost exclusively dominated by *Eucalyptus moluccana*, with a subcanopy of *Allocasuarina luehmannii* often present.

Eucalyptus moluccana and its intergrades with *Eucalyptus albens* are included as part of the assemblage of species for the Box Gum TEC, specifically for their occurrence as a co-dominant canopy in the Nandewar and Upper Hunter bioregions (NSW Scientific Committee, 2020). Within the subject land PCT 3314 is almost exclusively dominated by *Eucalyptus moluccana* with no evidence of hybridisation or intergrades with *Eucalyptus albens* that are more commonly known to occur to the northwest of the subject land from Muswellbrook to the Upper Hunter region.

The dominance of *Eucalyptus moluccana* within the PCT 3314 in the subject land combined with an absence of any evidence of the other key associated canopy species is or their intergrades suggest a closer alignment with the characteristic floristic assemblage within the final determination listing for Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (NSW Scientific Committee 2010).

Of note, the widespread presence of the key characteristic species, *Allocasuarina luehmannii* within the subject land is included as part of the assemblage of species for the Central Hunter Grey Box-Ironbark Woodland TEC listing, and isn't part of the species for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC.

Furthermore, the assessment and association of PCT 3314 to the Central Hunter Grey Box-Ironbark Woodland TEC listing is consistent with the finding of the adjoining and surrounding detailed investigations undertaken for the HVOCP (Umwelt 2024) PCT 3314 (formally PCT 1691) has been assigned to the Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions TEC.

4.3.2 EPBC Act listed threatened ecological communities

Based on the protected matters search tool (PMST) report generated for the project, there are 10 EPBC Act listed TECs that may occur or are likely to occur in the search area. These include:

- Central Hunter Valley eucalypt forest and woodland (Critically Endangered)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community (Endangered)
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (Endangered)
- Hunter Valley Weeping Myall (*Acacia pendula*) Woodland (Critically Endangered)
- Kurri sand swamp woodland of the Sydney Basin bioregion (Endangered)

- Lowland Rainforest of Subtropical Australia (Critically Endangered)
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Critically Endangered)
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Endangered)
- Warkworth Sands Woodland of the Hunter Valley (Critically Endangered)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered).

Of these 10 EPBC Act listed TECs, 3 were confirmed to occur in the subject land and comprise of:

- Central Hunter Valley eucalypt forest and woodland
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland of the Hunter Valley.

A summary of recorded EPBC Act listed TECs and associated vegetation zones within the subject land are presented in Table 4.73 and their extent is shown on Figure 14.11.

Table 4.73 EPBC Act listed TECs within the subject land

TEC name	EPBC Act Status	IBRA subregion	Associated vegetation zones within the subject land	Total area within the subject land (ha)
Central Hunter Valley eucalypt forest and woodland	CE	Yengo Hunter	3314_Thinned (38.46 ha) 3315_Thinned (8.86 ha) 3431_Thinned (63.42 ha) 3431_Poor (5.20 ha) 3431_Plantation (14.90 ha) 3438_Mod-good (12.19 ha) 3446 Mod-good (1.37 ha)	144.40
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	CE	Yengo Hunter	3328_Mod-good (0.45 ha) 4039_Mod-good (0.91 ha)	1.36
Warkworth Sands Woodland of the Hunter Valley	CE	Hunter	3636_Thinned (7.51 ha) 3636_Disturbed Grassland (4.86 ha)	12.37
Total				**158.13**

In addition to these TECs, PCT 3314 has been assessed against the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC, since it can form part of this TEC. PCT 3314 didn't meet the key diagnostic characteristics of this TEC and was instead assigned to the Central Hunter Valley eucalypt forest and woodland TEC.

4.3.2.1 Central Hunter Valley eucalypt forest and woodland

PCTs 3314, 3315, 3431, 3438 and 3446 are part of the Central Hunter Valley eucalypt forest and woodland ecological community TEC listed under the EPBC Act.

A summary of the relevant Commonwealth guidelines and policy statements available for this TEC is as follows:

- Approved Conservation Advice (including listing advice): Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community. Canberra (DoE 2015). Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/130-conservation-advice.pdf. In effect under the EPBC Act from 07-May-2015.
- Policy Statement: Central Hunter Valley eucalypt forest and woodland: a nationally protected ecological community (Department of the Environment and Energy 2016) [Admin Guideline].
- This Approved Conservation Advice (including listing advice) and the Policy Statement have been applied to PCTs 3314, 3315, 3431, 3438 and 3446 to determine whether this vegetation within the subject land is part of the Central Hunter Valley eucalypt forest and woodland ecological community TEC listed under the EPBC Act.

Description

The ecological community occurs in the Hunter Valley region (primarily in the Central Hunter) which is mostly in the northeast of the Sydney Basin IBRA bioregion (DoE 2015). Within the Sydney Basin IBRA bioregion the ecological community occurs mainly in the Hunter IBRA subregion and also occurs in subregions adjacent to the Hunter Thrust Zone in the Upper Hunter IBRA subregion (Department of the Environment 2015). The occurrence of the Central Hunter Valley eucalypt forest and woodland ecological community TEC within the subject land is within the central distribution for the TEC.

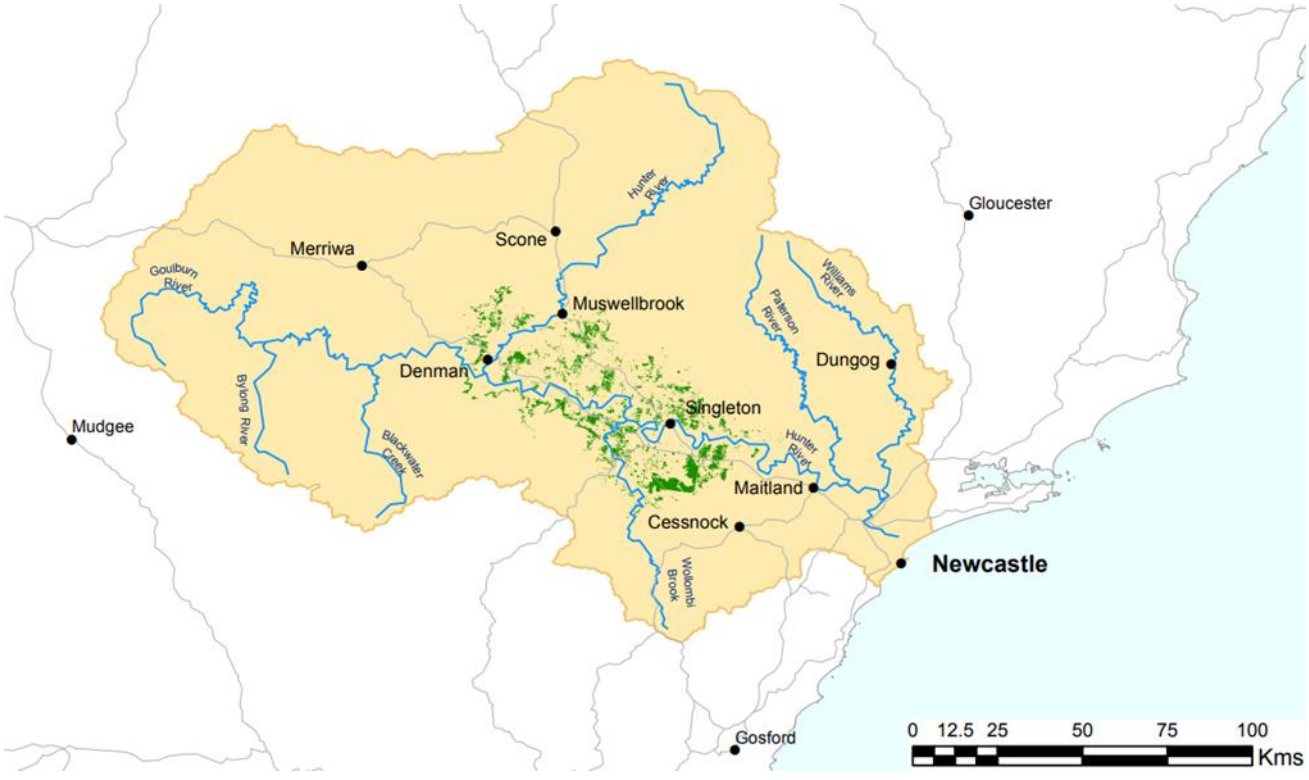


Figure 4.3 Distribution of the Central Hunter Valley eucalypt forest and woodland ecological community (DoE 2015). Green polygons show core distribution (most likely to be present). The yellow polygon shows the area within which the TEC may occur

The Central Hunter Valley eucalypt forest and woodland ecological community generally occurs on soils derived from the Permian sedimentary bedrock found on the valley floors and on lower hillslopes and low ridges (DoE 2015).

The canopy of the ecological community is dominated by 1 or more of the following 4 eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *Eucalyptus dawsonii* (Slaty Gum) and *E. moluccana* (Grey Box). Under certain circumstances a fifth species, *Allocasuarina luehmannii* (Buloke), may be part of the mix of dominants, in sites previously dominated by 1 or more of the above 4 eucalypt species. Derived native grasslands and shrublands are not included in the nationally protected ecological community (DoE 2015).

The listed ecological communities comprise of patches that meet the key diagnostic characteristics and also meet at least the minimum condition thresholds for High quality condition classes.

Key diagnostic characteristics

The Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community (DoE 2015) provides key diagnostic characteristics for the TEC which are:

- it occurs in the Hunter River catchment (typically called the Hunter Valley region); AND
- it typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from Permian sedimentary rocks; AND
- it does not occur on alluvial flats, river terraces, aeolian sands, Triassic sediments, or escarpments; AND
- it is woodland or forest, with a projected canopy cover of trees of 10% or more; or with a native tree density of at least 10 native tree stems per 0.5 ha (at least 20 native tree stems/ha) that are at least 1 metre in height; AND
- the canopy of the ecological community is dominated by 1 or more of the following 4 eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *Eucalyptus dawsonii* (Slaty Gum) and *Eucalyptus moluccana* (Grey Box); OR
- a fifth species, *Allocasuarina luehmannii* (Buloke) dominates in combination with 1 or more of the above 4 eucalypt species, in sites previously dominated by 1 or more of the above 4 eucalypt species; AND
- *Allocasuarina torulosa* (Forest Oak/She-Oak, Rose She-Oak/Oak), *Eucalyptus acmenoides* (White Mahogany) and *Eucalyptus fibrosa* (Red/broad-leaved Ironbark) are largely absent from the canopy of a patch; AND
- a ground layer is present (although it may vary in development and composition), as a sparse to thick layer of native grasses and other native herbs and/or native shrubs.

All of these identified PCTs mapped within the subject land occur in the Hunter River catchment; on soils derived from Permian sedimentary rocks; and don't occur on alluvial flats, river terraces, aeolian sands, Triassic sediments, or escarpments. The areas mapped under the derived native grassland condition class don't meet the key diagnostic characteristics for the TEC.

PCT 3314 within the subject land meets the key diagnostic characteristics for the TEC. Patches that fell under the:

- thinned condition class were characterised by a canopy of *Allocasuarina luehmannii* (Buloke) and *Eucalyptus moluccana* (Grey Box). These patches have at least 10 native trees per 0.5 hectares that are at least 1 metre in height, with a sparse shrub layer usually present. The ground layer consisted of a mid-dense layer of native grasses (*Aristida ramosa, Cymbopogon refractus* and *Sporobolus creber*), often with a mix of exotic grasses and forbs also present. These patches meet the key diagnostic characteristics for this TEC.

- poor condition class were often characterised by a disturbed canopy dominated by *Allocasuarina luehmannii* (Buloke), with *Eucalyptus moluccana* (Grey Box) also present. These patches have at least 10 native trees per 0.5 hectares that are at least 1 metre in height. The ground layer consisted of a mid-dense layer of native grasses (*Aristida ramosa, Austrostipa scabra* and *Cynodon dactylon*), often with a mix of exotic grasses and forbs also present. These patches meet the key diagnostic characteristics for this TEC.

PCT 3315 within the subject land meets the key diagnostic characteristics for the TEC. This PCT was identified along the foothills within the Singleton Military Area. This PCT had a canopy cover greater than 10% and was dominated by the characteristic species *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus moluccana* (Grey Box) and *Corymbia maculata* (Spotted Gum). The ground layer consisted of a mid-dense layer of native grasses (*Aristida vagans, Cymbopogon refractus* and *Sporobolus creber*), with a sparse cover of shrubs and herbs also present in the understory.

PCT 3431 within the subject land meets the key diagnostic characteristics for the TEC. This PCT was identified on the undulating floor of the central Hunter Valley. Patches that fell under the:

- thinned condition class were characterised by a canopy dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and/or *E. moluccana* (Grey Box), often with *Allocasuarina luehmannii* (Buloke) present as a dominant small tree. These patches all had a canopy cover greater than 10%, with the shrub layer either very sparse or absent. The ground layer consisted of a mid-dense layer of native grasses (*Aristida ramosa, Cymbopogon refractus* and *Entolasia stricta*), often with a mix of exotic grasses and forbs also present. These patches meet the key diagnostic characteristics for this TEC
- poor condition class were often characterised by a disturbed canopy dominated by *Allocasuarina luehmannii* (Buloke), with *Eucalyptus crebra* (Narrow-leaved Ironbark) and/or *Eucalyptus moluccana* (Grey Box) also present. These patches have at least 10 native trees per 0.5 hectares that are at least 1 metre in height. The ground layer consisted of a mid-dense layer of native grasses (*Aristida ramosa, Chloris ventricosa* and *Sporobolus creber*), often with a mix of exotic grasses and forbs also present. These patches meet the key diagnostic characteristics for this TEC
- plantation condition class were characterised by a planted canopy of *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus moluccana* (Grey Box), often with *Allocasuarina luehmannii* (Buloke) present as a dominant small tree. These patches all had a canopy cover greater than 10%, with the shrub layer either very sparse or absent. The ground layer consisted of a mid-dense layer of native grasses (*Austrostipa verticillata*, *Bothriochloa biloba* and *Sporobolus creber*), often with a mix of exotic grasses and forbs also present. These patches meet the key diagnostic characteristics for this TEC.

PCT 3438 within the subject land meets the key diagnostic characteristics for the TEC. This PCT was identified along the escapement footslopes that occur to the south of the Singleton Military Area. This PCT had a canopy cover greater than 10% and was dominated by the characteristic species *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum). The ground layer consisted of a mid-dense layer of native grasses (*Aristida vagans, Cymbopogon refractus* and *Themeda triandra*), with a sparse cover of shrubs and herbs also present in the understory.

PCT 3446 within the subject land meets the key diagnostic characteristics for the TEC. This PCT was identified along the foothills in the Singleton Military Area. This PCT had a canopy cover greater than 10% and was dominated by the characteristic species *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum). The ground layer consisted of a mid-dense layer of native grasses (*Aristida vagans, Cymbopogon refractus* and *Entolasia stricta*), with a sparse cover of shrubs and herbs also present in the understory.

Within the subject land the TEC occurs in the Sydney Basin IBRA bioregion (Yengo and Hunter IBRA subregions).

Condition thresholds

The Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community (Department of the Environment 2015) provides condition thresholds for the TEC which are outlined in Table 4.74.

Based on the vegetation integratory plots collected, the patches of PCTs 3314 (Thinned), 3315, 3431 (Poor, Thinned and Plantation) and 3438 all met the condition thresholds of Class A High quality condition (e.g. A larger patch with good quality native understorey). Their patch sizes are ≥ 5 ha; ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species. PCT 3446 patch size was <5 hectares, however it still met the threshold for Class B High quality condition (e.g. A patch with high quality native understorey). Patches of PCT 3314 (Poor) didn't meet the thresholds for any of the categories due to <50% of its perennial understory vegetation cover being native. PCT 3314 (Poor) has therefore not met the condition thresholds for this TEC.

Table 4.74 Condition thresholds for the Central Hunter Valley eucalypt forest and woodland ecological community (adapted from Table 1 in Threatened Species Scientific Committee 2010)

Category and rationale	Thresholds	Does PCT 3314 meet the threshold?	Does PCT 3315 meet the threshold?	Does PCT 3431 meet the threshold?	Does PCT 3438 meet the threshold?	Does PCT 3446 meet the threshold?
Class A. High quality condition e.g. A larger patch with good quality native understorey	Patch size is ≥ 5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	Partial (excludes 3314 – Poor) Patch sizes are ≥ 5 ha; AND ≥ 50% of perennial vegetative cover in each layer present is native (native cover <50% in 3314 – Poor); AND the patch contains at least 12 native understory species.	Yes Patch size is ≥ 5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	Yes Patch size is ≥ 5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	Yes Patch sizes are ≥ 5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	No. Patch size is < 5 ha.
Class B. High quality condition e.g. A patch with high quality native understorey	Patch size is ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native; AND the patch contains at least 12 native understory species.	Partial (excludes 3314 – Poor) Patch sizes are ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native (native cover <70% in 3314 – Poor); AND the patch contains at least 12 native understory species.	Yes. Patch sizes are ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native; AND the patch contains at least 12 native understory species.	Partial (excludes 3431 – Poor) Patch sizes are ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native (native cover <70% in 3431 – Poor); AND the patch contains at least 12 native understory species.	Yes. Patch sizes are ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native; AND the patch contains at least 12 native understory species.	Yes Patch size is ≥ 0.5 ha; AND ≥ 70% of perennial vegetative cover in each layer present is native; AND the patch contains at least 12 native understory species.

Category and rationale	Thresholds	Does PCT 3314 meet the threshold?	Does PCT 3315 meet the threshold?	Does PCT 3431 meet the threshold?	Does PCT 3438 meet the threshold?	Does PCT 3446 meet the threshold?
Class C. Moderate quality condition e.g. A patch with good quality native understorey	Patch size is ≥ 0.5 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND the patch contains at least 12 native understorey species.	Partial (excludes 3314 – Poor) Patch sizes are ≥ 0.5 ha; AND ≥ 50% of perennial vegetative cover in each layer present is native (native cover <50% in 3314 – Poor); AND the patch contains at least 12 native understory species.	Yes Patch size is ≥ 0.5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	Yes Patch size is ≥ 0.5 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND the patch contains at least 12 native understory species.	Yes Patch sizes are ≥ 0.5 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND the patch contains at least 12 native understorey species.	Yes Patch size is ≥ 0.5 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND the patch contains at least 12 native understorey species.

Category and rationale	Thresholds			Does PCT 3314 meet the threshold?	Does PCT 3315 meet the threshold?	Does PCT 3431 meet the threshold?	Does PCT 3438 meet the threshold?	Does PCT 3446 meet the threshold?
Class D. Moderate quality condition e.g. A moderate to large sized patch with: connectivity to a native vegetation area; or a mature tree; or a tree with hollows.	Patch size is ≥ 2 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND			Partial (excludes 3314 – Poor) Patch sizes are ≥ 0.5 ha; AND ≥ 50% of perennial vegetative cover in each layer present is native (native cover <50% in 3314 – Poor); AND The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area; AND The patch has at least 1 large locally indigenous tree (≥ 60 cm DBH), or at least 1 tree with hollows	Yes Patch sizes are ≥ 2 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area; AND/OR The patch has at least 1 large locally indigenous tree (≥ 60 cm DBH), or at least 1 tree with hollows	Yes Patch size is ≥ 2 ha; AND ≥ 50% of perennial understory vegetative cover is native; AND The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area; AND/OR The patch has at least 1 large locally indigenous tree (≥ 60 cm DBH), or at least 1 tree with hollows.	Yes Patch sizes are ≥ 2 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area; AND The patch has at least 1 large locally indigenous tree (≥ 60 cm DBH), or at least 1 tree with hollows.	Yes Patch size is ≥ 2 ha; AND ≥ 50% of perennial understorey vegetative cover is native; AND The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area.
	The patch is contig-uous with another patch of native woody vegeta-tion ≥1 ha in area	OR	The patch has at least 1 large locally indige-nous tree (≥ 60 cm DBH), or at least 1 tree with hollows					

4.3.2.2 River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

PCTs 3328 and 4039 are both part of the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria TEC listed under the EPBC Act.

A summary of the relevant Commonwealth guidelines available for this TEC is as follows:

- Approved conservation advice: Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/154-conservation-advice.pdf. Canberra: (DAWE 2020). In effect under the EPBC Act from 15 December 2020.

The Approved Conservation Advice has been applied to PCT 3328 and 4039 to determine whether this vegetation within the subject land is part of the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria TEC listed under the EPBC Act.

Description

The River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria is found in the South East Corner and Sydney Basin) IBRA bioregions. This encompasses the area from around Sale on the southeast coast of Victoria to around Raymond Terrace, just north of Newcastle on the NSW east coast.

The ecological community occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans. Floodplains may be occasionally or more often saturated, water-logged or inundated. The ecological community is typically found below 50 metres ASL, although it can occur up to 250 metres ASL (e.g. on floodplain pockets and plateaus above nick points).

Species composition of this ecological community is influenced by, amongst other things: the size of the patch, proximity of other native vegetation, seasonal conditions (e.g. rainfall and temperature), latitude, inundation frequency, hydrological conditions and disturbance history (including fire and grazing). Plant surveys conducted during spring and early summer will more easily identify understorey species in the ecological community and should be conducted at least 6–12 months after a major disturbance. However, the key diagnostic characteristics are designed to allow identification of the ecological community irrespective of the season.

Key diagnostic characteristics

The Approved Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (DAWE 2020) provides key diagnostic characteristics for the TEC which are:

- occurs in the South East Corner and Sydney Basin IBRA bioregions, in eastern Victoria and south eastern NSW
- occurs within the catchments of the eastern and southern watershed of the Great Dividing Range
- occurs at elevations up to 250 metres ASL, but most typically below 50 metres ASL
- occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans
- occurs on alluvial soils of various textures including silts, clay loams, sandy loams, gravel and cobbles. Does not occur on soils that are primarily marine sands, or aeolian sands
- occurs as a tall closed-forest, tall open-forest, closed forest, open forest, tall woodland, or woodland. The canopy has a crown cover of at least 20%
- has a canopy dominated by 1 or a combination of the following species: *Angophora floribunda, A. subvelutina, Eucalyptus baueriana, E. benthamii, E. bosistoana, E. botryoides, E. botryoides x E. saligna, E. elata, E. grandis, E. longifolia, E. moluccana, E. ovata, E. saligna, E. tereticornis, E. viminalis.*

All these patches occur within the Sydney Basin IBRA bioregion (Yengo and Hunter IBRA subregions) and within the catchments of the eastern watershed of the Great Dividing Range. Both PCTs within the subject land occur below 250 metres ASL and on alluvial soils. PCT 4039 within the subject land meets the key diagnostic criteria for the TEC. Occurring along the riparian zones of Monkey Place Creek, this PCT is a tall open forest with a canopy dominated by *Eucalyptus tereticornis* and *Angophora floribunda*.

While PCT 3328 within the subject land has met most of the key diagnostic criteria for the TEC, it lacked the presence of any of the diagnostic canopy species. The absence of these eucalypt species within the patches has likely been the result of previous land clearing and agricultural practices on the surrounding landscape. While these patches still consisted of the characteristic sub-canopy of *Casuarina cunninghamiana subsp. cunninghamiana* (River Oak) and *Melaleuca styphelioides* (Prickly-leaved Paperbark) with a cover greater than 20%, there was no visible indication of regeneration of the diagnostic eucalypt species within the patches. Neighbouring patches of vegetation consisting of some of these diagnostic eucalypt species (*Angophora floribunda, Eucalyptus moluccana* and *Eucalyptus tereticornis*) could potentially allow for future regeneration of the species within these patches.

Condition thresholds

The Approved Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (DAWE 2020) provides condition thresholds for the TEC which are outlined in Table 4.75.

Since PCT 3328 hasn't met the key diagnostic criteria for this TEC, it won't be considered likely to meet the condition thresholds for this TEC.

PCT 4039 meets the threshold to be considered a large patch since it's greater than 2 hectares in area. Between 50–80% of its total perennial understory vegetation cover is comprised of native species, with over 20 identified within the patch. With 5 large trees identified within the vegetation integratory plot, its likely for there to be over 20 large trees per hectare. Recent fauna surveys conducted within or near this patch have identified several arboreal mammal species, including Squirrel Glider and Yellow-bellied Glider. It likely that at least 4 or more species of arboreal mammals would utilize this patch. PCT 4039 likely meets the threshold to be considered under the condition class A2 (Large or contiguous patch in good condition with arboreal mammals).

Table 4.75 Condition thresholds for River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (adapted from Table 4 in DAWE 2020)

Biotic thresholds	**Patch size thresholds**		
	Large patch (Patch size ≥ 2 ha)	**Small contiguous patch (Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha)**	**Small patch (Patch size ≥ 0.5 ha)**
High condition ≥ 80% of its total perennial understory vegetation cover is comprised of native species; AND Ground cover richness ≥ 10 native species per sample plot; AND ≥ 20 large trees per ha.	CLASS A1 Large or contiguous patch in high condition		CLASS B1 Small patch in high condition

Biotic thresholds	Patch size thresholds		
	Large patch (Patch size ≥ 2 ha)	Small contiguous patch (Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha)	Small patch (Patch size ≥ 0.5 ha)
Good condition with arboreal mammals ≥ 50% of its total perennial understory vegetation cover is comprised of native species; AND Ground cover richness ≥ 6 native species per sample plot; AND ≥ 10 large trees per ha; AND Evidence of 4 or more arboreal mammals detected in the patch.	CLASS A2 Large or contiguous patch in good condition with arboreal mammals		CLASS B2 Small patch in good condition with arboreal mammals
Good condition ≥ 50% of its total perennial understory vegetation cover is comprised of native species; AND Ground cover richness ≥ 6 native species per sample plot; AND ≥ 10 large trees per ha.	CLASS B3 Large or contiguous patch in good condition		CLASS C1 Small patch in good condition
Moderate condition ≥ 30% of its total perennial understory vegetation cover is comprised of native species; AND Ground cover richness ≥ 4 native species per sample plot.	CLASS C2 Large or contiguous patch in moderate condition		

4.3.2.3 Warkworth Sands Woodland of the Hunter Valley

PCT 3636 is equivalent to the Warkworth Sands Woodland of the Hunter Valley TEC listed under the EPBC Act.

A summary of the relevant Commonwealth guidelines available for this TEC is as follows:

- Approved conservation advice: Approved Conservation Advice (including listing advice) for the Warkworth Sands Woodland of the Hunter Valley ecological community. Canberra. (DoE 2016). Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/143-conservation-advice-05052016.pdf. In effect under the EPBC Act from 05May2016.

The Approved Conservation Advice has been applied to PCT 3636 to determine whether this vegetation within the subject land is part of the Warkworth Sands Woodland of the Hunter Valley TEC listed under the EPBC Act.

Description

The Warkworth Sands Woodland occurs in the Hunter River catchment, in the Central Hunter region of the Hunter Valley. It occurs in the Hunter IBRA subregion, in the north of the Sydney Basin IBRA bioregion. The ecological community is only known to occur on aeolian sands – on old dune formations and swales between the dunes and on sand sheets ('veneers'); all part of the Warkworth Land System. See Figure 4.4 for the mapped distribution of the Warkworth Sands Woodland of the Hunter Valley TEC.

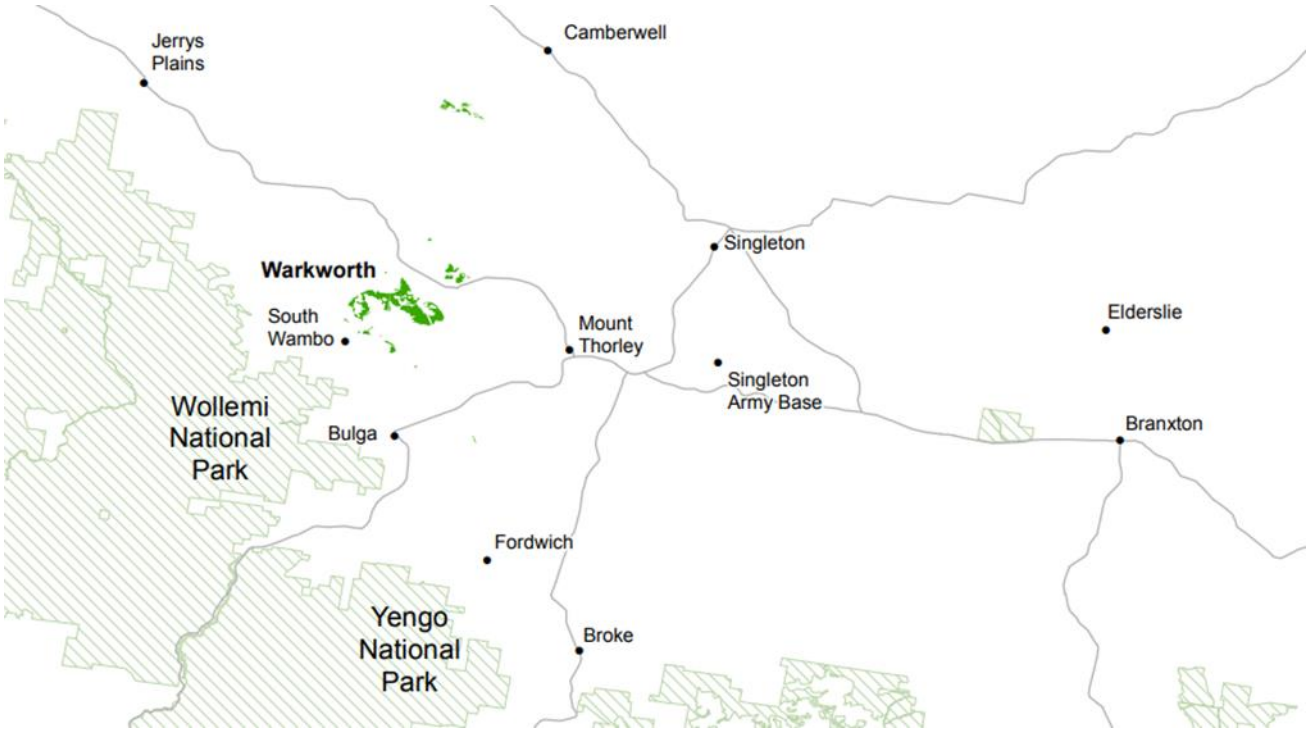


Figure 4.4 Distribution of the Warkworth Sands Woodland of the Hunter Valley (DoE 2016). Green polygons show core distribution (most likely to occur)

Isolated native grasslands are not included in the ecological community, except where they fill a gap in, or at the edge of a patch, or between 2 patches across a short distance.

Key diagnostic characteristics

The Approved Conservation Advice (including listing advice) for the Warkworth Sands Woodland of the Hunter Valley ecological community (DoE 2016) provides key diagnostic characteristics for the TEC which are:

- it occurs in the Central Hunter Valley, in the Hunter IBRA subregion of the Sydney Basin IBRA bioregion in NSW
- it occurs on aeolian sands of the Warkworth Land System
- it is a mid to low woodland (occasionally forest), with a projected crown cover of at least 10%
- a ground layer is present (although it may vary in development and composition), as a sparse to thick layer of native shrubs, bracken, grasses and/or other native herbs
- it is characterized by multiple flora species in Table 1 of the Approved Conservation Advice, although not all species need to be present (see section 1.3 of the Approved Conservation Advice for more details on vegetation structure and flora).

Other diagnostic considerations are also provided by the Approver Conservation Advice, which include:

- Warkworth Sands Woodland mostly occupies linear sand dunes, which are generally between 1 and 6 metres high, typically resting on a river terrace, on the undulating valley floor.
- As well as these deeper sand deposits, the ecological community also occurs on shallow "veneers" of sand separated from the main sand deposit by areas of clay soils developed on Permian sediments.
- It does not occur on clay soils on Permian sediments, nor does it occur on the sandy colluviums of the widespread Triassic Sandstone plateaus.
- The canopy is typically dominated by *Angophora floribunda* (rough-barked apple) on deeper sands.
- On the shallower sands (e.g.in swales) *Eucalyptus blakelyi x E. tereticornis* (Blakely's red gum-forest red gum hybrid) and sometimes *E. crebra* (narrow-leaved ironbark) may be more numerous. There may be more grasses and herbs typical of the surrounding clay landscapes, but they are not dominant in the understory.

- In more disturbed areas, other canopy trees such as *Allocasuarina luehmannii* (Buloke) and *Callitris endlicheri* (black cypress-pine) may be more.
- Other tree species may include *Eucalyptus blakelyi* (Blakely's red gum), as well as *Brachychiton populneus subsp. populneus* (kurrajong) in some areas.
- Patches with hybrid eucalypt species are included in the ecological community (i.e. areas should not be excluded on the basis of hybridisation).
- A sparse, sub-canopy layer is likely to be dominated by *Banksia integrifolia subsp. integrifolia* (coast banksia) and/or *Acacia filicifolia* (fern-leaved wattle).
- Derived native grasslands are not included in patches of this nationally protected ecological community, except where there is a gap, in or at the edge of a patch; or connecting 2 patches across a short distance (i.e. 30 metres).

The patches of PCT 3636 within the subject land (excluding derived grasslands further than 30 metres from the edge of the tree canopy) meets the key diagnostic characteristics for the EPBC Act listed Warkworth Sands Woodland of the Hunter Valley TEC.

The patches of PCT 3636 within the subject land occurs on aeolian sands within the Hunter IBRA subregion (SYB02). These disturbed woodland patches contained a canopy dominated by either *Angophora floribunda* or *Eucalyptus crebra*, with the *Allocasuarina luehmannii* usually dominant as a small tree. Tree cover was at least 10% in each of these patches, with a sparse to thick native ground layer present.

Condition thresholds

Condition thresholds have not been applied to this ecological community, because less than 500 hectares of this ecological community remains. A minimum patch size of 0.1 hectares (1000 m^2) has been applied; i.e. patches less than 0.1 hectares in size do not trigger the protection provisions of the EPBC Act. It is acknowledged that:

- small patches (≥ 0.1 hectares in size) that remain largely intact have significant conservation value
- even degraded patches that retain the characteristics of the ecological community need protecting
- mature locally indigenous trees (and hollow bearing trees) are important for the range of habitats and resources they provide to species in the ecological community and the broader region
- large intact patches are relatively uncommon in this landscape and
- larger size and/or connectivity to other native vegetation areas are typically beneficial.

The patches of PCT 3636 within the subject land all meet this minimum patch size threshold, with most adjoining to larger areas of other native vegetation.

The EPBC Act conservation advice also applies the listing to grasslands where they occur within 30 metres of a woodland patch that exceed 0.1 hectares in size. Given this a 30 metre buffer has been applied to these woodland patches and 4.86 hectares of disturbed grassland has been applied to the TEC listing.

4.3.2.4 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

PCT 3314 may form part of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC listed under the EPBC Act.

A summary of the relevant Commonwealth guidelines available for this TEC is as follows:

- Approved conservation advice: Approved Conservation Advice for the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Canberra. (Commonwealth DCCEEW 2023). Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/43-conservation-advice.pdf. In effect under the EPBC Act from 31-Aug-2023.

- Relevant listing advice: Commonwealth Listing Advice on *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Threatened Species Scientific Committee 2006). Available from: https://www.dcceew.gov.au/sites/default/files/env/pages/dcad3aa6-2230-44cb-9a2f-5e1dca33db6b/files/box-gum.pdf. In effect under the EPBC Act from 18-May-2006.
- Policy statement: EPBC Act policy statement 3.5 – White box – yellow box – Blakely's red gum grassy woodlands and derived native grasslands (DEH 2006)

The Approved Conservation Advice and Relevant Listing Advice has been applied to PCT 3314 to determine whether this vegetation within the subject land is part of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC listed under the EPBC Act.

Description

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is broadly characterized by a species-rich understory of native tussock grasses, herbs and shattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees (Threatened Species Scientific Committee 2006) Associated, and occasionally co-dominant, trees include, but are not restricted to *Eucalyptus microcarpa, Eucalyptus conica, Eucalyptus bridgesiana, Eucalyptus polyanthemos, Eucalyptus macrorhyncha, Callitris glaucophylla, Callitris endlicheri, Eucalyptus goniocalyx, Eucalyptus caliginosa, Eucalyptus mannifera, Eucalyptus rubida, Eucalyptus cinerea, Brachychiton populneus* and *Allocasuarina verticillata* (Threatened Species Committee 2023). This ecological community occurs in areas where rainfall is between 400 and 1200 millimetres per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres (NSW Scientific Committee 2020).

Key diagnostic characteristics

The Approved Conservation Advice for the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Commonwealth DCCEEW 2023) provides key diagnostic characteristics for the TEC which are:

- The ecological community occurs in the following bioregions: Brigalow Belt South, Murray Darling Depression, Nandewar, New England Tableland, NSW North Coast, NSW South Western Slopes, Riverina, South Eastern Queensland, South East Corner, South East Coastal Plain, South Eastern Highlands, Southern Volcanic Plain, Sydney Basin and Victorian Midlands
- It has, or previously had, an overstory dominated or co-dominated by:
  - *Eucalyptus albens* (White Box) and/or *Eucalyptus melliodora* (Yellow Box) and/or *Eucalyptus blakelyi* (Blakely's Red Gum) (applicable across the entire range of the ecological community); or
  - In the Nandewar bioregion, any of the above three species and/or *Eucalyptus microcarpa* (Western Grey Box) and/or *E. moluccana* (Coastal Grey Box).
- It has a predominantly native ground layer.
- Tussock grasses are conspicuous in the ground layer (except in some situations, such as under dense groves of shrubs or regenerating trees), usually with several native species from some of the following genera: *Austrostipa, Bothriochloa, Chloris, Cymbopogon, Dichanthium, Microlaena, Poa, Themeda, Rytidosperma* or *Sorghum*.
- Amongst the grass tussocks and sometimes in swathes, a range of broad-leaved forbs and petaloid monocots (e.g. lilies *sens. lat.*) may be a major component of the plant diversity.
- While shrubs may be dominant locally within areas of the ecological community, areas of native vegetation with a more continuous shrub layer, in which the average shrub cover of the whole patch is greater than 30%, is considered to be a shrubby woodland and so is not part of the listed ecological community. In assessing this, the effects of disturbance need to be considered, e.g. where heavy grazing may result in high densities of shrubs during a recovery phase.

While PCT 3314 in the subject land meets some of these key diagnostic characteristics for the TEC, it does not include and/or have evidence that it contained the characteristic canopy species listed above within its patches. The only canopy species recorded within these patches was *Eucalyptus moluccana*, which was often accompanied with *Allocasuarina luehmannii* and *Brachychiton populneus*. One plot (HTP-MS-03) recorded *Eucalyptus tereticornis*, however this plot was dominated by *Eucalyptus moluccana* and *Allocasuarina luehmannii*. The vegetation within the subject land mapped as PCT 3314 doesn't meet the key diagnostic characteristics of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC.

Furthermore, PCT 3314 in the subject land has also been tested against the Central Hunter Valley eucalypt forest and woodland ecological community TEC, which it also forms part of. PCT 3314 (Thinned) and 3314 (Poor) were found to meet the key diagnostic characteristics for the TEC. PCT 3314 (disturbed grassland) didn't meet the key diagnostic characteristics for the TEC.

4.4 Vegetation zones

The vegetation within the subject land was firstly assigned to a PCT which was then divided into vegetation zones based on condition using features such as disturbance to growth form groups for tree, shrub and ground cover, and/or extent of exotic species. A vegetation zone is defined in the BAM as 'an area of native vegetation on the proposal site that is the same PCT and has the same broad condition state'. A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

Broad condition state is used for stratifying areas of the same PCT into a vegetation zone for determining vegetation integrity score. The broad condition states used for this report are outlined in Table 4.76. The VI score of each plot was used as a guide to assign vegetation zones. However, as benchmark data had to be used for some vegetation zones due to absence of survey data the VI scores do not necessarily represent the on ground condition of the vegetation zone. Importantly, where this is the case the assigned VI scores will be higher than they actually are. Underestimation of VI scores is avoided. This provides a conservative assessment of vegetation integrity by overestimating biodiversity values in these vegetation zones.

Patch size was determined in accordance with BAM subsection 4.3.2. A patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 metres from the next area of native vegetation (or ≤ 30 metres for non-woody ecosystems). A patch may extend onto adjoining land. The vegetation zones in the subject land are connected to large areas of good condition bushland that are in excess of 100 hectares. As such, each vegetation zone has been assigned to the ≥ 100 hectare class.

Vegetation zones are illustrated in Figure 14.12.

Table 4.77 to Table 4.79 outline the vegetation zones and patch size for each vegetation zone mapped in each subregion.

Table 4.76 Native vegetation broad condition states

Condition	Code used in BAM-C	Description	VI Score
Moderate_Good	Mod_good	High quality areas of vegetation with close to benchmark VI scores. This condition state represents the best condition vegetation within the subject land. Native vegetation is relatively intact but may have some altered structural layers. Exotic weed cover is generally low.	Variable although generally 65–100
Thinned	Thinned	Native vegetation that has obvious altered structural layers (i.e. canopy thinning, shrub layer removal, etc.) but otherwise retains native species. Exotic weed cover is generally low.	Variable although generally 40–64
Poor	Poor	Vegetation in Poor condition that has altered structural layers and/or the groundcover layer is dominated or co-dominated by exotic species. Native species diversity is generally relatively low and the mid and low stratums have been structurally modified due to weed incursions, clearing, agricultural practises such as cropping or direct seeding.	Variable although generally 0–39
Derived	Derived	Grasslands that contain a dominance of native species (i.e. native species cover is greater than exotic species cover) but are derived or secondary forms resulting from clearing of a PCT. For this BDAR, it includes PCTs that have changed to an alternative state because of land management practices since European settlement. Over-storey structural components of derived communities have either entirely been removed or are severely reduced (i.e. derived native grasslands with or without scatted paddock trees). These areas can contain regrowth trees.	Variable, only areas with VI score above offset threshold.
Disturbed Grassland	Disturbed_Grassland	Exotic Grasslands	VI scores below offset threshold
Plantation	Plantation	This vegetation type comprises mostly of forestry plantations of Forestry Corporation of NSW and revegetation plantings on mining and power infrastructure land. Plantations generally comprise of native species plantings that contain species compositions in 1 or more stratum.	Variable, only areas with VI score above offset threshold.
Sub-categories where offset thresholds were not met			
CEEC – Offset not required	No Offset	<15 for a PCT representative of a critically endangered ecological community (CEEC) or an endangered ecological community (EEC).	<15
Threatened species habitat – Offset not required	No Offset	<17 for a PCT that provides habitat for threatened species or is representative of a vulnerable ecological community (VEC).	<17
PCT – Offset not required	No Offset	<20 for a PCT that is not representative of a TEC or associated with threatened species habitat.	<20

Table 4.77 Vegetation zones and patch sizes within the Wyong IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
11	3029_Mod-good	3029 – Lower North Wet Gully Palm Rainforest	Mod-good	4.81	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	4	4	HTP-MS-43 HTP-MS-52 HTP-MS-59 HTP-MS-63
1	3150_Mod-good	3150 – Hunter Coast Ranges Turpentine Wet Forest	Mod-good	33.98	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	5	5	LCSM-19 HTP-MS-42 HTP-MS-44 HTP-MS-56 HTP-MS-58
8	3150_Plantation	3150 – Hunter Coast Ranges Turpentine Wet Forest	Plantation	2.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	LCSM-15 HTP-MS-50
2	3230_Mod-good	3230 – Central Coast Escarpment Moist Forest	Mod-good	43.53	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	6	6	LCSM-03 LCSM-08 LCSM-11 HTP-MS-48 HTP-MS-60 HTP-MS-62

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
9	3230_Plantation	3230 – Central Coast Escarpment Moist Forest	Plantation	11.63	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	LCSM-12 LCSM-14 LCSM-17 HTP-MS-57
3	3239_Mod-good	3239 – Hunter Range Sheltered Grey Gum Forest	Mod-good	4.90	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	LCSM-26 TS-17
4	3242_Mod-good	3242 – Lower North Ranges Turpentine Moist Forest	Mod-good	25.93	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	5	5	HTP-MS-11 HTP-MS-17 HTP-MS-46 HTP-MS-54 HTP-MS-55
13	3244_Mod-good	3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Mod-good	1.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	HTP-MS-53
10	3250_Mod-good	3250 – Northern Foothills Blackbutt Grassy Forest	Mod-good	2.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	TC-14 TC-15

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
5	3263_Mod-good	3263 – Watagan Range Turpentine-Mahogany Grassy Forest	Mod-good	39.10	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	5	5	LCSM-21 LCSM-24 LCSM-25 HTP-MS-12 HTP-MS-16
12	3581_Mod-good	3581 – Hunter Coast Foothills Apple Forest	Mod-good	0.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	TC-16
6	3617_Mod-good	3617 – Sydney Hinterland Peppermint-Apple Forest	Mod-good	33.65	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	4	4	LCSM-05 LCSM-06 HTP-MS-65 TS-04
7	3621_Mod-good	3621 – Sydney Hinterland Turpentine-Apple Gully Forest	Mod-good	4.86	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	3	3	LCSM-04 LCSM-07 LCSM-10

Table 4.78 Vegetation zones and patch sizes within the Yengo IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
24	3086_Mod-good	Lower North Hinterland Riparian Dry Rainforest	Mod-good	1.90	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	HTP-MS-74
1	3087_Mod-good	3087 – Lower North Ranges Riparian Turpentine Forest	Mod-good	2.82	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	TC-19 HTP-MS-10
18	3151_ Mod-good	3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	Mod-good	1.85	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	HTP-MS-75
2	3152_ Mod-good	3152 – Hunter Range Turpentine-Grey Myrtle Gully Forest	Mod-good	0.92	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (includes 1 benchmark plot)	benchmark
3	3230_Mod-good	3230 – Central Coast Escarpment Moist Forest	Mod-good	15.30	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	LCSM-29 HTP-MS-13 TC-09

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
4	3237_ Mod-good	3237 – Hunter Range Blue Gum Gully Forest	Mod-good	5.46	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	HTP-MS-78 HTP-MS-79 HTP-MS-80
14	3238_ Mod-good	3238 – Hunter Range Colluvial Apple-Gum Forest	Mod-good	0.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	0	benchmark
5	3239-Mod-good	3239 – Hunter Range Sheltered Grey Gum Forest	Mod-good	96.43	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	4	5 (includes 1 benchmark plot)	HTP-MS-18 HTP-MS-19 HTP-MS-25 TS-18 benchmark
22	3239_Plantation	3239 – Hunter Range Sheltered Grey Gum Forest	Plantation	2.83	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	HTP-MS-76 HTP-MS-77
19	3241_Mod-good	3241 – Lower North White Mahogany-Spotted Gum Moist Forest	Mod-good	10.21	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	2	3 (includes 1 benchmark plot)	HTP-MS-20 HTP-MS-82 benchmark

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
6	3242_Mod-good	3242 – Lower North Ranges Turpentine Moist Forest	Mod-good	10.57	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	LCSM-28 HTP-MS-83 TC-11
7	3244_Mood-good	3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Mod-good	0.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	DL-18
15	3328_ Mod-good	3328 – Lower Hunter Red Gum-Paperbark Riverflat Forest	Mod-good	0.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	DL-32
8	3438_Mod-good	3438 – Hunter Escarpment Footslopes Ironbark Forest	Mod-good	1.97	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	DL-63 DL-66
9	3439_Mod-good	3439 – Hunter Escarpment Grey Gum Sheltered Forest	Mod-good	1.62	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (includes 1 benchmark plot)	benchmark

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
16	3444_Mod-good	3444 – Lower Hunter Spotted Gum-Ironbark Forest	Mod-good	0.92	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	benchmark
23	3444_Derived	3444 – Lower Hunter Spotted Gum-Ironbark Forest	Derived	0.29	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (includes 1 benchmark plot)	benchmark
17	3446_Mod-good	3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest	Mod-good	1.35	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	DL-39
10	3489_Mod-good	3489 – Hunter Escarpment Grey Box Forest	Mod-good	5.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	1	3 (includes 2 benchmark plot)	DL-31 2 benchmark plots
11	3599_Mod-good	3599 – Blue Mountains Peppermint Shrub Forest	Mod-good	7.24	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	TC-05 TC-12 TC-17

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
12	3605_Mod-good	3605 – Hunter Range Ironbark Forest	Mod-good	57.10	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	5	5	HTP-MS-26 DL-04 DL-21 DL-22 HTP-MS-15
13	3617_Mod-good	3617 – Sydney Hinterland Peppermint-Apple Forest	Mod-good	1.91	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	TC-18
20	4039_Mod-good	4039 – Hunter Range Creekflat Apple-Red Gum Forest	Mod-good	0.07	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1	benchmark
21	4072_ Mod-good	4072 – Hunter River Oak Mesic Forest	Mod-good	0.07	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (includes 1 benchmark plot)	benchmark

Table 4.79 Vegetation zones and patch sizes within the Hunter IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
20	3086_Mod-good	3086 – Lower North Hinterland Riparian Dry Rainforest	Mod-good	4.06	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	0	0	benchmark
21	3087_Mod-good	3087 – Lower North Ranges Riparian Turpentine Forest	Mod-good	0.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	0	benchmark
22	3239-Mod-good	3239 – Hunter Range Sheltered Grey Gum Forest	Mod-good	5.81	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	0	3 (includes 3 benchmark plots)	3 benchmark plots
23	3241_Mod-good	3241 – Lower North White Mahogany-Spotted Gum Moist Forest	Mod-good	2.09	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	DL-67 HTP-MS-81
1	3314_Thinned	3314 – Central Hunter Slopes Grey Box Forest	Thinned	38.46	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	4	4	HTP-MS-03 HTP-MS-05 DL-37 NE-1

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
2	3314_Poor	3314 – Central Hunter Slopes Grey Box Forest	Poor	19.40	☐ <5 ha ☐ 5–24 ha ☒ 25–100 ha ☐ >100 ha	3	3	3	TC-08 HTP-DR-07 HTP-MS-88
3	3314_Disturbed_ Grassland	3314 – Central Hunter Slopes Grey Box Forest	Disturbed_Grassland	20.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	NE-2 TS-12 TS-13 HTP-MS-23
4	3315_Thinned	3315 – Central Hunter Ironbark-Spotted Gum Forest	Thinned	8.86	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	DL-64 DL-74 DL-77
5	3315_Derived	3315 – Central Hunter Ironbark-Spotted Gum Forest	Derived	17.44	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	DL-75 DL-76 DL-78
6	3431_Thinned	3431 – Central Hunter Ironbark Grassy Woodland	Thinned	63.42	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	5	5	DL-30 DL-45 DL-46 DL-47 DR-06

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
9	3431_Poor	3431 – Central Hunter Ironbark Grassy Woodland	Poor	5.20	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	HTP-MS-02 DL-26 DL-52
15	3431_Driturbed_ Grassland	3431 – Central Hunter Ironbark Grassy Woodland	Disturbed Grassland	35.34	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	4	4	DR-01 DR-04 DR-05 DL-40
7	3431_Plantation	3431 – Central Hunter Ironbark Grassy Woodland	Plantation	14.90	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	DR-02 DR-03 HTP-MS-01
8	3438_Mod-good	3438 – Hunter Escarpment Footslopes Ironbark Forest	Mod-good	10.22	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	1	3 (includes 2 benchmark plots)	DL-73 2 benchmark
10	3444_Mod-good	3444 – Lower Hunter Spotted Gum-Ironbark Forest	Mod-good	36.64	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	4	4	DL-43 DL-44 DL-62 DL-70

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
24	3444_Derived	3444 – Lower Hunter Spotted Gum-Ironbark Forest	Derived	0.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	TC-07
18	3446_Mod-good	3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest	Mod-good	0.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	0	Benchmark
11	3636_Thinned	3636 – Warkworth Sands Woodland	Thinned	7.51	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	HTP-TB-01 HTP-TB-02 HTP-MS-31
12	3636_Disturbed_ Grassland	3636 – Warkworth Sands Woodland	Disturbed Grassland	14.57	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	HTP-MS-33 HTP-MS-36 HTP-MS-37 HTP-MS-38
13	4015_Thinned	4015 – Central Hunter Riparian Forest	Thinned	7.61	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	DL-29 DL-72 MS-39

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
14	4015_Derived	4015 – Central Hunter Riparian Forest	Derived	2.21	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	DL-50 DL-79
16	4039_Mod-good	4039 – Hunter Range Creekflat Apple-Red Gum Forest	Mod-good	0.84	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	DL-41
17	4072_Mod-good	4072 – Hunter River Oak Mesic Forest	Mod-good	0.14	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	DL-68
19	4089_Poor	4089 – Namoi-Upper Hunter River Red Gum Forest	Poor	4.22	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	HTP-MS-68 HTP-MS-73
25	4089_Derived	4089 – Namoi-Upper Hunter River Red Gum Forest	Derived	6.92	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	HTP-MS-69 HTP-MS-70 Q46 (Umwelt 2024)

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

There were over 286 vegetation integrity plots completed during the survey from May 2023 to March 2025 over 90 field team days. Due to ongoing design refinements and alignment changes a selection of 138 of these plots were deemed suitable for use for this assessment. The location of vegetation integrity plots used for this assessment are shown in Figure 14.7.

Table 4.80 to Table 4.82 outline the number of vegetation integrity survey plots required for each vegetation zone and whether the minimum number of plots has been sampled in accordance with BAM Table 3.

Due to design changes and ongoing refinement of the alignment, some vegetation integrity survey plots were completed in areas that are now unaffected by the project and are outside of the subject land. This was prevalent throughout the alignment.

Where possible, local data was used to make up shortfalls. In lieu of using benchmark data for a PCT from the BioNet Vegetation Classification Database, existing plot data (benchmark plot) collected during the survey was duplicated in the BAM calculator or data from a better-quality vegetation zone was used as follows:

- Yengo – PCT 3239 Mod-good was partly unable to be surveyed due to survey constraints. This vegetation zone required 5 plots. One benchmark plot has been used in the BAM-C for this vegetation zone.
- Yengo – PCT 3241 Mod-good was partly unable to be surveyed due to survey constraints. This vegetation zone required 3 plots. One benchmark plot has been used in the BAM-C for this vegetation zone.
- Yengo – PCT 3489 Mod-good was partly unable to be surveyed due to survey constraints. This vegetation zone required 3 plots. Two benchmark plots have been used in the BAM-C for this vegetation zone.
- Hunter – PCT 3438 Mod-good was partly unable to be surveyed due to survey constraints. This vegetation zone required 3 plots. Two benchmark plots have been used in the BAM-C for this vegetation zone.
- Hunter – PCT 4089 Derived was partly unable to be surveyed due to lack of property access. Data from a pre-existing plot (Q46 – Umwelt 2022) has been used with the Hunter data in the BAM-C for this vegetation zone.

Where no other data was available in the same IBRA subregion for a PCT or Vegetation Zone (i.e. due to limited property access preventing survey), benchmark data for a PCT from the BioNet Vegetation Classification Database was used. Benchmark data was used for the following vegetation zones:

- Yengo – PCT 3152 Mod-good, PCT 3238 Mod-good, PCT 3439 Mod-good, PCT 3444 Mod-good, PCT 3444 Derived, PCT 4039 Mod-good and PCT 4072 Mod-good.
- Hunter – PCT 3086 Mod-good, PCT 3087 Mod-good, PCT 3239 Mod-good and PCT 3446 Mod-good.

4.5.2 Vegetation integrity scores

The vegetation integrity scores for each vegetation zone in each IBRA subregion are outlined in Table 4.80 to Table 4.82.

Note that due to the necessary use of PCT benchmark scores in place of field data and duplication of plots the vegetation integrity scores for some zones do not necessarily meet the scores as defined in section 4.4.

Table 4.80 Vegetation integrity scores for the Wyong IBRA subregion

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
11 – PCT 3029 – Lower North Wet Gully Palm Rainforest – Mod-good	88.7	98.2	93.5	93.4	Yes
1 – PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest – Mod-good	75.2	83.3	68	75.3	Yes
8 - PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest – Plantation	72.5	74.7	63.2	69.9	No
2 – PCT 3230 – Central Coast Escarpment Moist Forest – Mod-good	80.2	74.7	84.1	79.6	Yes
9 – PCT 3230 – Central Coast Escarpment Moist Forest – Plantation	68.9	74.1	60.2	67.5	No
3 – PCT 3239 – Hunter Range Sheltered Grey Gum Forest – Mod-good	64.2	72.6	47	60.3	Yes
4 – PCT 3242 – Lower North Ranges Turpentine Moist Forest – Mod-good	95.6	77.2	90.1	87.3	Yes
13 – 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	85.4	77	48.7	68.4	Yes
10 – PCT 3250 – Northern Foothills Blackbutt Grassy Forest – Mod-good	77.3	61.5	51.5	62.6	No
5 – PCT 3263 – Watagan Range Turpentine-Mahogany Grassy Forest – Mod-good	83.6	86	63.8	77.1	Yes
12 – PCT 3581 – Hunter Coast Foothills Apple Forest – Mod-good	55.4	55.6	89.4	65	No
6 – PCT 3617 – Sydney Hinterland Peppermint-Apple Forest – Mod-good	70.4	67.4	93	76.1	Yes
7 – PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest – Mod-good	70.8	72.4	94.5	78.5	No

Table 4.81 Vegetation integrity scores for the Yengo IBRA subregion

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
24 – 3086 – Lower North Hinterland Riparian Dry Rainforest – Mod-good	96	84.5	69.6	82.7	No
1 – 3087 – Lower North Ranges Riparian Turpentine Forest – Mod-good	90.4	90.3	74.2	84.6	Yes
18 – 3151 – Northwest Sydney Sandstone Grey Myrtle Dry Rainforest – Mod-good	88	53.3	49	61.3	No
2 – 3152 – Hunter Range Turpentine-Grey Myrtle Gully Forest – Mod-good	100	100	100	100	Yes
3 – 3230 – Central Coast Escarpment Moist Forest – Mod-good	81.7	91.4	63.8	78.1	No
4 – 3237 – Hunter Range Blue Gum Gully Forest – Mod-good	96	79.1	69.4	80.8	Yes
14 – 3238 – Hunter Range Colluvial Apple-Gum Forest – Mod-good	100	100	100	100	Yes
5 – 3239 – Hunter Range Sheltered Grey Gum Forest – Mod-good	80.9	88.2	56.9	74.1	Yes
22 – 3239 – Hunter Range Sheltered Grey Gum Forest – Plantation	78.3	68.1	20.9	48.1	No
19 – 3241 – Lower North White Mahogany-Spotted Gum Moist Forest – Mod-good	94.2	92.4	64.6	82.6	Yes
6 – 3242 – Lower North Ranges Turpentine Moist Forest – Mod-good	86.5	73.5	55.6	70.7	No
7 – 3244 – Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest – Mod-good	92.3	97.6	79	89.3	Yes
15 – 3328 – Lower Hunter Red Gum-Paperbark Riverflat Forest – Mod-good	25	73.6	18.9	32.6	No
8 – 3438 – Hunter Escarpment Footslopes Ironbark Forest – Mod-good	80.4	86.4	69.4	78.4	Yes
9 – 3439 – Hunter Escarpment Grey Gum Sheltered Forest – Mod-good	100	100	100	100	Yes
16 – 3444 – Lower Hunter Spotted Gum-Ironbark Forest – Mod-good	100	100	100	100	Yes

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
23 – 3444 – Lower Hunter Spotted Gum-Ironbark Forest – Derived	100	100	100	100	Yes
17 – 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest – Mod-good	98.2	83.8	61.8	79.8	No
10 – 3439 – Hunter Escarpment Grey Gum Sheltered Forest – Mod-good	99.5	96.6	73	88.9	Yes
11 – 3599 – Blue Mountains Peppermint Shrub Forest – Mod-good	50	67.4	93.6	68.1	Yes
12 – 3605 – Hunter Range Ironbark Forest – Mod-good	68.1	87.6	53.6	68.4	Yes
13 – 3617 – Sydney Hinterland Peppermint-Apple Forest – Mod-good	79.1	59.2	74	70.2	Yes
20 – 4039 – Hunter Range Creekflat Apple-Red Gum Forest – Mod-good	100	100	100	100	Yes
21 – 4072 – Hunter River Oak Mesic Forest – Mod-good	100	100	100	100	Yes

Table 4.82 Vegetation integrity scores for the Hunter IBRA subregion

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
20 – 3086 – Lower North Hinterland Riparian Dry Rainforest – Mod-good	100	100	100	100	Yes
21 – 3087 – Lower North Ranges Riparian Turpentine Forest – Mod-good	100	100	100	100	Yes
22 – 3239 – Hunter Range Sheltered Grey Gum Forest – Mod-good	100	100	100	100	Yes
23 – 3241 – Lower North White Mahogany-Spotted Gum Moist Forest – Mod-good	82.7	75.3	56.4	70.5	Yes
1 – 3314 – Central Hunter Slopes Grey Box Forest – Thinned	83.7	73.6	65.4	73.9	Yes
2 – 3314 – Central Hunter Slopes Grey Box Forest – Poor	62.6	17.7	43.5	36.4	No

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
3 – 3314 – Central Hunter Slopes Grey Box Forest – Disturbed_Grassland	25.6	33.9	0.6	9.5	No
4 – 3315 – Central Hunter Ironbark-Spotted Gum Forest – Thinned	93.4	92.1	48.1	74.5	Yes
5 – 3315 – Central Hunter Ironbark-Spotted Gum Forest – Derived	32.9	42.9	4.2	18.1	No
6 – 3431 – Central Hunter Ironbark Grassy Woodland – Thinned	79.1	71.2	60.9	70	Yes
9 – 3431 – Central Hunter Ironbark Grassy Woodland – Poor	61.2	55.5	33.5	48.5	No
15 – 3431 – Central Hunter Ironbark Grassy Woodland – Disturbed_Grassland	32.4	39.5	0	10.9	No
7 – 3431 – Central Hunter Ironbark Grassy Woodland – Plantation	60.7	44.1	33.8	44.9	Yes
8 – 3438 – Hunter Escarpment Footslopes Ironbark Forest – Mod-good	99.9	96.3	99.3	98.5	Yes
10 – 3444 – Lower Hunter Spotted Gum-Ironbark Forest – Mod-good	96.8	95.6	47.4	76	No
24 – 3444 – Lower Hunter Spotted Gum-Ironbark Forest – Derived	57.7	57.5	18.1	39.2	No
18 – 3446 – Lower North Foothills Ironbark-Box-Gum Grassy Forest – Mod-good	100	100	100	100	Yes
11 – 3636 – Warkworth Sands Woodland – Thinned	60.4	47.7	64.2	57	Yes
12 – 3636 – Warkworth Sands Woodland – Disturbed_Grassland	20	32.9`	0	8.7	No
13 – 4015 – Central Hunter Riparian Forest – Thinned	60.9	69.7	94.3	73.7	Yes
14 – 4015 – Central Hunter Riparian Forest – Derived	47.9	60.9	8.9	29.6	No
16 – 4039 – Hunter Range Creekflat Apple-Red Gum Forest – Mod-good	93.2	87.6	90.4	90.4	Yes
17 – 4072 – Hunter River Oak Mesic Forest – Mod-good	49.7	56.1	100	65.3	No

Vegetation zone ID and name	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
19 – 4089 – Namoi-Upper Hunter River Red Gum Forest – Poor	6.4	12	78.6	18.2	Yes
25 – 4089 – Namoi-Upper Hunter River Red Gum Forest – Derived	21.9	39.4	15.6	23.8	No

4.5.3 Use of benchmark data

This report has only relied upon standard average BioNet approved vegetation condition benchmark data and does not rely on any wet or dry benchmarks and does not rely on any local modified benchmark data.

4.6 Scattered trees assessment

A total of 25 trees were recorded within the subject land. A breakdown, per IBRA subregion, of each scattered tree type, class and associated PCT is provided in Table 4.83 and Table 4.85.

The location of each recorded scattered tree is shown in Figure 14.10.

In respect to Appendix B.4 of the BAM, no candidate threatened species (including SAII species) are considered likely to use any recorded scattered trees for habitat. Table 4.84 and Table 4.86 outlines the reasons for removal of threatened species from the scattered tree assessments. No SAII species would be impacted on by the proposed clearing of scattered trees. As no threatened species at risk of a SAII are present (nor are likely to be present) the scattered tree module can be applied.

Table 4.83 Assessment of scattered trees in the Yengo IBRA subregion

Class	Species	Number of trees	Contain hollows	DBH Category
3489 – Hunter Escarpment Grey Box Forest				
2	*Eucalyptus sparsifolia*	4	No (visual assessment)	≥20 cm and <50 cm DBH

Table 4.84 Scattered tree threatened species assessment for the Yengo IBRA subregion

Species type	Species	Habitat constraint	BAM-C outcome
Habitat suitability: Predicted species	*Calyptorhynchus lathami lathami* (Glossy Black-Cockatoo) (Foraging)	Presence of *Allocasuarina* and *Casuarina* species.	Removed. The scattered trees are *Eucalyptus* species so the 'Presence of *Allocasuarina* and *Casuarina* species' was deselected in the BAM-C case.
	Ephippiorhynchus asiaticus (Black-necked Stork)	Swamps; Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps. Waterbodies; Shallow lakes, lake margins and estuaries within 300 m of these waterbodies.	Removed. Trees not located within 300 m of this habitat constraint.
	Grantiella picta (Painted Honeyeater)	Mistletoes present at a density of greater than 5 mistletoes per hectare.	Removed. Trees were not recorded to contain mistletoes present at a density of greater than 5 mistletoes per hectare.
	Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Waterbodies; Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	Retained. Tress located within 1 km of Congewai Creek
	All other ecosystem credit species without identified habitat constraints	N/A	Retained
Habitat suitability: Candidate species	*Anthochaera phrygia* Regent Honeyeater (Breeding)	As per Important Habitat Map	Removed. The subject land is not included on the Regent Honeyeater Important Habitat Map.
	Lathamus discolor Swift Parrot (Breeding)	As per Important Habitat Map	Removed. The subject land is not included on the Swift Parrot Important Habitat Map.

Table 4.85 Assessment of scattered trees in the Hunter IBRA subregion

Class	Species	Number of trees	Contain hollows	DBH Category
3314 – Central Hunter Slopes Grey Box Forest				
1	*Eucalyptus moluccana*	1	No (visual assessment)	<20 cm DBH
3	*Eucalyptus moluccana*	1	Yes (visual assessment)	>50 cm DBH
3431 – Central Hunter Ironbark Grassy Woodland				
3	*Eucalyptus crebra*	6	Yes (estimated)	>50 cm DBH
3	*Eucalyptus moluccana*	6	Yes (estimated)	>50 cm DBH
3	*Eucalyptus tereticornis*	3	Yes (estimated)	>50 cm DBH
4015 – Central Hunter Riparian Forest				
2	*Eucalyptus tereticornis*	1	Yes (visual assessment)	≥20 cm and <50 cm DBH
3	*Eucalyptus tereticornis*	1	Yes (estimated)	>50 cm DBH
4089 – Namoi-Upper Hunter River Red Gum Forest				
3	*Eucalyptus tereticornis*	2	Yes (estimated)	>50 cm DBH

Table 4.86 Scattered tree threatened species assessment for the Hunter IBRA subregion

Species type	Species	Habitat constraint	BAM-C outcome
Habitat suitability: Predicted species	*Calyptorhynchus lathami lathami* (Glossy Black-Cockatoo) (Foraging)	Presence of *Allocasuarina* and *Casuarina* species.	Removed. The scattered trees are *Eucalyptus* species so the 'Presence of *Allocasuarina* and *Casuarina* species' was deselected in the BAM-C case.
	Ephippiorhynchus asiaticus (Black-necked Stork)	Swamps; Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps. Waterbodies; Shallow lakes, lake margins and estuaries within 300 m of these waterbodies.	Removed. Trees not located within 300 m of this habitat constraint.
	Grantiella picta (Painted Honeyeater)	Mistletoes present at a density of greater than 5 mistletoes per hectare.	Retained. The scattered trees were not inspected in the field so it is unknown whether the trees contain Mistletoes present at a density of greater than 5 mistletoes per hectare. Mistletoes are assumed present in the absence of data.

Species type	Species	Habitat constraint	BAM-C outcome
	Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Waterbodies; Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	Retained. Tress located within 1 km of the Hunter River.
	All other ecosystem credit species without identified habitat constraints	N/A	Retained
Habitat suitability: Candidate species	*Acacia pendula* - endangered population *Acacia pendula* population in the Hunter catchment	N/A	Removed. Habitat degraded.
	Anthochaera phrygia Regent Honeyeater (Breeding)	As per Important Habitat Map	Removed. The subject land is not included on the Regent Honeyeater Important Habitat Map.
	Eucalyptus pumila Pokolbin Mallee	N/A	Removed. Habitat degraded.
	Lathamus discolor Swift Parrot (Breeding)	As per Important Habitat Map	Removed. The subject land is not included on the Swift Parrot Important Habitat Map.
	Persoonia pauciflora North Rothbury Persoonia	N/A	Removed. Habitat degraded.
	Prasophyllum sp. Wybong	N/A	Removed. Habitat degraded.

4.7 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are communities of plants, animals, and other organisms whose extent and life processes are dependent on groundwater. When considering GDEs, groundwater is generally defined as the saturated zone of the regolith (the layer of loose rock resting on bedrock, constituting the surface of most land) and its associated capillary fringe, but it excludes soil water held under tension in soil pore spaces (the unsaturated zone or vadose zone) (Eamus et al. 2006).

GDEs include a diverse range of ecosystems, from those entirely dependent on groundwater to those that may use groundwater while not having a dependency on it for survival (i.e., ecosystems or organisms that use groundwater opportunistically or as a supplementary source of water) (Hatton and Evans 1998). Broad classes of GDEs that have the potential to be present within or near the subject land include:

- Ecosystems dependent on the surface expression of groundwater may be present in the subject land. This category of GDE includes base-flow rivers and watercourses, wetlands, some floodplains and mound springs and estuarine seagrass beds. Although plant roots are generally below ground, this class of GDEs requires a surface expression of groundwater, which may, in many cases, then soak below the soil surface and thereby become available to plant roots.

- Ecosystems dependent on the subsurface presence of groundwater, often accessed via the capillary fringe (non saturated zone above the saturated zone of the water table) when roots penetrate this zone, are likely to be present in the subject land. No surface expression of groundwater is required in this class of GDEs.

Groundwater levels on alluvial floodplains that support the forested wetland PCTs are expected to be moderately shallow. The groundwater systems within the subject land are recharged via the infiltration of rainfall and surface water runoff. Infiltration is thought to occur primarily through the profile of the Hunter Region and its ground water sources.

The GDE Atlas provides a national dataset of Australian GDEs based on a methodology that incorporates data from multiple sources including climate, river basins, groundwater systems, vegetation mapping, surface water mapping and conceptual understanding of how groundwater and ecosystems interact (Australian Bureau of Meteorology 2023). Review of the GDE Atlas in the subject land indicates likelihoods of GDAs being present.

An assessment of the possible relationships of PCTs and GDEs in the subject land indicates that several PCTs in the have a high or moderate potential to be GDEs.

The terrestrial GDE mapping indicates that the Forested Wetland vegetation types have high potential terrestrial GDEs (i.e., have a high potential for groundwater interaction) that may rely on surface expression of groundwater. Some Rainforests PCTs are also considered high potential terrestrial GDEs. The Forested Wetlands are most likely to rely on subsurface presence of groundwater.

Some portions of the Wet Sclerophyll Forest and Dry Sclerophyll Forest PCTs within the subject land are likely Moderate Potential GDEs (i.e., have a moderate potential for groundwater interaction).

All remaining Dry Sclerophyll Forest, Wet Sclerophyll Forest, Rainforest and Grassy Woodland PCTs within the subject land are likely to be Low Potential GDEs (i.e., have a Low potential for groundwater interaction). These drier forest types are not obligate GDEs (i.e., they are not entirely dependent on groundwater (often accessed via the capillary fringe – subsurface water just above the water table) in some locations but not others, particularly where an alternative source of water (i.e., rainfall) cannot be accessed to maintain ecological function. The plants within these PCTs would use shallow soil water before seeking deeper soil water or groundwater. The trees may take up groundwater from the capillary fringe when necessary (e.g., during dry seasons or in extended drought). The survival and position of these Forested Wetland PCTs rely on the current hydrology of the area.

5 Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

5.1.1 Geographic and habitat constraints assessment

Field survey for ecosystem and candidate threatened flora and fauna species included a detailed assessment of geographic and habitat constraints and microhabitats. A total of 14 threatened species (10 flora and 4 fauna) did not meet their geographic limitations or habitat constraints within the subject land and were removed from further consideration as ecosystem or candidate species. The following species with geographic and/or habitat constraints were assessed (see Table 5.1 and Table 5.2).

Table 5.1 Geographic limitations and habitat constraints assessed for candidate threatened flora species

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
Acacia gordonii	Habitat constraint being rocky areas, sandstone outcrops, ridgetops, spurs or within 200 metres.	Habitat constraints met. Subject land contains rocky areas, sandstone outcrops, ridgetops, spurs or within 200 metres. This species was therefore retained as a candidate species based on broad habitat constraints being met. Further assessment of microhabitats is used to exclude this species with justification provided in section 5.1.2.
Acacia pendula – endangered population	Geographic limitation of Hunter River catchment.	Geographic limitation met. The subject land resides in the Hunter River catchment. As such, *Acacia pendula – endangered population* was retained for further consideration as a candidate species based on this geographic limitation being met for the Hunter IBRA subregion.
Cymbidium canaliculatum – endangered population	Species is epiphytic to a range of eucalypts, acacia and angophora species. Can persist on cut stumps or logs on ground, if protected from grazing. Geographic limitation of Hunter catchment as defined by Australia's River Basins (Geoscience Australia 1997)	Geographic limitation met. The subject land resides in the Hunter catchment as defined by Australia's River Basins (Geoscience Australia 1997). As such, *Cymbidium canaliculatum – endangered population* was retained for further consideration as a candidate species based on this geographic limitation being met.
Darwinia glaucophylla	Habitat constraint being rocky areas, rocky platforms or within 100 metres	Habitat constraints met. Subject land contains rocky areas, rocky platforms or within 100 metres. This species was therefore retained as a candidate species based on broad habitat constraints being met. Further assessment of microhabitats is used to exclude this species with justification provided in section 5.1.2.

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
Darwinia peduncularis	Habitat constraint within 50 metres of rocky areas.	Habitat constraints met. The subject land contains sections of rocky areas. This species was therefore retained as a candidate species based on broad habitat constraints being met. Further assessment of microhabitats is used to exclude this species with justification provided in section 5.1.2.
Diuris praecox	Geographic limitations of the species being recorded within the Parish boundaries of Newcastle, Kahibah, Wallarah, Tuggerah and Kincumber	Geographic limitations not met. The entire subject land resides outside the listed Parish boundaries. Whilst BAM-C identifies this geographical limitation TBDC 2025 does not reference this. Given this, further assessment of microhabitats is used to exclude this species with justification provided in section 5.1.2.
Diuris tricolor – endangered population	Will grow in disturbed areas/grassland. Geographic limitation of the Muswellbrook local government area (LGA)	Geographic limitation met. The northern extent of the subject land resides in the Muswellbrook LGA. As such, *Diuris tricolor – endangered population* was retained for further consideration as a candidate species based on this geographic limitation being met.
Eucalyptus camaldulensis – endangered population	Habitat constraint floodplains of watercourses, including rivers, creeks, intermittent streams or billabongs. Geographic limitation of Hunter catchment as per the Determination.	Habitat constraints met. The subject land does contain floodplains of watercourses, including rivers, creeks, intermittent streams or billabongs so the habitat constraint for this endangered population is met. Geographic limitation met. The location of the Hunter Catchment in relation to the subject land was determined using the Catchment Boundaries of New South Wales (State Government of NSW and DPE 2010) layer in a GIS. The *Eucalyptus camaldulensis* endangered population was only considered in areas within the Hunter River catchment.
Eucalyptus glaucina	Geographic limitations of the species being recorded north of Gosford in 1955.	Geographic limitations met. The entire subject land resides north of Gosford. As such, *Eucalyptus glaucina* was retained for further consideration as a candidate species based on this geographic limitation being met.
Eucalyptus oblonga – endangered population	Geographic limitations of the *Eucalyptus oblonga* population at Bateau Bay, Forresters Beach and Tumbi Umbi in the Central Coast Council LGA.	Geographic limitation not met. Subject land is outside of the geographic limitation of being within Bateau Bay, Forresters Beach and Tumbi Umbi in the Central Coast Council LGA. As such, *Eucalyptus oblonga* – endangered population was removed from further consideration as a candidate species based on this geographic limitation not being met.

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
Gaudium deanei Syn. *Leptospermum deanei*	Habitat constraint within 100 m of freshwater or estuarine streams.	Habitat constraint limitation not met. Associated habitat within the subject land is not within 100 m of freshwater or estuarine streams. In terms of microhabitat *Gaudium deanei* the species is noted to occur in woodland on lower hill slopes or near creeks with substrates comprising of sandy alluvial soil or sand over sandstone at elevations of 0-50 metres (Benson & McDougall 1998, TBDC 2025). Within the subject land *Gaudium deanei* is predicted to be associated with PCT 3617 within the Yengo IBRA subregion. This PCT occurs on a ridge fringing Crumps Road within Corrabare State Forest. Within the Yengo IBRA subregion, PCT 3617 occurs at elevations of about 460 metres and does not occur on lower hill slopes or near creeks with substrates comprising of sandy alluvial soil or sand over sandstone and occurs greater than 100 metres from a freshwater or estuarine stream. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species. As such, *Gaudium deanei* was removed from further consideration as a candidate species based on this habitat constraint not being met.
Gyrostemon thesioides	Habitat constraint of sandy, alluvial or colluvial soil within 50 m of a water course.	Habitat constraints met. The subject land contains sandy, alluvial or colluvial soil within 50 m of a water course. This species was therefore retained as a candidate species based on broad habitat constraints being met. Further assessment of microhabitats is used to exclude this species with justification provided in section 5.1.2.
Hibbertia procumbens	Wyong IBRA subregion South of Wyong River within Central Coast LGA Yengo IBRA subregion Geographic limitations being within Yengo National Park.	Geographic limitations not met. Subject land is not south of Wyong River within Central Coast LGA and is outside of the geographic limitation of being within Yengo National Park. As such, *Hibbertia procumbens* was removed from further consideration as a candidate species based on this geographic limitation not being met.

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
Kunzea rupestris	Habitat constraint of rocky areas on Hawkesbury sandstone rock platforms or within 50 m.	Habitat constraint limitation not met. Associated habitat within the Yengo IBRA subregion does not constitute rocky areas on Hawkesbury sandstone rock platforms or within 50 m. Within the subject land *Kunzea rupestris* is only predicted within the Yengo IBRA subregion where the associated PCT is restricted to 3617. Hawkesbury Sandstone is restricted to southern portion of the Yengo IBRA subregion mostly between towers 30 to 38 and sections of Crumps Road (Colquhoun *et. al*. 2025) although no surface rock platforms occur within this area. Soils within the subject land that occur in the Yengo IBRA subregion where PCT 3617 occurs are mapped as having soils of the Watagan soil landscapes (Murphy 1993; Kovac and Lawrie 1991). The Watagan soil landscape unit is a colluvial landscape where ridgetops generally comprise yellow podzolic soils of hardsetting yellowish brown sandy clay loam and earthy yellowish brown light sandy clay loam (Murphy 1993). Crests and ridges of the Watagan, soil landscape unit are not associated with Hawkesbury sandstone rock platforms. Since this species is only being assessed for the Yengo IBRA subregion, it doesn't meet the listed habitat constraints. As such *Kunzea rupestris* was removed from further consideration as a candidate species based on this habitat constraint not being met.
Leionema lamprophyllum subsp. fractum	Habitat constraint of sandstone footslopes or within 100 m.	Habitat constraints met. Sandstone footslopes present within subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Leucopogon fletcheri subsp. fletcheri	Habitat constraint of slopes nearby rocky areas or within 50 m; Weathered laterite over sandstone on sandstone ridges and outcrops.	Habitat constraint limitation not met. Associated habitat within the Yengo IBRA subregion does not constitute weathered laterite over sandstone on sandstone ridges and outcrops. The known habitat constraints for this species are slopes nearby rocky areas or within 50 m on weathered laterite over sandstone on sandstone ridges, outcrops (TBDC 2025). *Leucopogon fletcheri* subsp. *fletcheri* is only predicted for the Yengo IBRA where habitat is associated with PCT 3617. This PCT occurs on a ridge fringing Crumps Road within Corrabare State Forest although the sandstone ridgetops within this area lack lateritic or shaley geological features.

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
		Further, ridgetops within the subject land that occur in the Yengo IBRA subregion are mapped as having soil of the Watagan, Ogilvie and Three Ways soil landscapes (Murphy 1993; Kovac and Lawrie, 1991). The Watagan soil landscape unit is a colluvial landscape where ridgetops generally comprise yellow podzolic soils of hardsetting yellowish brown sandy clay loam and earthy yellowish brown light sandy clay loam (Murphy, 1993). Ogilvie soil landscape derived from the Narrabeen Group geological unit and ridgetop soils mainly comprise of shallow loams and sands (Kovac and Lawrie, 1991). Ridgetops within the Three Ways soil landscape unit comprise of brown podzolic soils that form brownish black, black or dark brown loamy sand to loam soil (Kovac and Lawrie, 1991). Crests and ridges of the Watagan, Ogilvie and Three Ways soil landscapes are not associated with lateritic to shaley ridgetops. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species. As such *Leucopogon fletcheri subsp. fletcheri* was removed from further consideration as a candidate species based on this habitat constraint not being met.
Maundia triglochinoides	Habitat constraint within riparian areas/drainage lines, water ponding, shallow swamps, man-made dams and drainage channels up to 1 m deep.	Habitat constraints not met. Subject land within riparian areas/drainage lines, water ponding, shallow swamps, man-made dams and drainage channels up to 1 m deep. *Maundia triglochinoides* grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30–60 centimetre deep on heavy clay, low nutrients (TBDC 2025). In the subject land the species is predicted to be associated with PCT 3150 within the Wyong IBRA subregion. *Maundia triglochinoides* was recorded during field surveys outside the subject land on the coastal plain to the north of the proposed laydown area on Centennial Coal land. The species was recorded in a restricted drainage area of PCT 4042 – Lower North Riverflat Eucalypt-Paperbark Forest that was subject to grazing livestock. Within the subject land, associated habitat is in the form of PCT 3150 that occurs within sandstone hills above 200 metres in elevation and lacks habitat constraint features of swamps, lagoons, dams, channels, creeks or shallow freshwater 30–60 cm deep on heavy clay, low nutrients. A small number of first order creeks have been recorded but these lack 30–60 centimetre deep pools of water on heavy clay but are restricted to shallow ephemeral rocky substrates.

Species name	Geographic limitation/ habitat constraint assessed	Presence in the subject land
		The subject land does not contain specific habitat constraints for the species and as such habitat is therefore unlikely to be suitable for this species.
Micromyrtus blakelyi	Habitat constraint of skeletal soil in rocky areas; Hawkesbury sandstone rock platforms and outcrops or within 50 m.	Habitat constraints met. Subject land within areas of skeletal soil in rocky areas. Habitat constraint not met. *Micromyrtus blakelyi* is only predicted for the Yengo IBRA where habitat is associated with PCT 3617. This PCT occurs on a ridge fringing Crumps Road within Corrabare State Forest although the sandstone ridgetops within this area lack sandstone rock platforms and outcrops or within 50 m. This species was retained as a candidate species based on broad habitat constraints being met. Further assessment of microhabitats for this species is provided in section 5.1.2.
Persoonia pauciflora	Geographic limitation of areas within 10 km of North Rothbury.	Geographic limitation not met. Subject land is outside of the geographic limitation of areas within 10 km of North Rothbury. As such, *Persoonia pauciflora* was removed from further consideration as a candidate species based on this geographic limitation not being met.
Prostanthera askania	Geographic limitation of areas south of Wyong River in Central Coast LGA.	Geographic limitation not met. Subject land is outside of the geographic limitation of areas south of Wyong River in Central Coast LGA. As such, *Prostanthera askania* was removed from further consideration as a candidate species based on this geographic limitation not being met.
Seringia denticulata – endangered population	Geographic limitation within Colo River area between Lower Portland and Morans Rock and near Gees Lagoon.	Geographic limitation not met. Subject land is outside of the geographic limitation of the Colo River area between Lower Portland and Morans Rock and near Gees Lagoon. As such, *Seringa denticulata* (endangered population) was removed from further consideration as a candidate species based on this geographic limitation not being met.

Table 5.2 Geographic limitations and habitat constraints assessed for threatened fauna species

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Regent Honeyeater (*Anthochaera phrygia*) (Breeding)	Habitat constraints being as per Important Habitat Map.	Habitat constraints met for the Hunter IBRA subregion. This species was therefore retained as a candidate species based on habitat constraints being met.
Pink-tailed Legless Lizard (*Aprasia parapulchella*)	Habitat constraint of Rocky areas, or within 50 m of rocky areas.	Habitat constraints met for both the Hunter and Yengo IBRA subregions. Hillshade mapping identified rocky areas across regions the species is associated with. This species was therefore retained as a candidate species based on habitat constraints being met.
Bush Stone-curlew (*Burhinus grallarius*)	Habitat constraint of Fallen/ standing dead timber including logs.	Habitat constraints are met for this species within the Yengo, Wyong and Hunter IBRA subregions. Therefore, the Bush Stone-curlew was retained for further assessment as a candidate species. Further assessment of this species is provided in section 5.1.4.
Curlew Sandpiper (*Calidris ferruginea*) (breeding)	Habitat constraint as per Important Habitat Map.	Habitat constraint not met. The subject land is not located within areas of the important habitat map. As such, Curlew Sandpiper (*Calidris ferruginea*) was removed from further consideration as a candidate species based on this habitat constraint not being met.
Gang-gang Cockatoo (*Callocephalon fimbriatum) (breeding)*	Habitat constraint of hollow beating trees, and Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	Habitat constraints met for the Yengo, Wyong and Hunter IBRA subregions. Therefore, Gang-gang Cockatoo (breeding) has been retained for further consideration as a candidate species.
Gang-gang Cockatoo (*Callocephalon fimbriatum*) endangered population in the Hornsby and Ku-ring-gai	Geographic limitation of the Hornsby and Ku-ring-gai LGAs.	Geographic limitation not met. The subject land is not located within the Hornsby and Ku-ring-gai LGAs. As such, Gang-gang Cockatoo (*Callocephalon fimbriatum*) (endangered population) was removed from further consideration as a candidate species based on this geographic limitation not being met.
South-eastern Glossy Black-cockatoo (*Calyptorhynchus lathami lathami*)	Habitat constraint of hollow bearing trees and living or dead trees with hollows greater than 15 cm diameter and higher than 8 m above the ground.	Habitat constraints have been met for the Yengo, Wyong and Hunter IBRA subregions. As such, the species is retained as a candidate species for further assessment, provided in section 5.1.4.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Habitat constraint of Cliffs, and within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Habitat constraints for this species have been met for the Yengo, Wyong and Hunter IBRA subregions. Hillshade analysis identified potential roosting sites for the species across Watagan State Forest, Cedar Creek, and northern Pokolbin State Forest. Therefore, the Large-eared Pied Bat was retained for further assessment as a candidate species. Further assessment of this species is provided in section 5.1.4.
Emu (*Dromaius novaehollandiae*) endangered population in the New South Wales North Coast Bioregion and Port Stephens local government area	Geographic limitation of the Port Stephens LGA.	Geographic limitation not met. The subject land is not located within the Port Stephens LGA. As such, Emu (*Dromaius novaehollandiae*) (endangered population) was removed from further consideration as a candidate species based on this geographic limitation not being met.
Little Eagle (*Hieraaetus morphnoides*) (Breeding)	Habitat constraint of Nest trees – live (occasionally dead) large old trees within vegetation.	Habitat constraints met for the Yengo, Wyong and Hunter IBRA subregions. The species has significant associated habitats across the subject lands for which nest trees may be located. Thus, the species has been retained for further assessment as a candidate species. Further assessment of this species is located in section 5.1.4.
Broad-headed snake (*Hoplocephalus bungaroides*) (Breeding)	Habitat constraint of Rocky areas including escarpments, outcrops and pogodas within the Sydney Sandstone geologies.	The habitat constraints of the species are met for Yengo and Wyong IBRA subregions. The Broad-headed Snake is known to shelter in rock crevices and under flat sandstone rocks on exposed cliffs edges during autumn, winter and spring; moving to shelters in crevices or hollows within 500 m of escarpments during summer. An area identified at the northern end of Crumps Road in Corrabare State Forest was identified as being a suitable habitat for the species, based on habitat constraints. The species has been retained for further assessment, found in section 5.1.4.
Stephens' Banded Snake (*Hoplocephalus stephensii*)	Habitat constraint of Hollow bearing trees or within 500 m of this habitat, and within 500 m of arboreal vine tangles, fallen/standing dead timber including logs or within 500 m of this habitat.	The species' habitat constraints are met for the Wyong and Yengo IBRA subregions. Hollow bearing trees as well as fallen or standing dead timber occur across the subject land within associated plant community types. As such, Stephens' Banded Snake was retained for further assessment as a candidate species. Further assessment of microhabitats for this species is provided in section 5.1.4.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Swift Parrot (*Lathamus discolor*) (Breeding)	Habitat constraints being as per Important Habitat Map.	Habitat constraints met for the Hunter and Yengo IBRA subregions. This species was therefore retained as a candidate species based on habitat constraints being met. Habitat constraint not met for Wyong IBRA subregion. This species was therefore excluded as a candidate species based on habitat constraint not being met.
Broad-billed Sandpiper (*Limicola falcinellus*) (breeding)	Habitat constraint as per Important Habitat Map.	Habitat constraint not met. The subject land is not located within areas of the important habitat map. As such, Broad-billed Sandpiper (*Limicola falcinellus*) was removed from further consideration as a candidate species based on this habitat constraint not being met.
Green and Golden Bell Frog (*Litoria aurea*)	Habitat constraint of semi-permanent/ephemeral wet areas or within 1 km of wet areas/Swamps or within 1 km of swamp/waterbodies or within 1 km of waterbody.	Habitat constraints met for the Wyong, Yengo and Hunter IBRA subregion. Such permanent or ephemeral wet areas are identified across the subject land, with locations including Olney state forest and Corrabare North Flora Reserve being targeted. Thus, the species has been retained as a candidate species for further assessment.
Green-thighed Frog (*Litoria brevipalmata*)	Habitat constraint of semi-permanent/ephemeral wet areas or Swamps or waterbodies.	Habitat constraints have been met for the Wyong and Hunter IBRA subregion. Semi-permanent or ephemeral wet areas have been identified across the subject land, including Olney State Forest and Corrabare North Flora Reserve. The species has been retained for further assessment as a candidate species. Further assessment of microhabitats for this species is provided in section 5.1.4.
Square-tailed Kite (*Lophoictinia isura*) (Breeding)	Habitat constraint of nest trees.	Habitat constraints have been met for the species within the Wyong, Yengo and Hunter IBRA subregions. Significant associated habitat can be found across the subject land, with the potential for nest trees to be included within such habitat. Thus, the species is retained for further assessment as a candidate species.
Little Bent-winged Bat (*Miniopterus australis*) (Breeding)	Habitat constraint of Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.	Habitat constraints met for the Wyong, Yengo and Hunter IBRA subregions. Hillshade analysis identified potential roosting sites for the species across Watagan State Forest, Cedar Creek, and northern Pokolbin State Forest. The species was retained for further assessment, located in section 5.1.4.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Large Bent-winged Bat (*Miniopterus orianae oceanensis*) (Breeding)	Habitat constraint of Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.	Habitat constraints for the Large Bent-winged Bat were met for the Wyong, Yengo and Hunter IBRA subregions. Hillshade analysis identified potential roosting sites for the species across Watagan State Forest, Cedar Creek, and northern Pokolbin State Forest. The species was retained for further assessment. Further assessment of microhabitats for this species is provided in section 5.1.4.
Giant Barred Frog (*Mixophyes iteratus*)	Habitat constraint of land within 50 m of semi-permanent and permanent drainages.	The habitat constraints are met for the species within the Wyong and Yengo IBRA subregions. Sites identified to be potential habitat for the species includes Watagan State Forest and Olney State Forest. Thus, Giant Barred Frog was retained for further assessment as a candidate species.
Southern Myotis (*Myotis macropus*)	Habitat constraint of waterbodies, and waterbodies with permanent pools or stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site.	Habitat constraints for the Southern Myotis have been met for the Yengo, Wyong and Hunter IBRA subregions. Habitat constraint of waterbodies which meet the conditions for the species are present on the subject land. The species was retained for further assessment of microhabitats as a candidate species. Further information on the Southern Myotis microhabitats can be found in section 5.1.4.
Cotton Pygmy-Goose (*Nettapus coromandelianus*)	Habitat constraint of waterbodies, in the form of deep permanent fresh waters on floodplains with floating and submergent vegetation.	Habitat constraints met for the Yengo IBRA subregion. Water bodies meeting the conditions of the species are present on the subject land within the Yengo IBRA subregion. The species was retained for further assessment as a candidate species. The species was not retained for further assessment in the Wyong and Hunter IBRA subregions.
Barking Owl (*Ninox connivens*)	Habitat constraint of hollow bearing trees, being a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Habitat constraints for the Barking Owl have been met for the Yengo, Wyong and Hunter IBRA subregions. Potential areas of habitat include Pokolbin State Forest and Corrabare State Forest. As the habitat constraints are met, the species is retained for further assessment on microhabitats can be found in section 5.1.4.
Powerful Owl (*Ninox strenua*)	Habitat constraint of hollow bearing trees, being a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Habitat constraints are met for the Powerful Owl within the Yengo, Wyong and Hunter IBRA subregions. Hollow bearing trees are known to occur across the subject land, particularly in Pokolbin State Forest, Corrabare State Forest, and Watagan State Forest. The species is retained for further assessment, based on meeting habitat constraints.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Eastern Osprey (*Pandion cristatus*) (Breeding)	Habitat constraint of the presence of stick-nests in living and dead trees (>15 m) or artificial structures within 100 m of a floodplain for nesting).	Habitat constraints have been met for the species within the Wyong, Yengo and Hunter IBRA subregions. Floodplains are known to occur across the subject land, where there is a potential for stick nest to occur. As habitat constraints are met for Eastern Osprey, the species is retained for further assessment as a candidate species.
Brush-tailed Rock-wallaby (P*etrogale penicillata*)	Habitat constraint of land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines.	Habitat constrains are met for the Yengo, Wyong and Hunter IBRA subregions. Particular sites within the subject land where such habitat constraints are met include Pokolbin State Forest, near Monkey Place Creek, alongside Watagan State Forest. The species is retained for further assessment for a candidate species.
Koala (*Phascolarctos cinereus*)	Habitat constraint of the presence of Koala use trees.	Habitat constraints for the Koala have been met for the Wyong, Yengo and Hunter IBRA subregions across the subject land. Areas known to contain Koala habitat include Pokolbin State Forest and Watagan State Forest. The species is retained for further assessment as a candidate species. Further microhabitat information is found in section 5.1.4.
Long-nosed Potoroo (*Potorous tridactylus*)	Habitat constraint of a dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest)).	Habitat constraints for the species are met within the Wyong IBRA subregion. Key areas of habitat for the species are found in Olney State Forest. Thus, the species is retained for further assessment within the Wyong IBRA subregion as a candidate species.
Grey-headed Flying-fox (*Pteropus poliocephalus*) (Breeding)	Habitat constraint of the presence of breeding camps.	Habitat constraints for the Grey-headed Flying-fox are not met for any IBRA subregions, as no breeding camps were located. As such, Grey-headed Flying-fox was removed from further consideration as a candidate species based on this habitat constraint not being met.
Masked Owl (*Tyto novaehollandiae*)	Habitat constraint of hollow bearing trees, being a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Habitat constraints for the Masked Owl are met for Yengo, Wyong and Hunter IBRA subregions within the subject land. Areas known the meet the species habitat constraints include the southern extent of Watagan State Forest, and Pokolbin State Forest. The species is retained for further assessment as a candidate species across the three subregions found on the subject land.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Sooty Owl (*Tyto tenebricosa*)	Habitat constraint of caves or cliffs, which includes clifflines, ledges, and escarpments, alongside hollow bearing trees, being a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Habitat constraints for the Sooty Owl are met for the Yengo, Wyong and Hunter IBRA subregion. Caves associated with breeding sites for the species are known to occur within Corrabare State Forest, alongside appropriate hollow bearing trees being found across large portions of the subject land. The species has been retained for further assessment to be considered a candidate species based on habitat constraints being met.
Eastern Cave Bat (*Vespadelus troughtoni*)	Habitat constraint of Caves, or areas within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.	Habitat constraints have been met for the Yengo, Wyong and Hunter IBRA subregions across the subject land. Hillshade analysis identified potential roosting sites for the species across Watagan State Forest, Cedar Creek, and northern Pokolbin State Forest. As such, the species has been retained for further assessment in consideration to be a candidate species. Further information on the species microhabitats can be found in section 5.1.4.

5.1.2 Further assessment of candidate species credit species

NSW Biodiversity Assessment Method 2020 (BAM) subsection 5.2.3 (Step 3) outlines further options for removing a species credit species from the list auto-generated in the BAM-C. According to BAM section 5.2.3, a candidate species credit species is considered unlikely to occur on the subject land (or specific vegetation zones) if one of the following applies:

a After carrying out a field assessment:

i the assessor determines that microhabitats required by a species are absent from the subject land (or specific vegetation zone). The assessor must include a description of the microhabitats assessed as being required by the species in the biodiversity assessment report. This must be based on evidence such as published literature, or

ii the assessor determines that the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

b An expert report states that the species is unlikely to be present on the subject land or specific vegetation zones.

A candidate species credit species that does not have suitable habitat as defined above does not require further assessment.

Table 5.3 provides the further assessment for candidate species credit species according to BAM subsection 5.2.3 (Step 3). Table 5.3 provides the following:

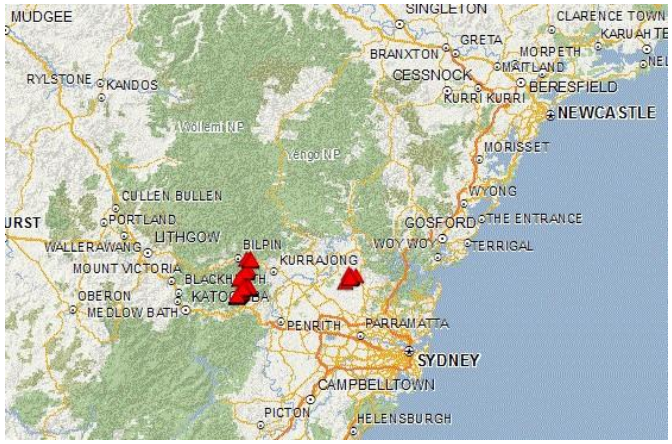
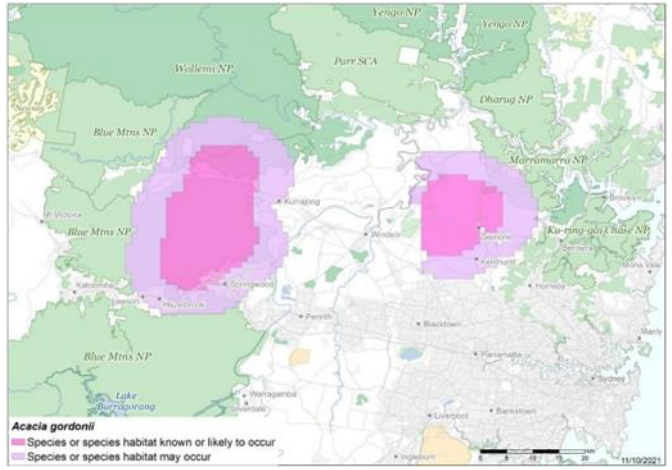
- a description of microhabitats required by the species, supported by evidence such as published literature
- details of the habitat constraints listed in the Threatened Biodiversity Data Collection (TBDC) for the species (where relevant)
- details of the field assessment conducted to determine if microhabitats are absent, or if present, whether microhabitats and/or habitat constraints identified within the TBDC are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

This assessment has been made based on the latest scientific evidence provided in the TBDC, BioNet, and other databases including the Commonwealth Species Profile and Threats Database and Birdlife International. A total of 23 credit species (17 flora and 6 fauna) were identified as not having suitable habitat within the biodiversity study area and were removed from further consideration as a candidate species.

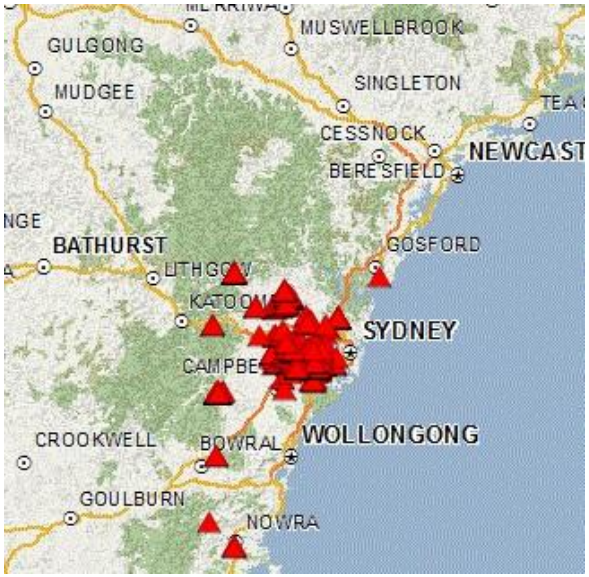
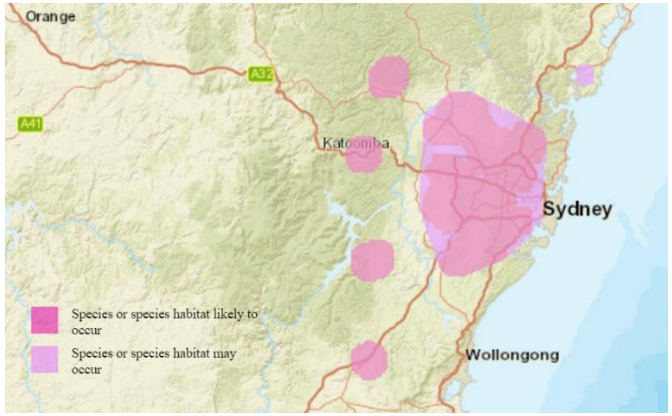
This is supported by a wide range of approved State significant infrastructure (SSI)/State significant development (SSD)/ critical State significant infrastructure (CSSI) projects within the locality of the subject land. While this project list is not exhaustive a summary is provided below.

- *Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report* (nsw.gov.au) (Umwelt 2022)
- *Mt Pleasant Optimisation Project – Appendix E – Biodiversity Development Assessment Report* (nsw.gov.au) (Hunter Eco 2021)
- Mangoola Coal Continued Operations Project (getContent (nsw.gov.au) (Umwelt 2019)
- Rix's Creek Coal Mine Extension getContent (nsw.gov.au) (Bell 2015)
- Warkworth Coal Mine Continuation getContent (nsw.gov.au) (Cumberland Ecology 2014)
- Bengalla Mine Continuation (Cumberland Ecology 2014)
- Bulga Coal Mine Optimisation CLIENT NAME (nsw.gov.au) (Umwelt 2013)
- Rix's Creek North Open Cut Microsoft Word - 64203_Flora_Final.doc (nsw.gov.au) (Geoff Cunningham Natural Resource Consultants Pty Ltd 2007)
- Wallarah 2 Coal Mine Ecological Impact Assessment (nsw.gov.au) (Cumberland Ecology 2013)
- Waratah Super Battery – Munmorah Appendix D BDAR (nsw.gov.au) (GHD 2022)
- Huntlee New Town – Stage 1 Huntlee New Town – getContent (nsw.gov.au) (RPS 2010) (MJD Environmental 2024)
- Huntlee New Town – Stage 2 MJD Environmental Ecological Report - Minmi Link Road City of Newcastle (nsw.gov.au) (MJD Environmental 2024).

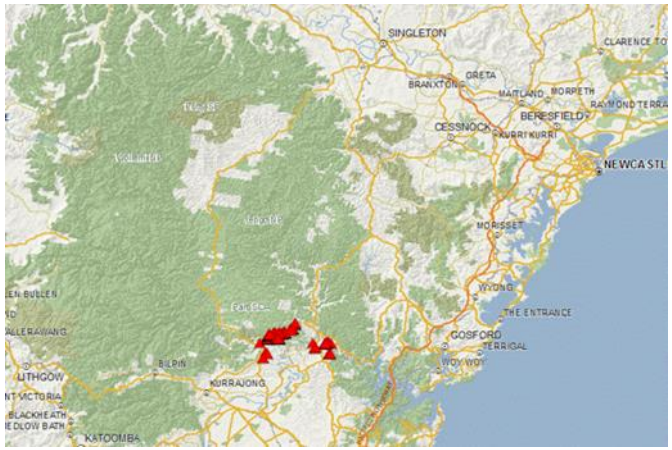
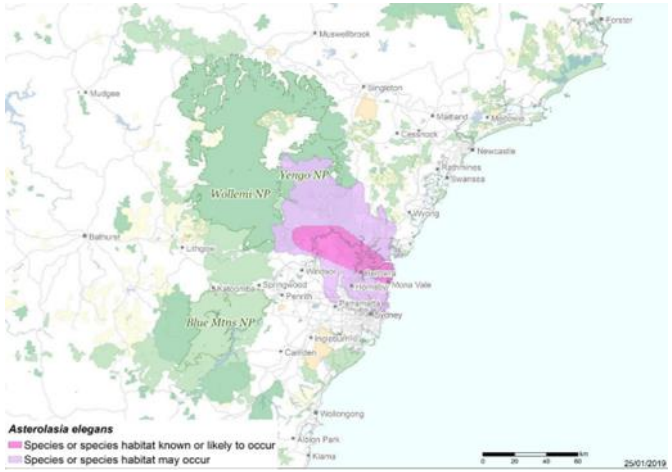
Table 5.3 Further assessment of candidate species credit species returned by the BAM-C

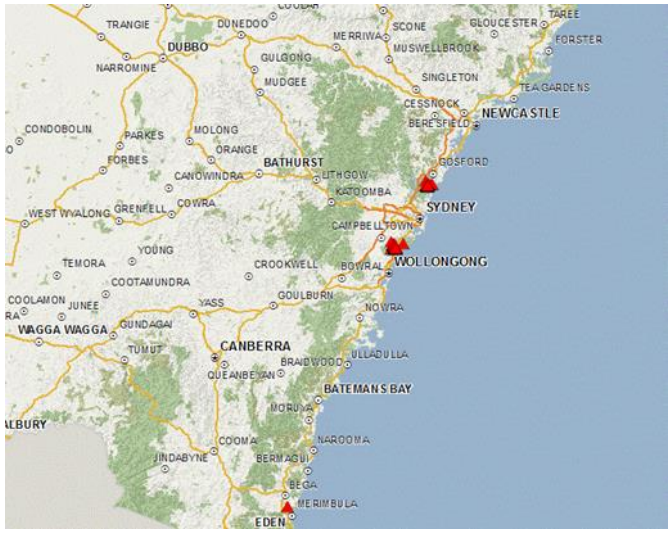
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Acacia gordonii	**Distribution** *Acacia gordonii* is known to have a highly restricted distribution and is confined to the northwest of Sydney. The known distribution of this species is disjunct with occurrences in the lower Blue Mountains in the west and the western Hornsby Plateau at Maroota/Glenorie in the east. The species is currently only known from within the Hawkesbury, Blue Mountains and Baulkham Hills local government areas (TBDC 2025). As recently cited in *Acacia gordonii* Conservation Advice under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth DCCEEW 2023), numerous historical records of this species were thought to be erroneous (Douglas 2020). Based on a detailed review of all *Acacia gordonii* the NSW BioNet Atlas database records were updated and as of 2020 all current records are spatially accurate as possible (Douglas 2020). The subject land is located over 50 km north of the nearest current known location of this species and outside of the known distribution limits outlined in the Scientific Committee's Final Determination and TBDC. Seed dispersal from the known meta population is considered unlikely to be within the subject land. Seed dispersal for general acacia species is thought to be through passive methods such as water and gravity. Longer distance seed dispersal vectors such as mammals and birds are considered likely however large distance dispersal is now thought to be unlikely given the loss of the Sydney emu population (Douglas 2020). Numerous other sources of published literature also state the species to have a highly restricted distribution, such as: — The species is known to be restricted to northwest of Sydney with an outlier subpopulation in the Blue Mountains National Park (NPWS 2022). — The species is also stated to have a scattered distribution but within a very narrow range. It occurs only in the lower Blue Mountains (e.g. Bilpin, Faulconbridge, Kings Tableland) and between Glenorie and Maroota in northwestern Sydney (Fairley 2004).	 

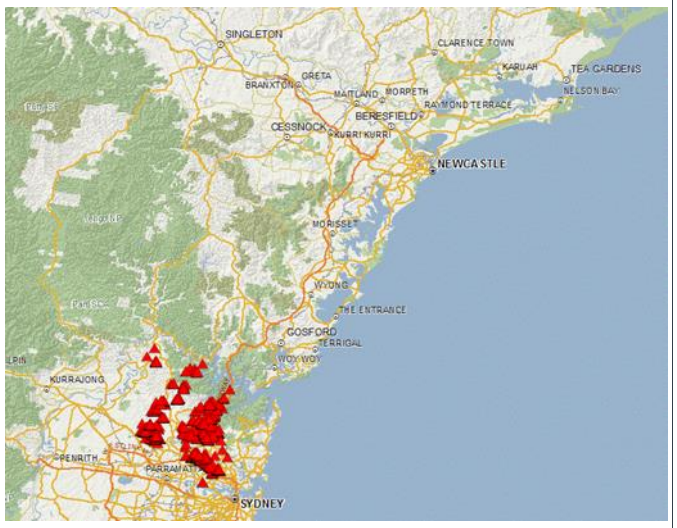
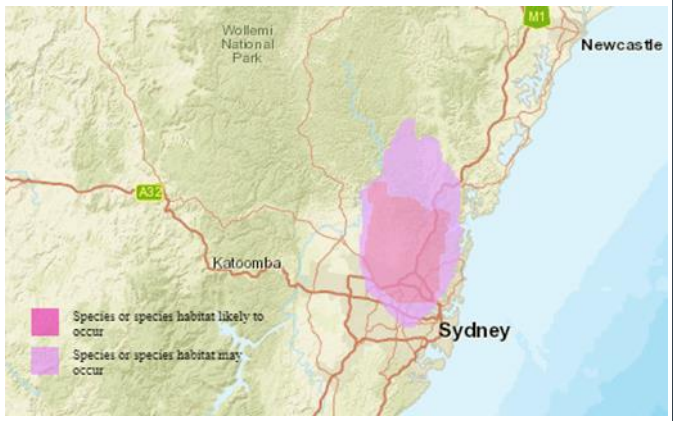
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	— The final determination listing for the species states 'known locations are Bilpin/ Faulconbridge/Maroota/Hornsby Heights areas, with some plants in the Blue Mountains National Park (NSW Scientific Committee 1997). Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Acacia gordonii* and that genetic dispersal and establishment of viable recruitment is unlikely. **Microhabitat** The subject land lacks the highly specific microhabitat that *Acacia gordonii* is known to occupy. *Acacia gordonii* is known from soils that are usually shallow, skeletal loamy sands with the substrate being Hawkesbury Sandstone with some residual clay and laterite influence, low in nutrients and well drained (Benson and McDougall 1996). Detailed investigation carried out by Douglas (2020) suggests the species to be restricted to Triassic Hawkesbury Sandstone specifically from the Faulconbridge Soil Landscape with possible associations with Gymea, Hawkesbury and Mittagong Soil Landscapes (NSW DCCEEW 2023). These soil landscape units do not occur within or within close proximity to the subject land. In the subject land *Acacia gordonii* is predicted to be associated with PCT 3617 within the Yengo IBRA subregion. This PCT is restricted to the Watagan Soil Landscape unit. The subject land does not contain soil landscape units associated with specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

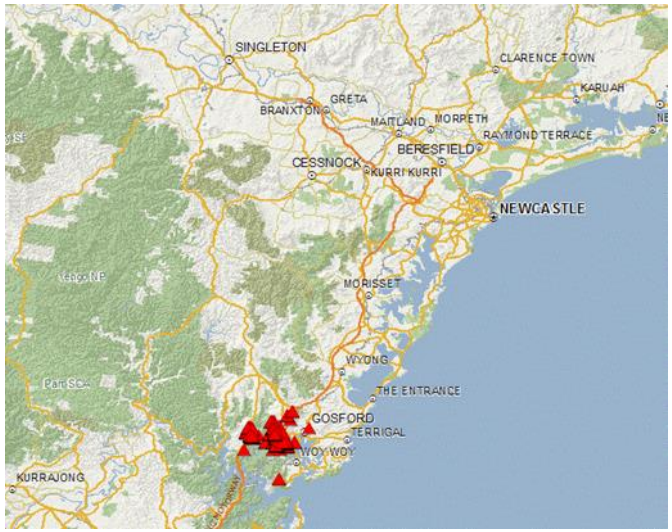
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Acacia pubescens	**Distribution** The main distribution of *Acacia pubescens* is concentrated around the Bankstown-Fairfield-Rockwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon (TBDC 2025). The species is also known to occur from Nowra, Lithgow and the Blue Mountains. The Conservation Advice for *Acacia pubescens* describes the species being restricted to the Sydney region of NSW. Its distribution is concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon (NPWS 2003). A complete picture of the original distribution is not apparent. An article from 1914 states that the 'centre of activity' for the species is around the Georges River area, from Canterbury through Belmore and Bankstown to Liverpool, occurring with Melaleuca spp. (Anon. 1914 in NPWS 2003). Although the distribution includes a large area, the extant sites are mostly small and fragmented, surrounded by development. It is assumed that the species was once more common across its range, given it occurs in an area which has largely been developed (NPWS 2003). In 2003, 116 subpopulations of the species were recorded, occurring at 151 sites (NSW NPWS 2003). At that time, for assessment purposes, plants within 300 m of each other were defined as the 1 subpopulation, as dispersal may occur over this distance in *Acacia* spp. (D. Keith, NPWS, pers. comm. in NPWS 2003). The nearest BioNet record is 27 km from the subject land. In woodlands, where *Acacia pubescens* occurs, it is thought that dispersal is likely to be by ants and is likely to be limited to a distance of a few metres (Auld 1996). Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Acacia pubescens*.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	Microhabitat *Acacia pubescens* is known to occur on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone (TBDC, 2025). The species is known to occur on geologies including Tertiary alluvium, Holocene alluvium and Wianamatta Shale (NPWS 2003). Within the subject land PCT 3617 within the Yengo IBRA subregion occurs on geology of Narrabeen Sandstones (Colquhoun *et. al*. 2025). . PCT 3617 within the subject land does not occur on Tertiary alluvium, Holocene alluvium or Wianamatta Shale and lacks the specific microhabitats that this species is known to occupy. The subject land does not contain geological units associated with specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

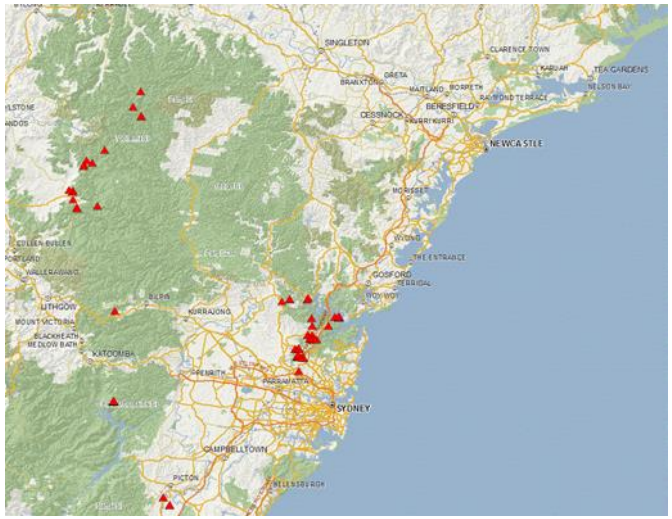
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Asterolasia elegans	**Distribution** *Asterolasia elegans* is known to have a highly restricted distribution and is confined to the north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. The species is known from only 7 sub-populations, only 1 of which is wholly within a conservation reserve (TBDC 2025). The Conservation Advice for *Asterolasia elegans* (DAWE 2021) describes the species as being currently known from 7 populations, in a disjunct distribution separated by roads and ridges north of Maroota in the Central Coast botanical subdivision of NSW. The species occurs in the local government areas of Hawkesbury, Baulkham Hills, and Hornsby. All populations exist within the Hawkesbury/Nepean Catchment Management Authority boundary. Seed dispersal is described as ballistic projection with seeds thought to exhibit ant attracting food body (Benson and McDougall 2001). The subject land is located over 50 km north of the nearest current known location of this species. Given the highly localised nature of seed dispersal, recruitment from the known meta population to areas covered by the project is considered unlikely. **Microhabitat** Microhabitat features for this plant are not unusual and the species is known to occur in sheltered forests on mid to lower slopes and valleys on Hawkesbury sandstone. The tree canopy at known sites includes Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*) (TBDC 2025)). Whilst the subject land exhibits microhabitat features similar to those documented from known sites of occupancy, the highly restricted distribution and lack of largescale genetic dispersal means the subject land is unlikely to support the species. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Asterolasia elegans* and that genetic dispersal and establishment of viable recruitment is unlikely. Further the subject land does not contain microhabitats and is therefore unlikely to be suitable for this species.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Astrotricha crassifolia	**Distribution** *Astrotricha crassifolia* is known to have a highly restricted distribution with the species occurring near Patonga (Gosford LGA), and in Royal National Park and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA) (TBDC 2025). *Astrotricha crassifolia* is locally endemic to 2 areas in New South Wales: a 'northern metapopulation' near Gosford, north of Sydney, and a 'southern metapopulation' near Sutherland, south of Sydney. The Gosford metapopulation occurs in the Brisbane Water National Park, near Warrah Trig between Pearl Beach and Patonga, in an area known as the 'Waratah Patch' (NSW DCCEEW 2024) Seed storage and dispersal ecology and germination requirements are unknown. The nearest BioNet record is about 43 km from the subject land. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Astrotricha crassifolia* and that genetic dispersal and establishment of viable recruitment is unlikely. The habitat is therefore unlikely to be suitable for this species. **Microhabitat** Microhabitat has been recorded as generally low woodland to low open woodland dominated by trees of *Eucalyptus oblonga*, *Eucalyptus haemastoma* and *Corymbia gummifera* (Warman & Beckers 2011). Within the subject land *Astrotricha crassifolia* is restricted to associated habitats PCT 3617 and 3621 in the Wyong IBRA subregion. Field surveys of these vegetation types identify *Corymbia gummifera* to occur in the tree layer although for both PCTs this species does not occur in association with *Eucalyptus oblonga* or *Eucalyptus haemastoma.* Advice from CPHR (September 2004) in respect to this species supported exclusion due to highly limited distribution in the Patonga area of the Central Coast LGA and field surveys have confirmed microhabitat are not present within the subject land.	 

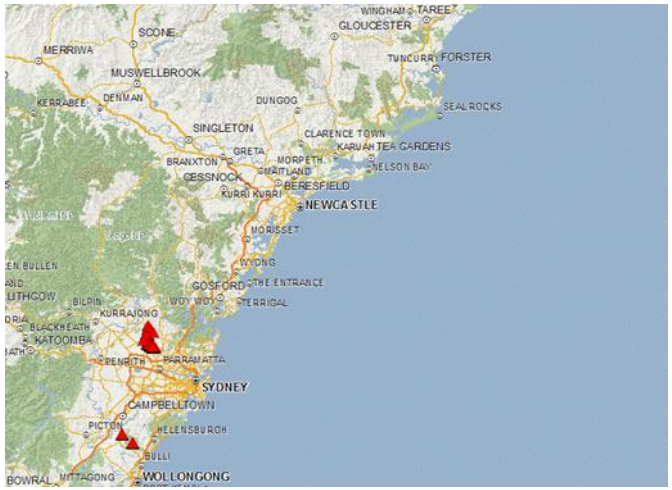
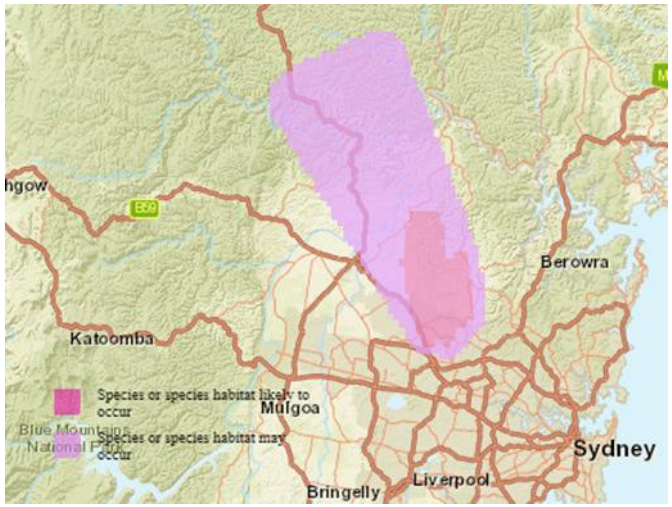
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Darwinia biflora	**Distribution** *Darwinia biflora* is known to have a highly restricted distribution with the species only known to occur in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas (LGAs). The northern, southern, eastern and western limits of the range are at Maroota, North Ryde, Cowan and Kellyville, respectively (TBDC 2025). *Darwinia biflora* is found across the Hornsby plateau area, northwestern Sydney, along the edges of weathered shale, capped ridges and Hawkesbury Sandstone (Carolin and Tindale 1993; DEC 2004a). Maroota is the northern extreme of the range, North Ryde in the south, Cowan in the east and Kellyville in the west (DEC 2004a). Known sites of *Darwinia biflora* are found in the LGAs of Ryde, Baulkham Hills, Hornsby, Ku-ring-gai and the Central Coast Botanical Subdivision. Previously recorded sites in Hunters Hill, Linden (Blue Mountains) and Royal National Park are no longer present (DEC 2004a). Regional distribution is within the Sydney Basin, from Cheltenham to Hawkesbury River. (NSW Flora Online) The species is reported to be killed by fire although readily re-establishes from soil-stored seed post fire (Benson and McDougall 1998). Seed dispersal mechanisms are unknown although likely to be highly localised given the known soil-stored seed capacity of the species. The nearest BioNet record is 45 km from the subject land and given this recruitment from the known meta population to areas covered by the project is considered unlikely. **Microhabitat** The species generally occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone (TBDC 2025). Associated overstorey species include *Eucalyptus haemastoma*, *Corymbia gummifera* and/or *E. squamosa*. The vegetation structure is usually woodland, open forest or scrub-heath (TBDC 2025). A small area of Hawkesbury Sandstone occurs along a ridge line connecting Olney and Watagan State Forests. The geology does not exhibit weathered shale-capped ridges and vegetation surveys did not record *Eucalyptus haemastoma* or *E. squamosa.* The subject land is not considered to contain suitable microhabitats for this species.	 

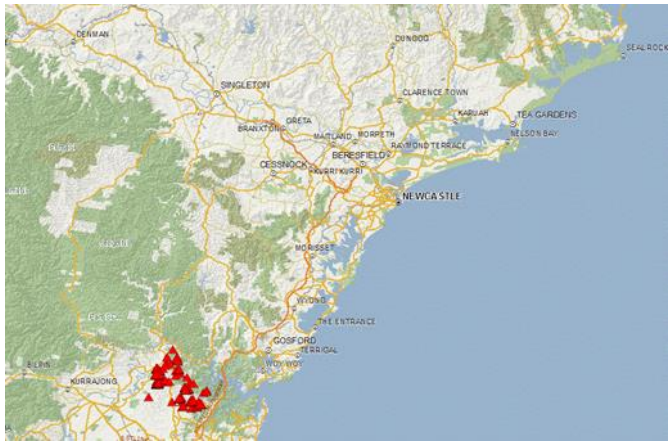
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Darwinia biflora* and that genetic dispersal and establishment of viable recruitment is unlikely. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	
Darwinia glaucophylla	**Distribution** *Darwinia glaucophylla* is known to have a highly restricted distribution with the species occurring between Gosford and the Hawkesbury River around Calga, Kariong and Mt Karing. Known from approximately 15 sites, several within or near to Brisbane Waters National Park and 1 within Popran National Park. Occurs entirely within the Gosford LGA of the Sydney Basin IBRA bioregion (TBDC 2025). The species is reported to be killed by fire although readily re-establishes from soil-stored seed post fire (Benson and McDougall 1998). Seed dispersal mechanisms are highly localised with seed thought to be dispersed by ants (TBDC 2025). The nearest BioNet records are over 30 km from the subject land and given this recruitment from the known meta population to areas covered by the project is considered unlikely. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Darwinia glaucophylla* and that genetic dispersal and establishment of viable recruitment is unlikely.	

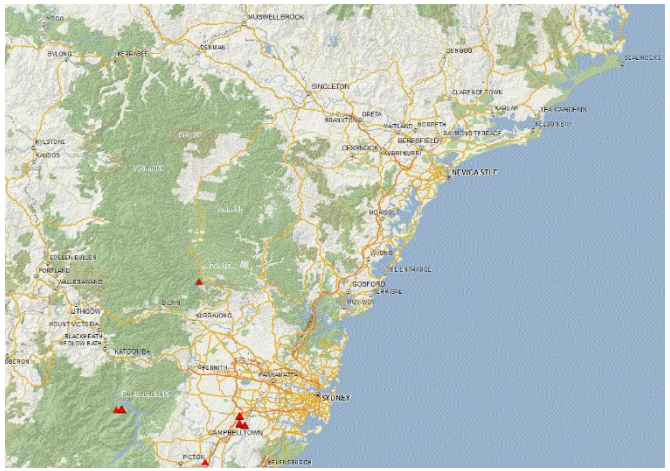
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	Microhabitat *Darwinia glaucophylla* occurs in sandy heath, scrub and woodlands often associate with sandstone rock platforms or near hanging swamps and friable sandstone shallow soils (TBDC 2025). The NSW Threatened Species Scientific Committee- conservation assessment of *Darwinia glaucophylla* was prepared to support the uplisting of the threat status of the species from vulnerable to endangered and states that the species has been recorded in a number of Plant Community Types (PCTs) (NSW Scientific Committee 2024). It has predominantly been recorded in Northern Sydney Sandstone Rockplate Shrubland (PCT 3808), Northern Sydney Scribbly Gum Woodland (PCT 3586) and Sydney Coastal Sandstone Bloodwood Shrub Forest (PCT 3593). None of these PCTs have been recorded within the subject land. However, the NSW Threatened Species Scientific Committee state that *Darwinia glaucophylla* is likely not confined to these PCTs and may be found within other PCTs that occur around known subpopulations (NSW Scientific Committee 2024). No subpopulation of this species occurs in the broader locality and given the foraging rangers of territorial Honeyeaters (the primary pollinators of the species) have typical home ranges of <1 ha it is considered highly unlikely the project will impact any potential habitat for this species. Further, the subject land lacks rocky platforms and heath vegetation and within the Wyong IBRA subregion the vegetation is mostly dominated by wet sclerophyll forest. It is noted that the species is shade intolerant and given the lack of exposed rock platforms and low heath woodland vegetation specific microhabitats for this species are absent within the subject land. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

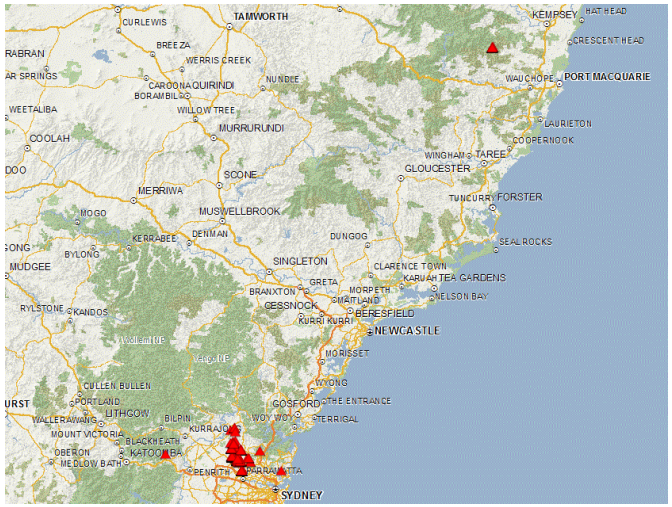
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Darwinia peduncularis	**Distribution** *Darwinia peduncularis* is known to occur as local disjunct populations in coastal NSW with isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland (TBDC 2025). The species is reported to be killed by fire although readily re-establishes from soil-stored seed post fire (Benson and McDougall 1998). Seed dispersal mechanisms are unknown although likely to be highly localised given the known soil-stored seed capacity of the species. The nearest BioNet record is 45 km from the subject land and given this recruitment from the known meta population to areas covered by the project is considered unlikely. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Darwinia peduncularis* and that genetic dispersal and establishment of viable recruitment is unlikely. **Microhabitat** Microhabitat features for this plant are not unusual and the species is known to occur on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone (TBDC 2025). No subpopulation of this species occurs in the broader locality and given the foraging rangers of territorial Honeyeaters (the primary pollinators of the species) have typical home ranges of <1 ha it is considered highly unlikely the project will impact any potential habitat for this species. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

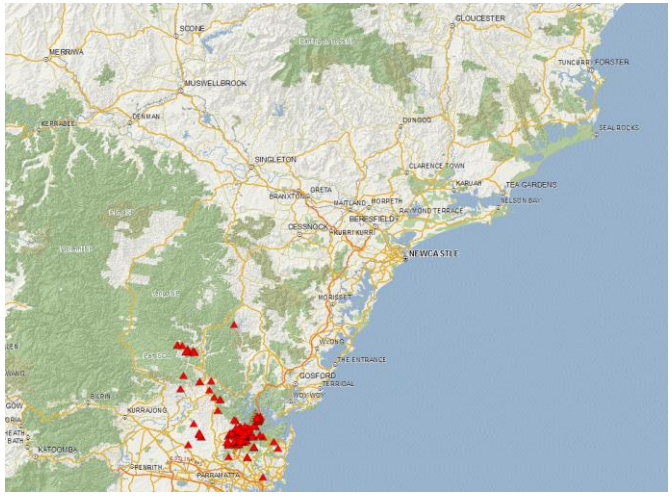
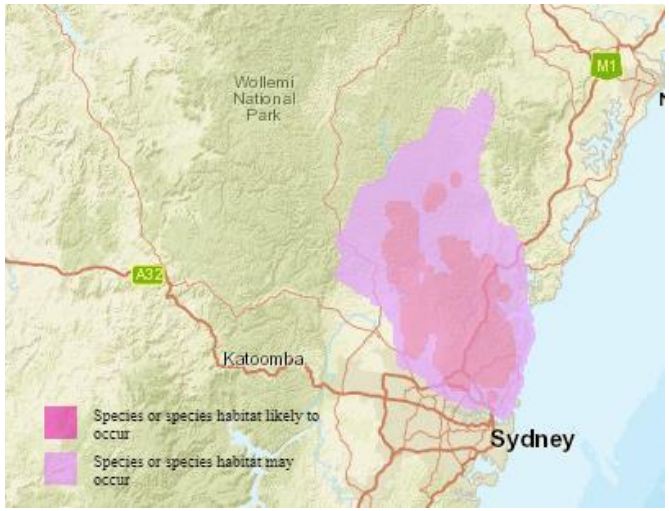
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Diuris praecox	**Distribution** *Diuris preacox* is known from coastal and near coastal situations between Bateau Bay and Smiths Lake, with inland records near Dooralong and Mandalong (Jones 1991; TBDC 2025, PlantNet 2024). Components of the subject land within the Hunter IBRA subregion are outside the known distribution for this species. A small area of the subject land associated with an existing approved cleared electricity easement and the proposed laydown area on Centennial Coal are located within the known distribution for *Diuris preacox.* Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Diuris preacox* and that genetic dispersal and establishment of viable recruitment is unlikely. **Microhabitat** There is currently no listed specific habitat constraint for *Diuris preacox* (TBDC 2025). The species is known to occur on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey (TBDC 2025). *Diuris preacox* is closely related to the non-threatened *Diuris abbreviata* although the latter is a late flowering species of the ranges and tablelands whereas *Diuris preacox* grows in coastal and near coastal situations (Jones 1991). Within the subject land *Diuris preacox* is predicted for the Wyong IBRA subregions. Literature on the species indicates that *Diuris preacox* is only known to occur at altitudes between 5–150 metres (Copeland and Backhouse 2022). Within the Wyong IBRA subregion the entire proposed easement occurs above 200 metres above sea level. The only part of the subject land that occurs below 150 metres above sea level is associated with an existing approved cleared electricity easement and the proposed laydown area on Centennial Coal where utilisation areas are restricted to existing cleared agricultural land dominated by exotic pasture species. Impact areas within the subject land are not considered to contain suitable microhabitat for *Diuris preacox.* The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

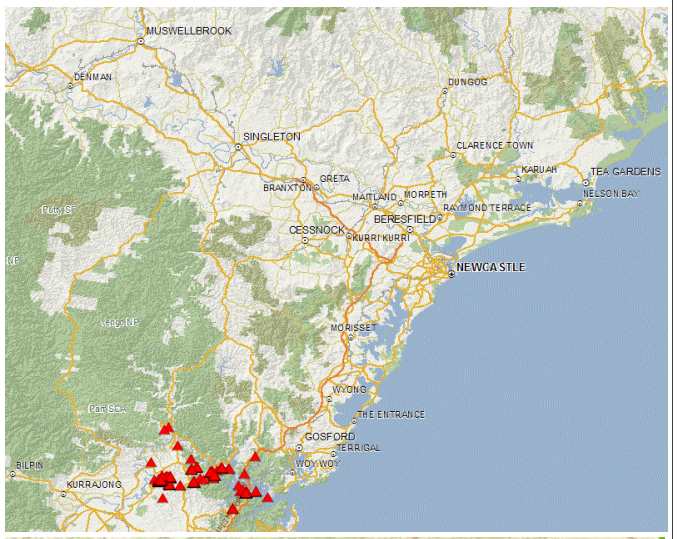
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Eucalyptus cryptica Syn. *Eucalyptus sp. Cattai*	**Distribution** *Eucalyptus cryptica* is known to have a highly restricted distribution with the species occurring in The Hills LGA, with known populations occurring within the area bounded by Kellyville – Maraylya – Glenorie (TBDC 2025). The Conservation Advice (TSSC 2018) describes the species as only occurring from northwestern Sydney between Castle Hill and Cattai. Previously the species was thought to occur at Colo Heights, however this record is now considered to be of a different taxon. The species has not been observed to have successfully recruited in the wild although seeds collected have been germinated and the species is not considered sterile (TBDC 2025). Whilst there is little known in regard to seed dispersal, it is likely that wind and gravity are the main mechanisms. The nearest BioNet record is about 50 km from the subject land and given this recruitment from the known meta population to areas covered by the project is considered unlikely. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Eucalyptus cryptica* and that genetic dispersal and establishment of viable recruitment is unlikely. The habitat is therefore unlikely to be suitable for this species. **Microhabitat** Associated soils for *Eucalyptus cryptica* are recorded as laterised clays overlying sandstone (TBDC 2025). Further, the species is recorded to be associated with in scrub, heath and low woodland, on sandstone-derived soils with habitats also associated with the edges of the Mittagong Formation, which may include Mittagong sandstone and shale, and at some sites with the presence of laterised loose stones (NSW Scientific Committee 2015). Within the subject land *Eucalyptus cryptica* is predicted to be associated with PCT 3617 within the Yengo IBRA subregion. This vegetation was recorded as an open woodland structure and not a scrub, heath or low woodland and does not exhibit soils with laterised clays overlying sandstone. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	 

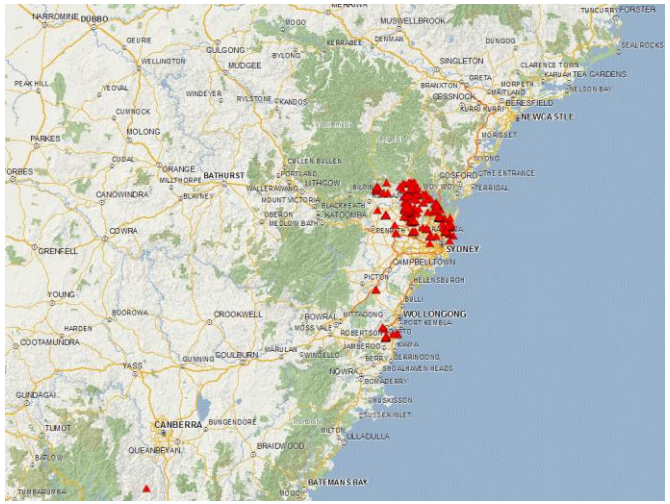
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Grevillea parviflora subsp. supplicans	**Distribution** *Grevillea parviflora subsp. supplicans* is known to have a highly restricted distribution with the species occurring between (approximately 8 by 10 km) and confined to the northwest of Sydney near Arcadia and the Maroota–Marramarra Creek area, in Hornsby and Baulkham Hills local government areas. It is known from only a few locations, 1 of which is in the southern portion of Marramarra National Park (TBDC). The species generates from seed and is insect pollinated although dispersal vectors are unknown (Makinson 2000). Given the highly restricted distribution seed dispersal is likely to be localised. The nearest BioNet record is about 45 km from the subject land and given this recruitment from the known meta population to areas covered by the project is considered unlikely. Based on available evidence, the subject land is not considered to be within the known or likely distribution for *Grevillea parviflora subsp. supplicans* and that genetic dispersal and establishment of viable recruitment is unlikely. **Microhabitat** Microhabitat features for this plant are strongly associated with clay-capped ridged of the Lucas Heights and Faulconbridge soil landscapes, with a preference for yellow clays with periodically impeded drainage (TBDC 2025). This species is predicted to be associated with PCT 3617 within the Yengo IBRA subregion where it occurs on Watagan soil landscape unit. No subpopulation of this species occurs in the broader locality and given the soil and geological microhabitat features it is considered highly unlikely the project will impact any potential habitat for this species.	

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Gyrostemon thesioides	Within NSW, the species has recently been recorded near Lake Burragorang in the Blue Mountains National Park. It has also been recorded in 2004 in Wollemi National Park, near the Colo River (1 male plant), and historically at sites near the Georges and Nepean Rivers (more than 55 and 110 years ago respectively) (TBDC). The nearest BioNet record is 67 km from the subject land. The known habitat constraint for this species is sandy, alluvial or colluvial soil within 50 metres of a water course (TBDC). *Gyrostemon thesioides* is only predicted for the Yengo IBRA subregion where within the subject land the only main area of potential habitat is the alluvial river terrace Congewai Creek. The native vegetation on deep alluvial soils within 50 m Congewai Creek have been completely modified through historic and ongoing agricultural activities and as such the vegetation today is completely dominated by exotic pasture species. In fact, the rich alluvial soils of Congewai Creek were used to grow wheat in the early days of the Sydney Colony (pers. Comm. Allan Stapleford 2024) and have over the last 200 odd years been completely modified that it is highly unlikely to support suitable habitat for *Gyrostemon thesioides*. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Gyrostemon thesioides.* The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

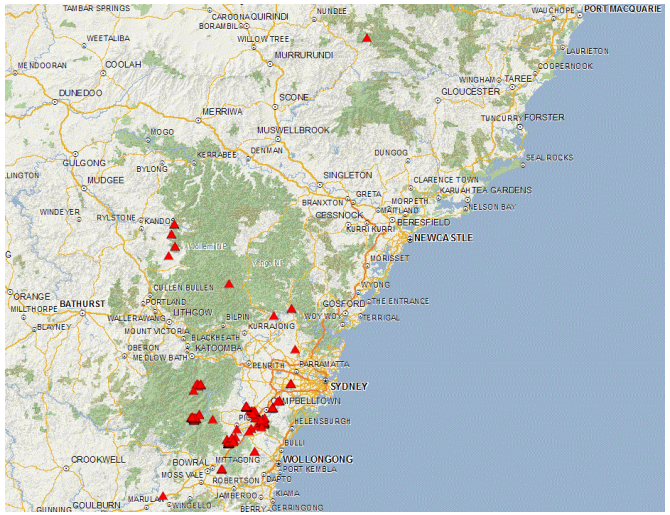
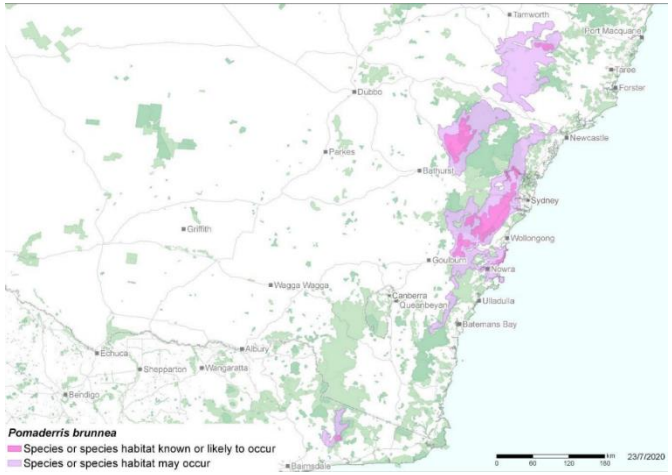
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Hibbertia superans	**Distribution** *Hibbertia superans* is known to have a highly restricted distribution occurring from Baulkham Hills to South Maroota in the northern outskirts of Sydney, where there are currently 16 known sites, and at 1 locality at Mount Boss, inland from Kempsey. No populations are known from a formal conservation reserve. The 2 widely disjunct populations displaying small differences, most noticeably being slightly fewer stamens in the northern populations (North Coast) compared to the southern populations (Sydney). These may be separated as different species in the future (TBDC 2025). The nearest BioNet record is 54 km from the subject land. The fruit is dehiscent and the seed has a fleshy aril which attracts ants and encourages them to disperse seeds (Benson & McDougall, 1995). Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Hibbertia superans*. **Microhabitat** There is currently no listed specific habitat constraint for *Hibbertia superans*. The species is known to occur on sandstone ridgetops often near the shale/sandstone boundary in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides (TBDC 2025). *Hibbertia superans* is only predicted for the Yengo IBRA subregion where within the subject land no sandstone ridgetops adjoin or are near a shale/sandstone geological boundary. Further, ridgetops within the subject land that occur in the Yengo IBRA subregion are mapped as having soil of the Watagan, Ogilvie and Three Ways soil landscapes (Murphy, 1993; Kovac and Lawrie 1991). The Watagan soil landscape unit is a colluvial landscape where ridgetops generally comprise yellow podzolic soils of hardsetting yellowish brown sandy clay loam and earthy yellowish brown light sandy clay loam (Murphy 1993). Ogilvie soil landscape derive from the Narrabeen Group geological unit and ridgetop soils mainly comprise of shallow loams and sands (Kovac and Lawrie 1991). Ridgetops within the Three Ways soil landscape unit comprise of brown podzolic soils that form brownish black, black or dark brown loamy sand to loam soil (Kovac and Lawrie 1991). Crests and ridges of the Watagan, Ogilvie and Three Ways soil landscapes are not associated with or occur near a shale/sandstone geological boundary. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Lasiopetalum joyceae	**Distribution** *Lasiopetalum joyceae* is known to have a highly restricted distribution occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved (TBDC 2025). The Conservation Advice for *Lasiopetalum joyceae* (DEWHA 2008) describes the species as occurring within the Hawkesbury-Nepean (NSW) Natural Resource Management Region. It was known from 34 sites on the Hornsby Plateau between Berrilee and Duffys Forest. The nearest BioNet record is 24 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Lasiopetalum joyceae*. **Microhabitat** There is currently no listed specific habitat constraint for *Lasiopetalum joyceae* (TBDC 2025). The species is known to grow in heath on sandstone on lateritic to shaley ridgetops (TBDC 2025; EPBC Conservation Advice 2008). *Lasiopetalum joyceae* is only predicted for the Yengo IBRA subregion where within the subject land sandstone ridgetops exhibit open forest vegetation structure and lack lateritic or shaley geological features. Further, ridgetops within the subject land that occur in the Yengo IBRA subregion are mapped as having soil of the Watagan, Ogilvie and Three Ways soil landscapes (Murphy 1993; Kovac and Lawrie 1991). The Watagan soil landscape unit is a colluvial landscape where ridgetops generally comprise yellow podzolic soils of hardsetting yellowish brown sandy clay loam and earthy yellowish brown light sandy clay loam (Murphy 1993). Ogilvie soil landscape derive from the Narrabeen Group geological unit and ridgetop soils mainly comprise of shallow loams and sands (Kovac and Lawrie, 1991). Ridgetops within the Three Ways soil landscape unit comprise of brown podzolic soils that form brownish black, black or dark brown loamy sand to loam soil (Kovac and Lawrie, 1991). Crests and ridges of the Watagan, Ogilvie and Three Ways soil landscapes are not associated with lateritic to shaley ridgetops. The habitat is therefore unlikely to be suitable for this species. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	 

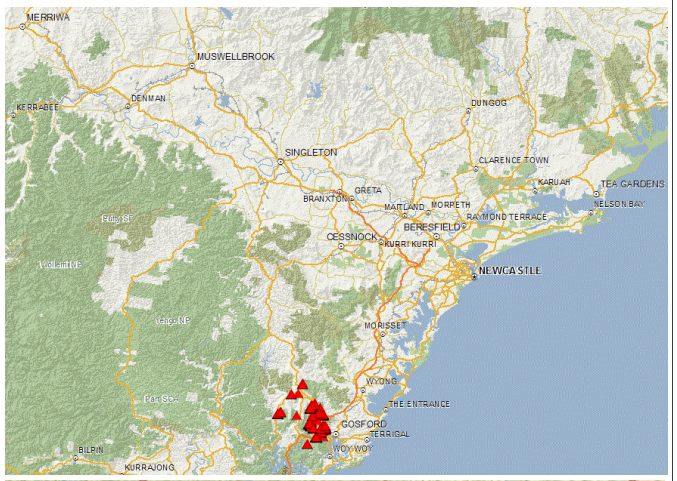
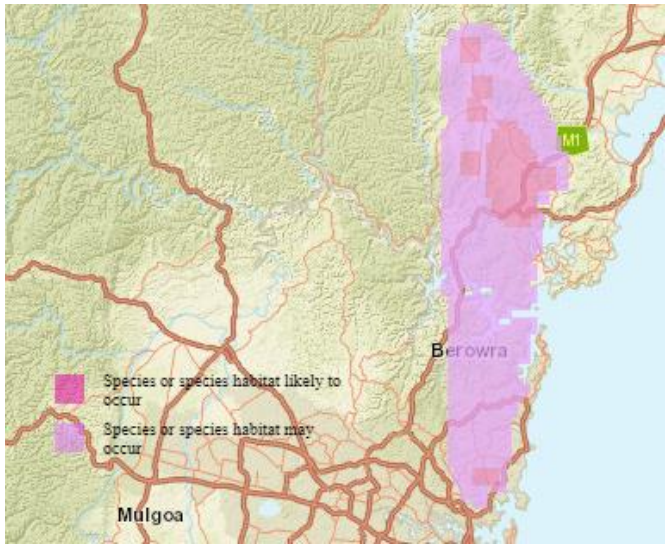
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Micromyrtus blakelyi	**Distribution** *Micromyrtus blakelyi* is known to have a highly restricted distribution to areas near the Hawkesbury River, north of Sydney. Distribution extends from St Albans in Yengo National Park and Maroota in the north, to Cowan in the south. All known populations occur within the Baulkham Hills and Hornsby local government areas (TBDC 2025). The Conservation Advice for *Micromyrtus blakelyi* (DEWHA 2008) describes the species as being restricted to areas near the Hawkesbury River, NSW, from Maroota to Cowan. It only occurs within the Hawkesbury-Nepean (NSW) Natural Resource Management Region. The nearest BioNet record is 38 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Micromyrtus blakelyi*. **Microhabitat** The known habitat constraints for this species are skeletal soil Hawkesbury sandstone rock platforms and outcrops or within 50 m. *Micromyrtus blakelyi* typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms (TBDC 2025). *Micromyrtus blakelyi* is only predicted for the Yengo IBRA subregion where within the subject land heath vegetation on ridges with large rock platforms are generally absent. The species is also recorded to occur with vegetation associated with *Angophora hispida*, *Corymbia gummifera*, *Banksia ericifolia*, *Grevillea buxifolia* and *Allocasurina distyla* (Bensin and McDougall 1998). These species are absent for the Yengo IBRA subregion section of the subject land. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	 

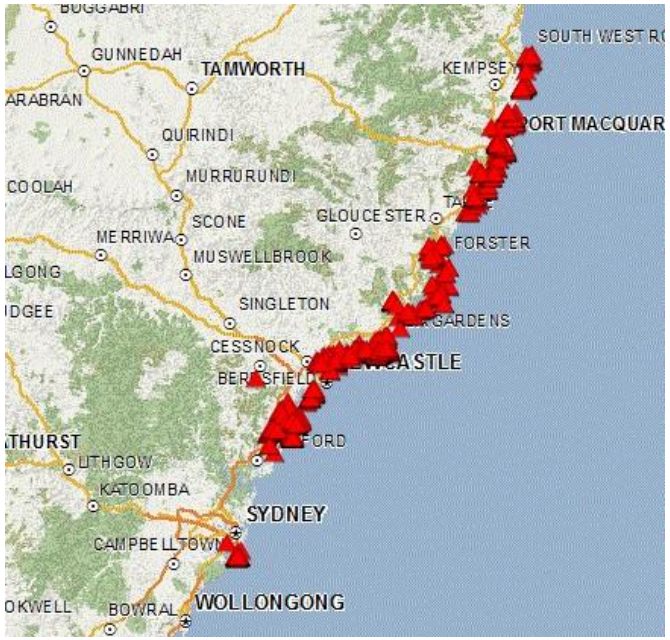
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Pimelea curviflora var. *curviflora*	**Distribution** *Pimelea curviflora* var. *curviflora* is known to have a highly restricted distribution with the species as being confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the northwest. New population discovered at Croom Reserve near Albion Park in Shellharbour LGA in August 2011. Formerly recorded around the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly (TBDC). *Pimelea curviflora* var. *curviflora* is confined to the coastal area of the Sydney and Illawarra regions of NSW (Fairley and Moore 2000; OEH 2012e; Rye 1990; Threlfall 1983). *Pimelea curviflora var. curviflora* is known from approximately 20 locations from the coastal area of northern Sydney to Maroota in the northwest (NSW SC 1998). It is found in the Baulkham Hills, Blacktown, Hornsby, Parramatta and Warringah (LGAs) (NPWS 1999ak). In 2011 a new population was detected at Croom Reserve near Albion Park in the Shellharbour LGA (OEH 2012e). The species was formerly recorded around the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly (OEH 2012e). The nearest BioNet record is 44 km from the subject land. No particular morphology for dispersal identified (McIntyre et al. 1995). Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Pimelea curviflora* var. *curviflora*. **Microhabitat** *Pimelea curviflora* var. *curviflora* occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands (TBDC 2025). This species is predicted for the Wyong and Yengo IBRA subregion where within the subject land sandstone ridgetops exhibit open forest vegetation structure and lack lateritic or shaley geological features.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	Further, ridgetops within the subject land that occur in the Yengo IBRA subregion are mapped as having soil of the Watagan, Ogilvie and Three Ways soil landscapes (Murphy 1993; Kovac and Lawrie 1991). The Watagan soil landscape unit is a colluvial landscape where ridgetops generally comprise yellow podzolic soils of hardsetting yellowish brown sandy clay loam and earthy yellowish brown light sandy clay loam (Murphy 1993). Ogilvie soil landscape derive from the Narrabeen Group geological unit and ridgetop soils mainly comprise of shallow loams and sands (Kovac and Lawrie, 1991). Ridgetops within the Three Ways soil landscape unit comprise of brown podzolic soils that form brownish black, black or dark brown loamy sand to loam soil (Kovac and Lawrie, 1991). Crests and ridges of the Watagan, Ogilvie and Three Ways soil landscapes are not associated with lateritic to shaley ridgetops. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

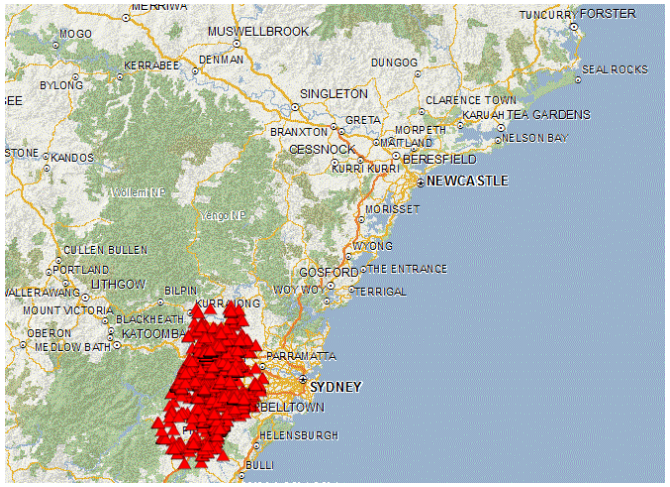
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Pomaderris brunnea	**Distribution** The species is recorded as being found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria (TBDC 2025). The species was originally considered endemic to the Sydney Hawkesbury Sandstone region. It is found on the Colo R., the Nepean R. floodplain at Menangle, in creeklines at Wirrumbirra Sanctuary (Bargo) and on the Hawkesbury R. (Harden 1990; Peacock 1996; Fairley and Moore 2000). The distribution may extend into the southern section of Yengo National Park along major creeklines and floodplains (Maryott-Brown and Wilks 1993). The species is also known from Tuggolo SF in Walcha/Nundle and Styx R. Management Areas, in the Northern Region of NSW (Peacock 1996). The nearest BioNet record is 45 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Pomaderris brunnea*. **Microhabitat** There is currently no listed specific habitat constraint for *Pomaderris brunnea* (TBDC 2025). The species is known to occur in moist woodland or forest on clay and alluvial soils of flood plains and creek lines (TBDC 2025). In NSW, it occurs on ridgetops and plateaux in relatively dry habitats, and also in moist woodland or forest on clay and alluvial soils of flood plains and creek lines in relatively damp habitats (EPBC Act Conservation Advice 2021). In the north of the range the associated overstorey species are *Eucalyptus laevopinea* (Silver-top Stringybark), *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus campanulata* (New England Blackbutt). Southern populations can occur in open eucalypt woodland dominated by *Eucalyptus amplifolia* (Cabbage Gum) with an understorey shrubland dominated by *Allocasuarina spp*. (Sheoak) and *Bursaria spp*. (Bursaria). Sites on alluvial floodplains are dominated by eucalypts including *Eucalyptus elata* (River Peppermint), *Eucalyptus piperita* (Sydney Peppermint) and *Eucalyptus punctata* (Grey Gum) with the understorey commonly consisting of *Bursaria spinosa* (Sweet Bursaria) and *Pteridium esculentum* (Austral Bracken) (EPBC Act Conservation Advice 2021).	 

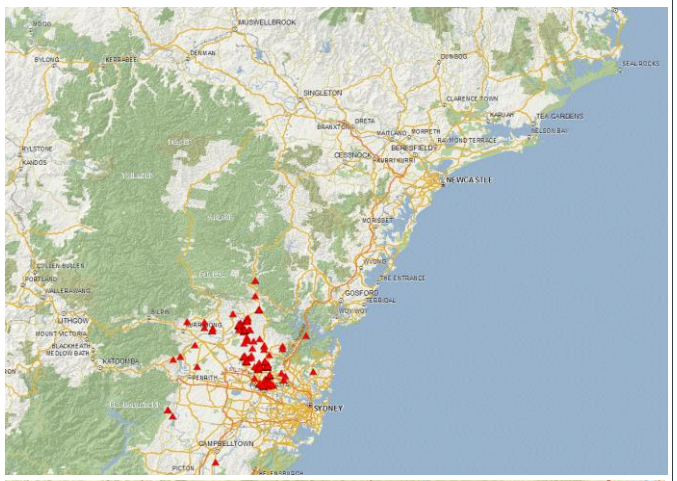
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
	Pomaderris brunnea is only predicted for the Yengo IBRA subregion where within the subject land vegetation assemblage (PCT 3241) lacks the diagnostic structural species of the northern population and also lack the alluvial floodplain floristic assemblage of the southern population. The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	

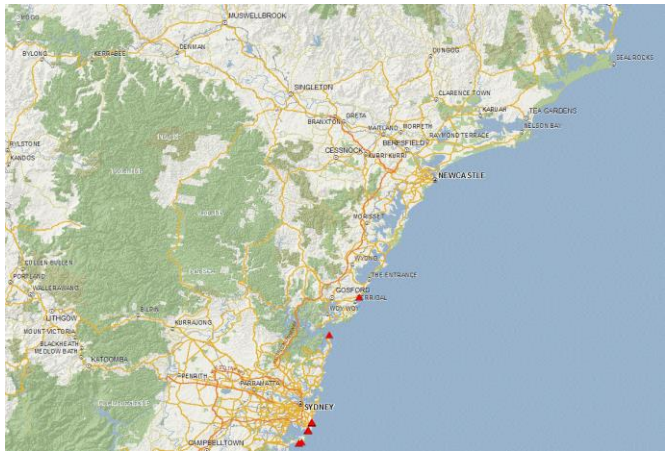
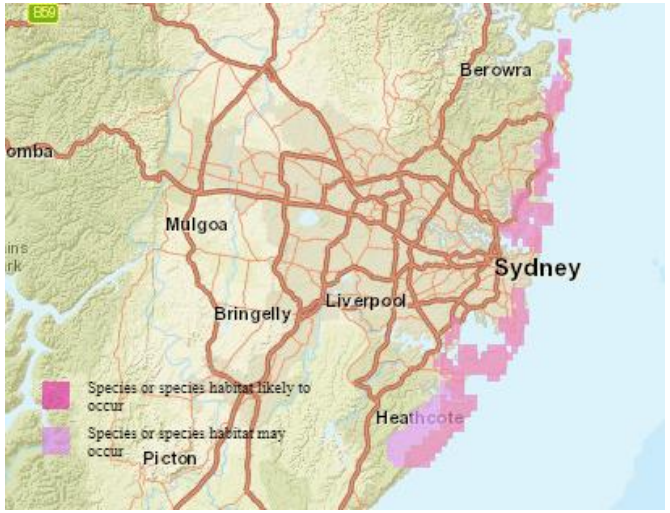
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Prostanthera junonis	**Distribution** *Prostanthera junonis* is known to have a highly restricted distribution with the species having a north-south range of approximately 19 km on the Somersby Plateau in the Gosford and Wyong local government areas (TBDC 2025). The Somersby Mintbush is currently known only from the eastern parts of the Somersby Plateau in the Gosford local government area in NSW (Conn 1997). The species is known to occur at 9 locations within a total extent of 19 km. The species previously occurred over a broader range and is known to have become locally extinct in some areas (Quinn et al. 1995). The nearest BioNet record is 18 km from the subject land. The occurrence of this species in relatively discrete populations suggests that seed is not dispersed over large distances (NPWS 2000). Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Prostanthera junonis*. The habitat is therefore unlikely to be suitable for this species. **Microhabitat** Habitat for *Prostanthera junonis* is listed in TBDC (2025) as being restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. Potential habitat within these soil landscapes is where woodland is dominated by *Eucalyptus haemostoma* with an understorey containing *Banksia ericifolia* and *Banksia serrata* (NPWS 2000). In the subject land *Prostanthera junonis* is predicted to be associated with PCT 3242 and 3617 in the Wyong IBRA subregion. An analysis of soil landscapes indicates that PCT 3242 occurs on Watagan soils whilst PCT 3617 occurs on Sydney Town soil landscape. Further analysis of PCT 3617 indicates that the floristic composition lacks a tree layer of *Eucalyptus haemostoma* with an understorey containing *Banksia ericifolia* and *Banksia serrata.* The subject land does not contain specific microhabitat for the species and as such habitat is therefore unlikely to be suitable for this species.	 

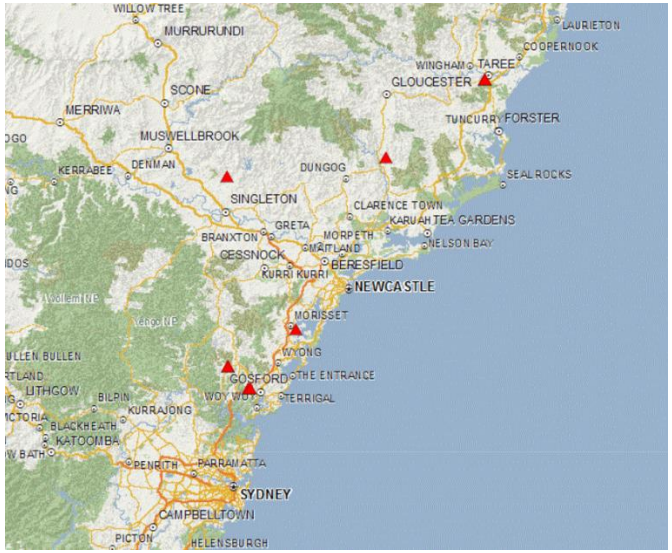
Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Wallum Froglet (*Crinia tinnula*)	Wallum Froglets are found along the coastal margin from Litabella National Park in southeast Queensland to Kurnell in Sydney (TBDC). Wallum Froglets are found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests (TBDC). The subject land is not located within the coastal floodplain and does not contain specific habitat requirements for the species particularly acidic swamps, sedgelands, heathlands or acid paperbark swamps. Based on available evidence, the subject land is not considered to contain habitat within the usual distribution of Wallum Froglet (*Crinia tinnula*). The habitat is therefore unlikely to be suitable for this species.	

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Mahony's Toadlet (*Uperoleia mahonyi*)	Mahony's Toadlet is endemic to the mid-north coast of NSW and to date has been found between Kangy Angy and Seal Rocks (TBDC). 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 (TBDC). As reference in the EPBC Act Conservation Advice, the NSW Scientific Committee (2017) state that "Mahony's Toadlet has been recorded almost exclusively on a substrate of leached (highly nutrient impoverished) white sand and is commonly associated with acid paperbark swamps (Clulow et al. 2016). The subject land is not located within the coastal floodplain and does not contain specific habitat requirements for the species particularly leached (highly nutrient impoverished) white sand associated with acid paperbark swamps. Based on available evidence, the subject land is not considered to contain habitat within the usual distribution of Mahony's Toadlet (*Uperoleia mahonyi*). The habitat is therefore unlikely to be suitable for this species.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Cumberland Plain Land Snail (*Meridolum corneovirens*)	The TBDC describes the species as living in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other due to land use patterns. The TBDC states that typical habitat for this species occurs in Cumberland Plain Woodland (a CEEC), and also in Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Of these communities, only River-flat Eucalypt Forest is present within the subject land (1.36 ha), however no PCT associations for Cumberland Plain Land Snail exist within the subject land. The nearest BioNet record is 62 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of Cumberland Plain Land Snail (*Meridolum corneovirens*). The habitat is therefore unlikely to be suitable for this species.	

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Dural Land Snail (*Pommerhelix duralensis*)	The TBDC describes the species as being a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is a shale-influenced habitat specialist, which occurs in low densities along the northwest fringes of the Cumberland Plain on shale-sandstone transitional landscapes (Shea, 2001; Hornsby Shire Council, 2006; Clarke, 2009; Ridgeway et. al., 2014). The species is known to occur as far north as St Albans. Moving southwest from St Albans, the species occurs in East Kurrajong and then south along the footslopes of the Blue Mountains as far south as Mulgoa. Southeast from St Albans, the species is found across The Hills Shire LGA and south to Parramatta. The majority of confirmed records for the species occur within The Hills Shire LGA. The species is also found within the LGAs of Blue Mountains City, Penrith City, Hornsby Shire and Parramatta City (Ridgeway 2010). Within the subject land only PCT 3617 – Sydney Hinterland Peppermint-Apple Forest has associations with this species (comprising a total of 35.56 ha), however the area lacks the shale microhabitat required by the species. The nearest BioNet record is 42 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of Dural Land Snail (*Pommerhelix duralensis*). The habitat is therefore unlikely to be suitable for this species.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Maroubra Woodland Snail (*Meridolum maryae*)	The EPBC Conservation Advice for the Maroubra Woodland Snail (NSW TSSC 2019) and the TBDC describes the species as being confined to a narrow band of habitat along the northeastern corner of the Royal National Park to Palm Beach in Sydney, a total linear distance of 65 km. Records of the species are generally within 1km of the ocean but occur up to 5 km inland. While Eraring Power Station at the eastern-most end of the project is near Lake Macquarie, a large salt water lagoon, the subject land is beyond 5 km from the ocean, and the coastal vegetation communities with which the species is associated such as dunes and sand plains, are absent from the subject land. The nearest BioNet record is 35 km from the subject land. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of the Maroubra Woodland Snail (*Meridolum maryae*). The habitat is therefore unlikely to be suitable for this species.	 

Species name	Habitat suitability	Mapped distribution/records of the species (Source BioNet; DCCEEW 2024)
Red-backed Button-quail (*Turnix maculosus*)	The TBDC describes Red-backed Button-quail as a cryptic species, mainly distributed in coastal and subcoastal regions, recorded infrequently in NSW. The species inhabits grasslands, open and savannah woodlands with grassy ground layer, pastures and crops in warm temperate areas, typically only in regions with more than 400 mm of annual summer rainfall. In NSW the species is said to occur in grasslands, heath and crops, preferencing sites close to water, such as sedgelands near creeks, swamps, springs, and wetlands. The species also typically breeds in dense vegetation near water. While the species has habitat associations in PCTs 3241, 3250 and 3617 which do occur in the subject land, the specific microhabitat requirements of grassland, heath and crops occurring near water do not occur within the subject land. The nearest BioNet record is 4.8 km from the subject land (near Morisset in 2005), with a historic record 13 km from the subject land (near Ravensworth in 1981). Based on available evidence, the subject land is not considered to contain habitat sufficient to support Red-backed Button-quail (*Turnix maculosus*). The habitat is therefore unlikely to be suitable for this species.	

5.1.3 Ecosystem credit species

Table 5.4 outlines the list of ecosystem credit species likely to occur on or use the subject land and is arranged in common name alphabetical order to be consistent with BAM-C report outputs. Of the total 52 ecosystem credit species provided by the BAM-C, 3 were not retained for further assessment, with 1 species partially retained (excludes areas of derived or disturbed grassland) for further assessment. Of these retained species (34 birds, 13 mammals, 2 reptiles), 4 are listed SAII species and 18 are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 5.4 Predicted ecosystem credit species

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Australasian Bittern	*Botaurus poiciloptilus*	E	E	No	–	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 4015, 4039, 4072 & 4089. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 4015, 4039, 4072 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Australian Painted Snipe	*Rostratula australis*	E	E	No	–	–	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 4015, 4039, 4072 and 4089. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 4015, 4039, 4072 & 4089.	Moderate
Black Bittern	*Ixobrychus flavicollis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3250, 3581, 3431 3152, 3237, 3239, 3241, 3244, 3438, 3439, 3489, 3238, 3444, 3446, 3151, 3241, 3489, 4015 & 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3250, 3581 & 3244.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3242, 3152, 3237, 3239, 3244, 3438, 3439, 3489, 3238, 3444, 3446, 3151 & 3241. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3431 3438, 3444, 3446, 3241, 4015 & 4089.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Black Falcon	*Falco subniger*	V	-	No	-	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3438, 3439, 3489, 3328, 3444, 3446, 4039, 4072, 3314, 3315, 3431, 4015 & 4089. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3438, 3439, 3489, 3328, 3444, 3446, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3438, 3444, 3446, 4039, 4072, 3314, 3315, 3431, 4015 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3241, 4072, 3314, 3315, 3431, 3636 & 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3241 & 4072.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4072, 3314, 3315, 3431, 3636 & 4089.	
Black-necked Stork	*Ephippiorhynchus asiaticus*	E	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained.	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3086, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Broad-billed Sandpiper	*Calidris falcinellus*	V	-	No	✓	-	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraint as per Important Habitat Map. Further discussion is provided in Table 5.2.	Species associated with PCT 3617, 3621, 3431, 3438, 3444, 3636 and 3446. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3617 & 3621. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3431, 3438, 3444, 3446 & 3636.	High
Broad-headed Snake	*Hopolocephalus bungaroides*	E	E	Yes	✓	✓	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3617, 3621, 3489 and 3599. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3617, 3489 & 3599.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	
Corben's Long-eared Bat	*Nyctophilus corbeni*	V	V	No	-	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315, 3438 & 4039.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Diamond Firetail	*Stagonopleura guttata*	V	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3239, 3617, 3621, 3250. 3244, 3439, 3489, 3605, 3446, 3314, 3315, 3431 & 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3239, 3244, 3250, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3617, 3244, 3439, 3446, 3489 & 3605. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3446, 3314, 3315, 3431 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	–	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3263, 3617, 3621, 3250 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3086, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	–	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3237, 3244, 3438, 3439, 3605, 3238, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636 and 4015. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3237, 3244, 3438, 3439, 3605, 3238, 3444, 3446, 3241 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636 & 4015.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3237, 3244, 3599, 3605, 3238, 3444, 3241, 3431 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3237, 3244, 3599, 3605, 3238, 3444, 3241 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3444, 3241, 3431 & 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Eastern Grass Owl	*Tyto longimembris*	V	-	No	-	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Within the Hunter IBRA subregion, associated habitat occurs in PCT 4015.	Moderate
Eastern Osprey	*Pandion cristatus*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3087, 3237, 3244, 3438, 3439, 3605, 3238, 3328, 3444, 3446, 3241, 4039, 4072, 3431, 4015 and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3237, 3244, 3438, 3439, 3605, 3328, 3444, 3446, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3431, 4015 & 4089.	
Flame Robin	*Petroica phoenicea*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3444, 3446, 3151, 3241, 4072, 3431, 4089 and 3086.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3444, 3446, 3151, 3241, 4072 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4072, 3431, 4089 & 3086.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Gang-gang Cockatoo	*Callocephalon fimbriatum*	E	E	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072 & 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
Golden-tipped Bat	*Phoniscus papuensis*	V	-	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3605, 3238, 3446, 3151 and 3241. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3605, 3238, 3446, 3151 & 3241.	
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3244, 3605, 3446, 3241, 3315 and 3431. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3244, 3605, 3446 & 3241.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3446, 3241, 3315 & 3431.	
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3250, 3152, 3230, 3237, 3239, 3242, 3244, 3438, 3439, 3599, 3605, 3617, 3238, 3444, 3446, 3241, 4039, 4072, 3315, 3431, 3636, 4015, 3263, 3621 and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3250, 3230, 3239, 3242, 3244, 3617, 3263 & 3621.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3230, 3237, 3239, 3242, 3244, 3438, 3439, 3599, 3605, 3617, 3238, 3444, 3446, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4039, 4072, 3315, 3431, 3636, 4015 & 4089.	
Grey-headed Fly-fox	*Pteropus poliocephalus*	V	V	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 4089, 3238 & 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3444, 3446, 3241, 4039, 3238 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 4089, 3238 & 3086.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3438, 3439, 3599, 3605, 3238, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636, 4015 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3244, 3617, 3087, 3152, 3237, 3438,3439, 3599, 3605, 3238, 3444, 3446, 3241, 4039 & 3086.	Very High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636, 4015 & 3086.	
Little Bent-winged Bat	*Miniopterus australis*	V	-	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3250, 3029, 3581, 3087, 3237, 3244, 3438, 3439, 3444, 3446, 3151, 3241, 4039, 3314, 3315, 3431, 3636 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3250, 3029, 3581 & 3244.	Very High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3237, 3244, 3438, 3439, 3444, 3446, 3151, 3241, 4039 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636 & 3086.	
Little Eagle	*Hieraaetus morphnoides*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Little Lorikeet	*Parvipsitta pusilla*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3242, 3617, 3230, 3086, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072 & 3599.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3250, 3581, 3244, 3446, 3315 and 3446. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3244 & 3446. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315 & 3446.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Olive Whistler	*Pachycephala olivacea*	V	-	No	-	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3152, 3230, 3237, 3239, 3242, 3244, 3599, 3605, 3617, 3238, 3446, 3151 & 3241. Within the Yango IBRA subregion, associated habitat occurs in PCTs 3152, 3230, 3237, 3239, 3242, 3244, 3599, 3605, 3617, 3238, 3446, 3151 & 3241.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Painted Honeyeater	*Grantiella picta*	V	V	No	-	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3152, 3230, 3242, 3244, 3489, 3599, 3605, 3617, 3151, 3636 & 4015. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3230, 3242, 3244, 3489, 3599, 3605, 3617 & 3151. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3636 & 4015.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Pilotbird	*Pycnoptilus floccosus*	V	V	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3239, 3617, 3621, 3250, 3152, 3599, 3605 & 3238. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3239, 3617, 3621 & 3250. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3617, 3152, 3599, 3605 & 3238.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Red-legged Pademelon	*Thylogale stigmatica*	V	-	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3242, 3250, 3029 and 3244. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3242, 3250, 3029 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3242 & 3244.	High
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Partial (when a species is retained within 1 vegetation zone but not another)	The species has been excluded from derived and disturbed grassland only as it lacks any mid-storey to canopy vegetation and favoured feed trees	Species associated with PCT 3230, 3239, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3241, 4039, , 3621, 3581, 3314, 3315, 3431, 3636, 4072 & 4089.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3244, 3621 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4039, 3314, 3315, 3431, 3636, 4072 & 4089.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Rose-crowned Fruit-Dove	*Ptilinopus regina*	V	-	No	✓	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3244, 3250, 3446 & 3581. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3244, 3250 & 3581. Within the Hunter IBRA subregion, associated habitat occurs in PCT 3446.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Rosenberg's Goanna	*Varanus rosenbergi*	V	-	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3152, 3438, 3439, 3489, 3599, 3605 and 3238. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3152, 3438, 3439, 3489, 3599, 3605 & 3238.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Scarlet Robin	*Petroica boodang*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3242, 3617, 3621, 3250, 3581, 3152, 3244, 3438, 3439, 3489, 3599, 3605, 3328, 3444, 3446, 3241, 4072, 3314, 3315, 3431, 3636 and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3242, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3242, 3617, 3152, 3244, 3438, 3439, 3489, 3599, 3605, 3328, 3444, 3446, 3241 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3438, 3444, 3446, 3241, 4072, 3314, 3315, 3431, 3636 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3086, 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3086, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3086, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	
South-eastern Hooded Robin	*Melanodryas cucullata cucullata*	E	E	No	-	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3152, 3230, 3242, 3244, 3489, 3599, 3605, 3617, 3151, 3636 and 4015. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3230, 3242, 3244, 3489, 3599, 3605, 3617 & 3151. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3636 & 4015.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Speckled Warbler	*Pyrrholaemus sagittatus*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3244 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	
Spotted Harrier	*Circus assimilis*	V	-	No	-	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3438, 3439, 3328, 3444, 3446, 4039, 4072, 3314, 3315, 3431, 3636, 4015 and 4089. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3438, 3439, 3328, 3444, 3446, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3438, 3444, 3446, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3444, 3446, 3151, 3241, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3444, 3446, 3151, 3241, 4072 & 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
Square-tailed Kite	*Lophoictinia isura*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 and 4089. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015 & 4089.	
Superb Fruit-Dove	*Ptilinopus superbus*	V	-	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3242 & 3250.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Swift Parrot	*Lathamus discolor*	E	CE	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072 & 3086.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
Turquoise Parrot	*Neophema pulchella*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3239, 3617, 3621, 3581, 3438, 3439, 3489, 3605, 3444, 3446 and 3431. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3239, 3617, 3621 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3617, 3438, 3439, 3489, 3605, 3444 & 3446.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446 & 3431.	
Varied Sittella	*Daphoenositta chrysoptera*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3617, 3238, 3444, 3446, 3151, 3241, 4039, 4072 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072 & 3086. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
White-throated Needletail	*Hirundapus caudacutus*	V	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 and 3086. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3029, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3087, 3152, 3237, 3244, 3438, 3439, 3489, 3599, 3605, 3238, 3328, 3444, 3446, 3151, 3241, 4039, 4072 & 3086.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3087, 3438, 3444, 3446, 3241, 4039, 4072, 3314, 3315, 3431, 3636, 4015, 4089 & 3086.	
Wompoo Fruit-Dove	*Ptilinopus magnificus*	V	-	No	✓	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Species associated with PCT 3242, 3250, 3029, 3241 & 3244. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3242, 3250, 3029 & 3244. Within the Hunter IBRA subregion, associated habitat occurs in PCT 3241.	Moderate

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Yellow-bellied Glider	*Petaurus australis*	V	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581, 3152, 3438, 3444, 3446, 3086, 3087, 3237, 3244, 3599, 3605, 3238 and 3241. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3617, 3621, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3152, 3438, 3444, 3446, 3086, 3087, 3237, 3244, 3599, 3605, 3238 & 3241. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3086, 3087 & 3241.	High

Common name	Scientific name	Listing status			IBRA Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter						
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	Species associated with PCT 3150, 3230, 3239, 3242, 3617, 3250, 3581, 3244, 3438, 3605, 3238, 3444, 3446, 3314, 3315 and 3431. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3617, 3250, 3581 & 3244. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3242, 3617, 3244, 3438, 3605, 3238, 3444 & 3446. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446, 3314, 3315 & 3431.	High

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

5.1.4 Species credit species

The list of species credit species likely to occur on or use the subject land and whether they were retained for further assessment are outlined in Table 5.5 and Table 5.6.

Table 5.6 outlines the list of species credit species likely to occur on or use the subject land and whether they were retained for further assessment.

Of the 77 flora credit species, 26 were excluded from further assessment. Of the 51 flora species credit species retained, 13 are recognised SAII species and 32 are listed under the EPBC Act.

Of the 52 species fauna credit species, 10 were excluded from further assessment. Of the 42 species fauna credit species retained (8 frogs, 14 birds, 15 mammals, 5 reptiles), 11 are recognised SAII species and 20 are listed under the EPBC Act.

Table 5.5 Predicted flora species credit species

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Bynoe's Wattle	*Acacia bynoeana*	E	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3617. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3617 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315 & 4039. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Acacia gordonii*	E	E	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
Acacia pendula population in the Hunter catchment	*Acacia pendula – endangered population*	EP	-	Yes	-	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3438 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431, 3438 & 4039. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Downy Wattle	*Acacia pubescens*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
-	*Androcalva rosea* Syn. *Commersonia rosea*	E	E	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCT 3439. Species subject to detailed targeted surveys.
Charmhaven Apple	*Angophora inopina*	V	V	No	✓	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3244, 3250 & 3581. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3244, 3250, 3315 & 3581. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Trailing Woodruff	*Asperula asthenes*	V	V	No	✓	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3242, 3244 & 3250. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3241 & 3446. Species subject to detailed targeted surveys.
-	*Asterolasia elegans*	E	E	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Thick-leaf Star-hair	*Astrotricha crassifolia*	V	V	Yes	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
-	*Brachyscome brownii*	-	CE	No	-	✓	✓	☐ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	No associated PCTs have been listed for this species. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Netted Bottle Brush	*Callistemon linearifolius*	V	-	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3230, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3444, 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315 & 3444. Species subject to detailed targeted surveys.
Red Helmet Orchid	*Corybas dowlingii*	E	-	No	✓	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3244, 3250 & 3581. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241 & 3446. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3250 & 3581. Species subject to detailed targeted surveys.
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum – endangered population*	EP	-	No	-	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3438 & 3439. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431, 3438 & 3636. Species subject to detailed targeted surveys. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
White-flowered Wax Plant	*Cynanchum elegans*	E	E	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3237, 3239, 3244, 3250, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3237, 3239, 3244, 3489 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3239 & 3489. Species subject to detailed targeted surveys.
-	*Darwinia biflora*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Darwinia glaucophylla*	V	-	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
-	*Darwinia peduncularis*	V	-	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
Spider Orchid	*Dendrobium tetragonum var. melaleucaphilum*	E	-	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3250. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Dillwynia tenuifolia*	V	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3605 & 3617. Species subject to detailed targeted surveys.
Rough Doubletail	*Diuris preacox*	V	V	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
Pine Donkey Orchid	*Diuris tricolor*	V	-	No	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315 & 3431. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor – endangered population*	EP	-	No	-	-	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431, 3438 & 3444. Species subject to detailed targeted surveys.
-	*Epacris purpurascens var. purpurascens*	V	-	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3250, 3617 & 3621. Species subject to detailed targeted surveys.
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis – endangered population*	EP	-	No	-	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCT 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 4072 & 4089. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Camfield's Stringybark	*Eucalyptus camfieldii*	V	V	No	✓	-	-	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in 3244. Species subject to detailed targeted surveys.
Singleton Mallee	*Eucalyptus castrensis*	E	-	Yes	-	-	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3438 & 3446. Species subject to detailed targeted surveys.
-	*Eucalyptus cryptica* Syn. *Eucalyptus sp. Cattai*	CE	CE	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
Broken Back Ironbark	*Eucalyptus fracta*	E	-	Yes	-	✓	-	☒ BAM-C ☒ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3489 & 3605. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Slaty Red Gum	*Eucalyptus glaucina*	V	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3239. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3239, 3241, 3438, 3446 & 3605. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3241, 3314, 3315, 3431, 3438, 3446 & 3636. Species subject to detailed targeted surveys.
Eucalyptus oblonga - endangered population	*Eucalyptus oblonga* - *endangered population*	EP	-	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Eucalyptus parramattensis subsp. decadens*	V	V	No	✓	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3244. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3244 & 3315. Species subject to detailed targeted surveys.
Pokolbin Mallee	*Eucalyptus pumila*	V	V	Yes	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3239, 3444, 3446 & 3605. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3314, 3315, 3444 & 3446. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Gaudium deanei* Syn. *Leptospermum deanei*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further.
-	*Genoplesium branwhiteorum* Syn. *Corunastylis* sp. Charmhaven	CE	CE	Yes	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3581. Species subject to detailed targeted surveys.
Variable Midge Orchid	*Genoplesium insigne*	CE	CE	Yes	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3581. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Narrow-leaf Finger Fern	*Grammitis stenophylla*	E	-	No	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3239, 3242, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3242 & 3617. Species subject to detailed targeted surveys.
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3244 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3244, 3444 & 3446. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3444 & 3446. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Grevillea parviflora subsp. supplicans*	E	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
-	*Gyrostemon thesioides*	E	-	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Spreading Guinea Flower	*Hibbertia procumbens*	E	-	No	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further.
-	*Hibbertia puberula*	E	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCT 3617. Species subject to detailed targeted surveys.
-	*Hibbertia suparans*	E	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Kunzea rupestris*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further.
-	*Lasiopetalum joyceae*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.
-	*Leionema lamprophyllum subsp. fractum*	CE	CE	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3244 & 3605. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Leucopogon fletcheri subsp. fletcheri*	V	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further.
-	*Maundia triglochinoides*	V	-	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Biconvex Paperbark	*Melaleuca biconvexa*	V	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3242, 3244 & 3250. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3241, 3242 & 3244. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Grove's Paperbark	*Melaleuca groveana*	V	-	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3239, 3244 & 3250. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3244 & 3605. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239. Species subject to detailed targeted surveys.
-	*Micromyrtus blakelyi*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Olearia cordata*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3238, 3239, 3605 & 3617. Species subject to detailed targeted surveys.
-	*Ozothamnus tesselatus*	V	V	No	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315 & 3431. Species subject to detailed targeted surveys.
Hairy Geebung	*Persoonia hirsuta*	E	E	Yes	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3238, 3605 & 3617. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
North Rothbury Persoonia	*Persoonia pauciflora*	CE	CE	Yes	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further
-	*Pimelea curviflora var. curviflora*	V	V	No	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Brown Pomaderris	*Pomaderris brunnea*	E	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further
Scant Pomaderris	*Pomaderris queenslandica*	E	-	No	-	-	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3242, 3244, 3431 & 3439. Species subject to detailed targeted surveys.
Tarengo Leek Orchid	*Prasophyllum petilum*	E	E	No	-	-	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431, 3438 & 3444. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Prasophyllum sp. Wybong*	-	CE	No	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431, 3438 & 3444. Species subject to detailed targeted surveys.
Tranquility Mintbush	*Prostanthera askania*	E	E	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Singleton Mint Bush	*Prostanthera cineolifera*	V	V	No	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3239, 3438, 3444, 3446 & 3605. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3315, 3438, 3444 & 3446. Species subject to detailed targeted surveys.
Somersby Mintbush	*Prostanthera junonis*	E	E	No	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.3.	Species not considered further

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Pterostylis chaetophora*	V	-	No	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241, 3314, 3315, 3431, 3438, 3444 & 3446. Species subject to detailed targeted surveys.
Illawarra Greenhood	*Pterostylis gibbosa*	E	E	No	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Yengo and Hunter IBRA subregions, associated habitat occurs in PCT 3438. Species subject to detailed targeted surveys.
Eastern Australian Underground Orchid	*Rhizanthella slateri*	V	E	Yes	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3230, 3237, 3241, 3242, 3244, 3599 & 3617. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Scrub Turpentine	*Rhodamnia rubescens*	CE	CE	Yes	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263 & 3617. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3446 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3239, 3241 & 3446. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Native Guava	*Rhodomyrtus psidioides*	CE	CE	Yes	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3242, 3250 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3242 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086 & 4072. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3244, 3250 & 3581. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3244, 3444, 3446, 3605 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3315, 3444, 3446 & 4039. Species subject to detailed targeted surveys.
Rainforest Cassia	*Senna acclinis*	E	-	No	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150 & 3242. Within the Yengo IBRA subregion, associated habitat occurs in PCTs, 3086 & 3242. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
Seringia denticulate in the Hawkesbury local government area	*Seringia denticulate – endangered population*	EP	-	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable microhabitats deemed not to be present (see section 5.1.1). Further discussion provided in Table 5.1.	Species not considered further
Magenta Lilly Pilly	*Syzygium paniculatum*	V	V	No	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3241, 3242, 3244 & 3250. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3087, 3241, 3242 & 3244. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3087 & 3241. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Tetratheca glandulosa*	V	-	No	✓	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCT 3617. Species subject to detailed targeted surveys.
Black-eyed Susan	*Tetratheca juncea*	V	V	No	✓	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3242, 3244, 3250, 3581 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241. Species subject to detailed targeted surveys.
Wyong Sun Orchid	*Thelymitra adorata*	CE	CE	Yes	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3244. Species subject to detailed targeted surveys.

Common name	Scientific name	Listing status			Subregion			Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter				
-	*Velleia perfoliata*	V	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3239, 3605 & 3617. Species subject to detailed targeted surveys.
-	*Zieria involucrata*	E	V	No	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3238, 3239, 3605 & 3617. Species subject to detailed targeted surveys.

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.6 Predicted fauna species credit species

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Frogs												
Wallum Froglet	*Crinia tinnula*	V	-	No	✓	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Project alignment outside of known range and distribution. Suitable habitat deemed not to be present (see section 5.1.2). Further discussion provided in Table 5.3.	Species polygons not created. Suitable habitat deemed not to be present.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Giant Burrowing Frog	*Heleioporus australiacus*	V	E	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3151 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3263, 3438, 3439, 3489, 3581, 3599, 3605, 3617, 3621, 4039, & 4072 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3438, 3439, 3489, 3599, 3605, 3617, 4039 & 4072. Species recorded in PCT 3230 near the Olney Substation.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Green and Golden Bell Frog	*Litoria aurea*	E	V	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3230, 3237, 3238, 3241, 3242, 3244, 3315, 3328, 3431, 3438, 3444, 3581, 3621, 4015, 4039 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3242, 3244, 3581 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3237, 3238, 3241, 3242, 3244, 3328, 3438 & 3444. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241, 3315, 3431, 3438, 3444, 4015, 4039 & 4089.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Booroolong Frog	*Litoria booroolon-gensis*	E	E	No	-	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Yengo IBRA subregion, associated habitat occurs in PCT 3617.
Green-thighed Frog	*Litoria brevipalmata*	V	-	No	✓	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3150, 3230, 3241, 3242, 3244, 3250, 3263 & 3444 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3242, 3244, 3250 & 3263. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3241 & 3444.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Littlejohn's Tree Frog	*Litoria littlejohni*	E	E	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3230, 3237, 3238, 3239, 3250, 3263, 3581, 3605, 3617, 3621 & 4039 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3237, 3238, 3239, 3605, 3617 & 4039. Species recorded in PCT 3230 and 3621 surrounding the Olney substation.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Stuttering Frog	*Mixophyes balbus*	E	V	Yes	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3581, 3599, 3605, 3617, 3621, & 4072 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3599, 3605, 3617 & 4072. Species recorded in PCT 3029, 3041, 3150 and 3230, surrounding the Olney substation.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Giant Barred Frog	*Mixophyes iteratus*	V	V	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3581, 3605, 3617, 3621 & 4072 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3605, 3617 & 4072. Species recorded in PCT 3029.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Red-crowned Toadlet	*Pseudophryne australis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3263, 3314, 3581, 3599, 3605, 3617 & 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3230, 3239, 3242, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3599, 3605 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3241 & 3314. Species recorded in PCT 3150, 3230, 3239, 3242, 3617 and 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Mahony's Toadlet	*Uperoleia mahonyi*	E	E	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Suitable habitat deemed not to be present (see section 5.1.2). Further discussion provided in Table 5.3.	Species polygons not created. Suitable habitat deemed not to be present.
Birds												
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3230, 3238, 3239, 3241, 3244, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3621, 3636, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3230, 3239, 3244, 3581 & 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3230, 3238, 3239, 3241, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4039, 4072 & 4089. Important habitat recorded Species polygon as per 'important habitat map'.
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3250, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3605, 3617, 3621, 4015, 4039, 4072 & 4089 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3438, 3439, 3444, 3446, 3489, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3314, 3315, 3431, 3438, 3444, 3446, 4015, 4039, 4072 & 4089.
Curlew Sandpiper (breeding)	*Calidris ferruginea*	CE	CE	Yes	-	-	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraint as per 'important habitat map'. Further discussion is provided in Table 5.2.	Species not retained.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	E	E	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 3230, 3239, 3242, 3263 and 3605.
Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	*Callocephalon fimbriatum – endangered population*	EP	-	No	-	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Geographic limitation of the Hornsby and Ku-ring-gai LGAs. Further discussion is provided in Table 5.2.	Endangered population not retained.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 3086, 3150, 3230, 3239, 3241, 3263, 3431, 3599, 3605 and 3617.
Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	*Dromaius novaehollandiae – endangered population*	EP	-	No	-	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Geographic limitation of the Port Stephens LGA. Further discussion is provided in Table 5.2.	Endangered population not retained.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 4089.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Little Eagle	*Hieraaetus morphnoides*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3087, 3150, 3151, 3152, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3605, 3617, 3621, 3636, 4015, 4039, 4072, 4089 according to the TBDC. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3087, 3151, 3152, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3087, 3239, 3241, 3242, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Swift Parrot	*Lathamus discolor*	E	CE	Yes	-	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment for Hunter IBRA subregion due to the presence of mapped Import Habitat within this section of the subject land. This isn't present in the other IBRA subregions of the subject land. Further discussion is provided in Table 5.2.	Species associated with PCT 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3599, 3605, 3617, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3444, 3446, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Important habitat recorded

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Broad-billed Sandpiper (breeding)	*Limicola falcinellus*	V	-	No	-	-	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraint as per Important Habitat Map. Further discussion is provided in Table 5.2.	Species not retained.
Square-tailed Kite	*Lophoictinia isura*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Cotton Pygmy-Goose	*Nettapus coromandelia-nus*	E	-	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621.
Barking Owl	*Ninox connivens*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 3150 in Corrabare State Forest.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Powerful Owl	*Ninox strenua*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Species recorded in PCT 3237, 3239, 3263, 3315, and 3605 within Corrabare State Forest, Pokolbin State Forest and Singleton Military Area.
Eastern Osprey	*Pandion cristatus*	V	-	No	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3087, 3150, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3328, 3431, 3438, 3439, 3444, 3446, 3581, 3605, 3617, 3621, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3087, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3087, 3239, 3241, 3431, 3438, 3444, 3446, 4015, 4039, 4072 & 4089.
Red-backed Button-quail	*Turnix maculosus*	V	-	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Suitable microhabitat deemed not to be present (see section 5.1.2). Further discussion provided in Table 5.3.	Species polygons not created. Suitable microhabitat deemed not to be present.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Masked Owl	*Tyto novaehollandiae*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3605, 3617 & 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3438, 3439, 3444, 3446, 3489, 3605 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3314, 3315, 3431, 3438, 3444 & 3446.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Species recorded in PCT 3239.
Sooty Owl	*Tyto tenebricosa*	V	-	Yes	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3087, 3150, 3230, 3237, 3239, 3241, 3242, 3244, 3250, 3263, 3581, 3605, 3617 & 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3087, 3230, 3237, 3239, 3241, 3242, 3244, 3605 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3087, 3239, 3241 & 3242.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Species recorded in PCT 3025, 3150, 3230, 3237, 3239, 3263 and 3605.
Mammals												
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 3621 in Olney SF.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Large-eared Pied Bat	*Chalinolobus dwyeri*	E	E	Yes	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3086, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621 & 3636 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605 & 3617.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446 & 3636. Species recorded in PCT 3150, 3230, 3239, 3242, 3244, 3263, 3328, 3231, 3444 and 3599.
Little Bent-winged Bat	*Miniopterus australis*	V	-	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3230, 3237, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3581, 3617, 3636 & 4039 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581 & 3617.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3230, 3237, 3239, 3241, 3242, 3244, 3438, 3439, 3444, 3446, 3617 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636 & 4039. Species recorded in PCT 3150, 3237, 3242, 3263, 3328, 3431, 3444, 3605 and 3617.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3581, 3599, 3605, 3617, 3621, 3636, 4015 & 4039 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3438, 3439, 3444, 3446, 3599, 3605, 3617 & 4039.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015 & 4039. Species recorded 3150, 3237, 3239, 3263, 3431, 3444 and 3605.
Southern Myotis	*Myotis macropus*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3581, 3599, 3605, 3617, 3621, 3636, 4015, 4039, 4072 & 4089 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3599, 3605, 3617, 4039 & 4072. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015, 4039, 4072 & 4089. Species recorded in PCT 3431.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Parma Wallaby	*Notamacropus parma*	V	V	No	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3250, 3263, 3581, 3605, 3617 & 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3605 & 3617. Species recorded in PCT 3230, 3242 and 3263 within Corrabare State Forest.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Southern Greater Glider	*Petauroides volans*	E	E	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4039 & 4072 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3328, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617, 4039 & 4072.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4039 & 4072. Species recorded in PCT 3237, 3239, 3242, 3263, 3599 and 3605.
Squirrel Glider	*Petaurus norfolkensis*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3086, 3087, 3150, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 4039 & 4089 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 4039 & 4089. Species recorded in PCT 3263, 3315, 3431, 3438, 3444 and 3605.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 3636, 4015 & 4039 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617 & 4039.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 3636, 4015 & 4039. Species recorded in PCT 3239, 3244, 3263 and 3605.
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3446, 3581, 3605, 3617, 3621, 3636, 4015 & 4089 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3244, 3438, 3439, 3446, 3605 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3314, 3315, 3431, 3438, 3446, 3636, 4015 & 4089. Species recorded in PCT 3314.
Koala	*Phascolarctos cinereus*	E	E	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438, 3439, 3446, 3489, 3581, 3599, 3605, 3617, 3621 & 4089 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3087, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3438, 3439, 3446, 3489, 3599, 3605 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3087, 3239, 3241, 3314, 3315, 3431, 3438, 3446 & 4089. Species recorded in PCT 3239, 3263 and 3605.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Common Planigale	*Planigale maculataq*	V	-	No	✓	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3230, 3239, 3242, 3244, 3250, 3263, 3314, 3315, 3431, 3438 & 3446 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3250 & 3263. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3239, 3314, 3315, 3431, 3438 & 3446. Species recorded in PCT 3314 and 3315

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3230, 3242, 3244, 3250, 3581 & 3617 according to the TBDC. Species recorded in PCT 3617 in Olney SF.
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	No	-	✓	-	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species not retained for further assessment. Habitat constraints not met.	Species excluded from further assessment. Species recorded in PCT 3239, 3263, 3315 and 3605.
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Yes	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3150, 3237, 3239, 3241, 3242, 3244, 3250, 3314, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 4015 & 4039 according to the TBDC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
												Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3150, 3239, 3242, 3244, 3250, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3237, 3239, 3241, 3242, 3244, 3438, 3439, 3444, 3446, 3489, 3599, 3605, 3617 & 4039. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3239, 3241, 3314, 3315, 3431, 3438, 3444, 3446, 4015 & 4039. Species recorded in PCT 3605.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Reptiles												
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	No	-	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCT 3314 according to the TBDC.
Striped Legless Lizard	*Delma impar*	V	V	No	-	-	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3314, 3315, 3431 & 3438 according to the TBDC.
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	-	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Within the Wyong IBRA subregion, associated habitat occurs in PCT 3250 according to the TDBC.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Broad-headed Snake	*Hoplocephalus bungaroides*	E	E	Yes	✓	✓	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3489, 3599, 3617, 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3489, 3599 & 3617.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Stephens' Banded Snake	*Hoplocephalus stephensii*	V	-	No	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained for further assessment.	Species associated with PCT 3029, 3086, 3087, 3150, 3230, 3237, 3238, 3241, 3242, 3244, 3250, 3263, 3581, 3617, 3621 according to the TBDC. Within the Wyong IBRA subregion, associated habitat occurs in PCTs 3029, 3150, 3230, 3242, 3244, 3250, 3263, 3581, 3617 & 3621. Within the Yengo IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3230, 3237, 3238, 3241, 3242, 3244 & 3617. Within the Hunter IBRA subregion, associated habitat occurs in PCTs 3086, 3087, 3241 & 3242. Species recorded in PCT 3150 and 3581 in Olney SF.

Common name	Scientific name	Listing status			Subregion			Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act[1]	EPBC Act[2]	SAII	Wyong	Yengo	Hunter					
Invertebrates												
Cumberland Plain Land Snail	*Meridolum corneovirens*	E	-	No	-	✓		No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Project alignment outside of known range and distribution. Further discussion provided in Table 5.3.	-
Maroubra Woodland Snail	*Meridolum maryae*	E	E	No	✓	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Project alignment outside of known range and distribution. Further discussion provided in Table 5.3.	-
Dural Land Snail	*Pommerhelix duralensis*	E	E	No	-	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Project alignment outside of known range and distribution. Further discussion provided in Table 5.3.	-

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

5.2 Presence of candidate species credit species

Table 5.7 to Table 5.9 identify the candidate flora species and Table 5.10 to Table 5.12 identify the candidate fauna species determined to be present within the subject land in accordance with BAM subsection 5.2.4 based on:

- targeted threatened species surveys
- assumed presence within the subject land
- important habitat map (for duel credit species), or
- an expert report.

Section 5.2.1 and section 5.2.2 provide descriptions of the candidate species credit species found within the subject land during the field surveys undertaken for this BDAR.

Table 5.7 Determining the presence of candidate flora species credit species on the subject land in the Wyong IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Bynoe's Wattle	*Acacia bynoeana*	E	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Charmhaven Apple	*Angophora inopina*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Trailing Woodruff	*Asperula asthenes*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Netted Bottle Brush	*Callistemon linearifolius*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Red Helmet Orchid	*Corybas dowlingii*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
White-flowered Wax Plant	*Cynanchum elegans*	E	E	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Spider Orchid	*Dendrobium melaleucaphilum*	E	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Epacris purpurascens var. purpurascens*	V	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Camfield's Stringybark	*Eucalyptus camfieldii*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Slaty Red Gum	*Eucalyptus glaucina*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Eucalyptus parramattensis subsp. decadens*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Genoplesium branwhiteorum*	CE	CE	Yes	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Variable Midge Orchid	*Genoplesium insigne*	CE	CE	Yes	Targeted threatened species survey	Recorded during targeted surveys, however the occurrence was within an existing electrical transmission easement and does for form part of impacts for this project. Species not considered further.	No
Narrow-leaf Finger Fern	*Grammitis stenophylla*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Biconvex Paperbark	*Melaleuca biconvexa*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Grove's Paperbark	*Melaleuca groveana*	V	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Eastern Australian Underground Orchid	*Rhizanthella slateri*	V	E	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Scrub Turpentine	*Rhodamia rubescens*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey with 646 individuals identified within the Wyong IBRA subregion portion of the subject land (refer Figure 14.13). The species was recorded from the following vegetation zones: — 3029-Mod-good – 35 individuals — 3150-Mod-good – 123 individuals — 3150-Plantation – 9 individuals — 3230-Mod-good – 109 individuals — 3230-Plantation – 146 individuals — 3239-Mod-good – 19 individuals — 3242-Mod-good – 131 individuals — 3263-Mod-good – 74 individuals	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
						Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	
Native Guava	*Rhodomyrtus psidioides*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey with 4 individuals identified within 3263-Mod-good (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Rainforest Cassia	*Senna acclinis*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Magenta Lilly Pilly	*Syzygium paniculatum*	E	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Tetratheca glandulosa*	V	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Black-eyed Susan	*Tetratheca juncea*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Presence assumed where survey not undertaken.	Yes
Wyong Sun Orchid	*Thelymitra adorata*	CE	CE	Yes	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.8 Determining the presence of candidate flora species credit species on the subject land in the Yengo IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Bynoe's Wattle	*Acacia bynoeana*	E	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Acacia pendula population in the Hunter catchment	*Acacia pendula – endangered population*	EP	-	Yes	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Androcalva rosea* Syn. *Commersonia rosea*	E	E	Yes	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further. The patch of PCT 3439 occurs within the Singelton Military Area and was subject to a fire event in 2019/20 (NSW DCCEEW 2025). Survey comments in TBDC (2025) state that the species is fire ephemeral, and that survey are to be conducted 18 months to 5 years post fire. Surveys during 2024 were completed within this post fire survey window.	No
-	*Brachyscome brownii*	-	CE	No	Targeted threatened species survey	Species recorded. Recorded during the survey within 3239-Mod-good and 3241-Mod-good (refer Figure 14.13).	Yes
Netted Bottle Brush	*Callistemon linearifolius*	V	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* – endangered population	EP	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
White-flowered Wax Plant	*Cynanchum elegans*	E	E	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Dillwynia tenuifolia*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis* – endangered population	EP	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Brocken Back Ironbark	*Eucalyptus fracta*	E	-	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey with 4.53 ha of habitat identified within 3605-Mod-good (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Slaty Red Gum	*Eucalyptus glaucina*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Pokolbin Mallee	*Eucalyptus pumila*	V	V	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Narrow-leaf Finger Fern	*Grammitis stenophylla*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Hibbertia puberula*	E	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Leionema lamprophyllum subsp. fractum*	CE	CE	Yes	Targeted threatened species survey	Not recorded during targeted surveys within habitat constraints. Species not considered further.	No
Biconvex Paperbark	*Melaleuca biconvexa*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Grove's Paperbark	*Melaleuca groveana*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey with 187 individuals identified within the Yengo IBRA subregion portion of the subject land (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Olearia cordata*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Hairy Geebung	*Persoonia hirsuta*	E	E	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Singleton Mint Bush	*Prostanthera cineolifera*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey within the Yengo IBRA subregion portion of the subject land (refer Figure 14.13). Area of occupancy is 23.74 ha within Disturbance area A, being: — 3237-Mod-good – 0.64 ha — 3239-Mod-good – 19.54 — 3605-Mod-good – 3.56. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Illawarra Greenhood	*Pterostylis gibbosa*	E	E	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Eastern Australian Underground Orchid	*Rhizanthella slateri*	V	E	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Scrub Turpentine	*Rhodamia rubescens*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Species recorded. Recorded during the survey with 508 individuals identified within the Yengo IBRA subregion portion of the subject land (refer Figure 14.13). The species was recorded from the following vegetation zones: — 3086-Mod-good – 16 individuals — 3087-Mod-good – 56 individuals — 3151-Mod-good – 3 individuals — 3230-Mod-good – 23 individuals — 3237-Mod-good – 10 individuals — 3239-Mod-good – 137 individuals — 3241-Mod-good – 120 individuals — 3242-Mod-good – 38 individuals — 3605-Mod-good – 105 individuals. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Native Guava	*Rhodomyrtus psidioides*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Rainforest Cassia	*Senna acclinis*	E	-	No	Targeted threatened species survey	Recorded during surveys outside the subject land (refer Figure 14.13). The species occurs on Cedar Creek and the species, and its habitat will be span by the project and not subject to disturbance. Species not considered further.	No
Magenta Lilly Pilly	*Syzygium paniculatum*	E	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Tetratheca glandulosa*	V	-	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
-	*Velleia perfoliata*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Zieria involucrata*	E	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.9 Determining the presence of candidate flora species credit species on the subject land in the Hunter IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Bynoe's Wattle	*Acacia bynoeana*	E	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Acacia pendula population in the Hunter catchment	*Acacia pendula – endangered population*	EP	-	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Charmhaven Apple	*Angophora inopina*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Trailing Woodruff	*Asperula asthenes*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Brachyscome brownii*	-	CE	-	Targeted threatened species survey	Species recorded. Recorded during the survey within 3241-Mod-good (refer Figure 14.13).	Yes
Netted Bottle Brush	*Callistemon linearifolius*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Red Helmet Orchid	*Corybas dowlingii*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum – endangered population*	EP	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey. 1 individual recorded within the subject land in PCT 3444. An additional 4 species recorded outside the subject land (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
White-flowered Wax Plant	*Cynanchum elegans*	E	E	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Pine Donkey Orchid	*Diuris tricolor*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Presence assumed where survey not undertaken.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor – endangered population*	EP	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	As above	Yes
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis – endangered population*	EP	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey within 1.50 ha area of PCT 4089-Poor (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Singleton Mallee	*Eucalyptus castrensis*	E	-	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Slaty Red Gum	*Eucalyptus glaucina*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Eucalyptus parramattensis subsp. decadens*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Pokolbin Mallee	*Eucalyptus pumila*	V	V	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Biconvex Paperbark	*Melaleuca biconvexa*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No
Grove's Paperbark	*Melaleuca groveana*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Ozothamnus tesselatus*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Scant Pomaderris	*Pomaderris queenslandica*	E	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Tarengo Leek Orchid	*Prasophyllum petilum*	E	E	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
-	*Prasophyllum sp. Wybong*	-	CE	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Singleton Mint Bush	*Prostanthera cineolifera*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey within 4.54 ha area of PCT 3438-Mod-good and 1.73 ha of PCT 3444-Mod-good within Disturbance area A (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
-	*Pterostylis chaetophora*	V	-	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Illawarra Greenhood	*Pterostylis gibbosa*	E	E	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes Recorded during the survey within 1.97 ha area of PCT 3431-Thinned within Disturbance area A (refer Figure 14.13). Presence assumed where survey not undertaken.	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Scrub Turpentine	*Rhodamia rubescens*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes A total of 10 individuals were recorded within PCT 3241-Mod-good within the Hunter IBRA subregion (refer Figure 14.13). Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Native Guava	*Rhodomyrtus psidioides*	CE	CE	Yes	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Magenta Lilly Pilly	*Syzygium paniculatum*	E	V	No	Targeted threatened species survey & assumed present in areas lacking survey effort	Not recorded during targeted surveys. Assumed present in areas lacking survey where there was associated PCTs and/or potentially suitable habitat.	Yes
Black-eyed Susan	*Tetratheca juncea*	V	V	No	Targeted threatened species survey	Not recorded during targeted surveys. Species not considered further.	No

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.10 Determining the presence of candidate fauna species credit species on the subject land in the Wyong IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Frogs							
Giant Burrowing Frog	*Heleioporus australiacus*	V	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Green and Golden Bell Frog	*Litoria aurea*	E	V	No	Targeted threatened species survey	No	No
Green-thighed Frog	*Litoria brevipalmata*	V	-	No	Targeted threatened species survey	No	No
Littlejohn's Tree Frog	*Litoria littlejohni*	E	E	No	Targeted threatened species survey	Yes	Yes
Stuttering Frog	*Mixophyes balbus*	E	V	Yes	Targeted threatened species survey	Yes	Yes
Giant Barred Frog	*Mixophyes iteratus*	V	V	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Red-crowned Toadlet	Pseudophryne australis	V	-	No	Targeted threatened species survey	Yes	Yes
Birds							
Regent Honeyeater (breeding)	*Anthochaera phrygia*	CE	CE	Yes	Within important habitat mapped area	Assumed present	Yes
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	Targeted threatened species survey	No	No
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	E	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	Targeted threatened species survey	Yes and Assumed Present	Yes
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	No	Targeted threatened species survey	No	No
Little Eagle	*Hieraaetus morphnoides*	V	-	No	Targeted threatened species survey	No	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Square-tailed Kite	Lophoictinia isura	V	-	No	Targeted threatened species survey	No	No
Cotton Pygmy-Goose	Nettapus coromandelianus	E	-	No	Targeted threatened species survey	No	No
Barking Owl	*Ninox connivens*	V	-	No	Targeted threatened species survey	Yes	Yes
Powerful Owl	*Ninox strenua*	V	-	No	Targeted threatened species survey	Yes	Yes
Eastern Osprey	*Pandion cristatus*	V	-	No	Targeted threatened species survey	No	No
Masked Owl	*Tyto novaehollandiae*	V	-	No	Targeted threatened species survey	Yes	Yes
Sooty Owl	*Tyto tenebricosa*	V	-	Yes	Targeted threatened species survey	Yes	Yes
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	Targeted threatened species survey	Yes	Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	E	Yes	Targeted threatened species survey	Yes	Yes
Little Bent-winged Bat	*Miniopterus australis*	V	-	Yes	Targeted threatened species survey	Yes	Yes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	Targeted threatened species survey	Yes	Yes
Southern Myotis	*Myotis macropus*	V	-	No	Targeted threatened species survey	Yes	Yes
Parma Wallaby	*Notamacropus parma*	V	V	No	Targeted threatened species survey	Yes	Yes
Southern Greater Glider	*Petauroides volans*	E	E	No	Targeted threatened species survey	Yes	Yes
Squirrel Glider	*Petaurus norfolkensis*	V	-	No	Targeted threatened species survey	Yes	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	Targeted threatened species survey	Yes	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	Targeted threatened species survey	No	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Koala	*Phascolarctos cinereus*	E	E	No	Targeted threatened species survey	Yes	Yes
Common Planigale	*Planigale maculate*	V	-	No	Targeted threatened species survey	No	No
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes	Targeted threatened species survey	Yes	Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Yes	Assumed present	Assumed present	Yes
Reptiles							
Pale-headed Snake	*Hopolocephalus bitorquatus*	V	-	No	Assumed present	Assumed present	Yes
Broad-headed Snake	*Hopolocephalus bungaroides*	E	E	Yes	Targeted threatened species survey	No	No
Stephens' Banded Snake	*Hoplocephalus stephensii*	V	-	No	Targeted threatened species survey	Yes and Assumed Present	Yes

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.11 Determining the presence of candidate fauna species credit species on the subject land in the Yengo IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Amphibians							
Giant Burrowing Frog	*Heleioporus australiacus*	V	E	No	Targeted threatened species survey	No	No
Green and Golden Bell Frog	*Litoria aurea*	E	V	No	Targeted threatened species survey	No	No
Booroolong Frog	Litoria booroolongensis	E	E	No	Targeted threatened species survey	No	No
Littlejohn's Tree Frog	*Litoria littlejohni*	E	E	No	Targeted threatened species survey	No	No
Stuttering Frog	*Mixophyes balbus*	E	V	Yes	Targeted threatened species survey	No	No
Giant Barred Frog	*Mixophyes iteratus*	V	V	No	Targeted threatened species survey	No	No
Red-crowned Toadlet	Pseudophryne australis	V	-	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Birds							
Regent Honeyeater (breeding)	*Anthochaera phrygia*	CE	CE	Yes	Within important habitat mapped area	Assumed present	Yes
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	Targeted threatened species survey	No	No
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	E	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	Targeted threatened species survey	Yes and Assumed Present	Yes
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	No	Targeted threatened species survey	No	No
Little Eagle	*Hieraaetus morphnoides*	V	-	No	Targeted threatened species survey	No	No

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Swift Parrot	*Lathamus discolor*	E	CE	Yes	Within important habitat mapped area	Assumed present	Yes
Square-tailed Kite	Lophoictinia isura	V	-	No	Targeted threatened species survey	No	No
Barking Owl	*Ninox connivens*	V	-	No	Assumed present	Assumed present	Yes
Powerful Owl	*Ninox strenua*	V	-	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Eastern Osprey	*Pandion cristatus*	V	-	No	Targeted threatened species survey	No	No
Masked Owl	*Tyto novaehollandiae*	V	-	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Sooty Owl	*Tyto tenebricosa*	V	-	Yes	Targeted threatened species survey	Yes and Assumed Present	Yes
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	Targeted threatened species survey	No	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	E	Yes	Targeted threatened species survey	Yes	Yes
Little Bent-winged Bat	*Miniopterus australis*	V	-	Yes	Targeted threatened species survey	Yes and Assumed Present	Yes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	Targeted threatened species survey	Yes and Assumed Present	Yes
Southern Myotis	*Myotis macropus*	V	-	No	Targeted threatened species survey	Yes	Yes
Parma Wallaby	*Notamacropus parma*	V	V	No	Targeted threatened species survey	Yes	Yes
Southern Greater Glider	*Petauroides volans*	E	E	No	Targeted threatened species survey	Yes	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Squirrel Glider	*Petaurus norfolkensis*	V	-	No	Targeted threatened species survey	Yes	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	Targeted threatened species survey	Yes and Assumed Present	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	Targeted threatened species survey	No	No
Koala	*Phascolarctos cinereus*	E	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	No	Targeted threatened species survey	Yes	Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Yes	Assumed present	Assumed present	Yes
Reptiles							
Broad-headed Snake	*Hoplocephalus bungaroides*	E	E	Yes	Targeted threatened species survey	No	No
Stephens' Banded Snake	*Hoplocephalus stephensii*	V	-	No	Targeted threatened species survey	No	No

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 5.12 Determining the presence of candidate fauna species credit species on the subject land in the Hunter IBRA subregion

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Amphibians							
Green and Golden Bell Frog	*Litoria aurea*	E	V	No	Targeted threatened species survey	No	Yes
Green-thighed Frog	*Litoria brevipalmata*	V	-	No	Targeted threatened species survey	No	No
Red-crowned Toadlet	Pseudophryne australis	V	-	No	Targeted threatened species survey	No	No
Birds							
Regent Honeyeater (breeding)	*Anthochaera phrygia*	CE	CE	Yes	Within important habitat mapped area	Assumed present	Yes
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	Targeted threatened species survey	No	No
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	E	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	Targeted threatened species survey	Yes and Assumed Present	Yes
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	No	Targeted threatened species survey	No	No
Little Eagle	*Hieraaetus morphnoides*	V	-	No	Targeted threatened species survey	No	No
Swift Parrot	*Lathamus discolor*	E	CE	Yes	Within important habitat mapped area	Assumed present	Yes
Square-tailed Kite	Lophoictinia isura	V	-	No	Targeted threatened species survey	No	No
Barking Owl	*Ninox connivens*	V	-	No	Assumed present	Assumed present	Yes
Powerful Owl	*Ninox strenua*	V	-	No	Targeted threatened species survey	Yes and Assumed Present	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Eastern Osprey	*Pandion cristatus*	V	-	No	Targeted threatened species survey	No	No
Masked Owl	*Tyto novaehollandiae*	V	-	No	Assumed present	Assumed present	Yes
Sooty Owl	*Tyto tenebricosa*	V	-	Yes	Assumed present	Assumed present	Yes
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	Targeted threatened species survey	No	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	E	Yes	Targeted threatened species survey	Yes	Yes
Little Bent-winged Bat	*Miniopterus australis*	V	-	Yes	Targeted threatened species survey	Yes	Yes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	Targeted threatened species survey	Yes	Yes
Southern Myotis	*Myotis macropus*	V	-	No	Targeted threatened species survey	Yes	Yes
Southern Greater Glider	*Petauroides volans*	E	E	No	Targeted threatened species survey	Yes	Yes
Squirrel Glider	*Petaurus norfolkensis*	V	-	No	Targeted threatened species survey	Yes	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	Targeted threatened species survey	Yes	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	Targeted threatened species survey	Yes	Yes
Koala	*Phascolarctos cinereus*	E	E	No	Targeted threatened species survey	Yes and Assumed Present	Yes
Common Planigale	*Planigale maculate*	V	-	No	Targeted threatened species survey	Yes	Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Yes	Assumed present	Assumed present	Yes

Common name	Scientific name	Listing status			Method used to determine presence	Present?	Further assessment required? (BAM subsections 5.2.5 and 5.2.6)
		BC Act[1]	EPBC Act[2]	SAII			
Reptiles							
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	No	Targeted threatened species survey	No	No
Striped Legless Lizard	*Delma impar*	V	V	No	Targeted threatened species survey	No	No
Hunter Valley Delma	*Delma vescolineata*	E	E	No	Targeted threatened species survey	Yes	Yes

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

5.2.1 Recorded threatened flora species credit species

5.2.1.1 Brachyscome brownii

Brachyscome brownii is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is a daisy which grows up to 30 centimetres tall. Its leaves are mostly hairless to the naked eye, with distinct serrated edges or 'teeth'. The species has a single purple flowerhead which grows from the tip of the stem. There are 4 possibly extant populations located between Windsor and Cessnock. All 4 of these populations are within 14–34 kilometres of each other. These occur in Yengo National Park, Wollemi National Park and Putty State Forest and on private land near Pokolbin State Forest. A record located in Sydney is a historic record, made in 1805, with this Sydney population considered Extinct. Its unknown how many individual plants occurred in any of the 4 extant populations prior to the 2019–20 bushfires. Surveys in 2021 (Eco Logical Australia) revisited 3 of the 4 extant populations and only recorded plants at 1 population (Mellong Creek). These populations were burnt at low to moderate fire severity. The Pokolbin population was not revisited during the 2021 surveys, however, the Pokolbin area was not affected by the 2019–20 bushfires and this population was expected to persist (Department of Climate Change, Energy, the Environment and Water 2024).

Within the subject land, a population of *Brachyscome brownii* was identified within Pokolbin State Forest (Yengo and Hunter IBRA subregions). This area had been subject to a low intensity 'cool burn' by Forestry Corporation of NSW in the spring of 2023, with the species detected during targeted survey in February 2025. This species was often detected in areas of PCT 3241, with a few individuals detected in PCT 3239. Individuals were frequently recorded along roadsides, with some detected over 50 metres from these trails. Field based observations indicate that the species prefers areas of sandy-clay soils with low shrub cover and *Corymbia maculata* co-dominant with other Eucalypt species in the canopy.

Specimens of *Brachyscome brownii* were collected and forwarded to the National Herbarium of New South Wales and is currently awaiting confirmation.

The location of the *Brachyscome brownii* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Brachyscome brownii* has been recorded to occupy 25.42 hectares of habitat within the Yengo and Hunter IBRA subregions. As a suspected 'Area' species, the species polygon for *Brachyscome brownii* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species (see Photo 5.1 and Photo 5.2).



Photo 5.1 *Brachyscome brownii* individual found along road edge in Pokolbin State Forest



Photo 5.2 *Brachyscome brownii* habitat in Pokolbin State Forest

5.2.1.2 *Cymbidium canaliculatum* population in the Hunter catchment

According to the TBDC, the population of *Cymbidium canaliculatum* in the Hunter catchment occurs naturally as far south as Weston and Pokolbin in the Lower Hunter. This population represents the species southeastern geographic limit, but the endangered population is believed to be centred in the Upper Hunter, predominantly north of Singleton. Nevertheless, the population is defined as occurring in the Hunter River catchment, and as such may be present in any of the local government areas within the catchment area. This population is believed to be less than 500 individuals, though estimated to be as low as 90. Most of these individuals (>90%) occur on private property, scattered across 30–40 sites, predominantly in the Muswellbrook and Upper Hunter LGAs (NSW DCCEEW 2024a).

Within the subject land, 1 *Cymbidium canaliculatum* individual was recorded in the Hunter IBRA subregion within a host tree, Grey Box (*Eucalyptus mollucana*) (see Photo 5.3 and Photo 5.4), close to Lemington Road near Jerrys Plains.

The location of the *Cymbidium canaliculatum* plant recorded during the field surveys and mapped species polygons is shown in Figure 14.13. As an 'Count' species, the species polygon for *Cymbidium canaliculatum* was mapped to a 30-metre buffer off each individual species within vegetation zones. Assumed habitat for non-surveyed areas has been applied to a further 21.44 hectares, which is estimated to equate to 22 assumed individuals.



Photo 5.3 *Cymbidium canaliculatum* growing on the hollow of a Grey Box (*Eucalyptus mollucana*)



Photo 5.4 *Cymbidium canaliculatum* growing on the hollow of a Grey Box (*Eucalyptus mollucana*)

5.2.1.3 Diuris tricolor (Pine Donkey Orchid)

Diuris tricolor is listed as Vulnerable under the NSW BC Act, and currently not listed under the Commonwealth EPBC Act. It is a terrestrial species with between 1 and 3 leaves, up to 30 centimetres long and 4 millimetres wide. The flower stalk is between 20–40 centimetres high and has 2–6 flowers, which are bright yellow to orange, speckled with red to purple and white markings. The sepals are very long and often crossed. The species is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga. Condobolin-Nymagee road, Wattamondara towards Cowra, Eugowra, Girilambone, Dubbo and Cooyal, in the Central West. Pilliga State Conservation Area, Pilliga National Park and Bibblewindi State Forest in the north (and extending into Queensland) and Muswellbrook in the east (NSW DCCEEW 2024a).

Diuris tricolor grows in sclerophyll forest among grass, often among Cypress Pine. It is found in sandy soils, either on flats or small rises. It is most often recorded as common and locally frequent in populations, however this ranges from records of only 1 or 2 plants to large colonies at some sites (NSW DCCEEW 2024a).

While none were found within the subject land, 1 population of 13 *Diuris tricolor* individuals was recorded approximately 560 m outside the northern end of the subject land within PCT 3431 (Central Hunter Ironbark Grassy Woodland), at the south-end of Bayswater-Liddell Freshwater Dam within the Hunter IBRA subregion (see Photo 5.5 and Photo 5.6. Since this recorded population is located within the Muswellbrook LGA, it also meets the geographic constraints for *Pine Donkey Orchid population in the Muswellbrook local government area*, which is listed as an endangered population under the NSW BC Act (TBDC, 2025).

The location of the *Diuris tricolor* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. No individuals will be impacted within the subject land although 26.56 ha of assumed habitat has been applied to suitable habitat in non-surveyed areas. As an 'Area' species, the species polygon for *Diuris tricolor* were mapped to the extent of vegetation zones that contain assumed habitat that are likely to be suitable for the species (see Table 5.20).



Photo 5.5 *Diuris tricolor* at the south-end of Bayswater-Liddell Freshwater Dam



Photo 5.6 *Diuris tricolor* habitat

5.2.1.4 *Eucalyptus camaldulensis* population in the Hunter catchment

According to the TBDC the population of River Red Gum in the Hunter catchment is unique in NSW being the only one to occur in a coastal catchment. The NSW Scientific Committee (2005) states that western-most individuals in the Hunter are at Bylong, south of Merriwa, and the most easterly at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter. May occur with *Eucalyptus tereticornis*, *Eucalyptus melliodora*, *Casuarina cunninghamiana* subsp. *cunninghamiana* and *Angophora floribunda* (NSW DCCEEW 2024a).

It's likely that the species formed extensive stands of woodland and open woodland on the major floodplains of the Hunter and Goulburn rivers, especially in areas where water impoundment occurs after flood. Since settlement, most of the floodplains have been cleared of woody vegetation. Flood mitigation works now prevent most minor floods from inundating floodplains. These flow changes, coupled with the clearing of native vegetation, have greatly reduced the

extent of habitat favourable to the River Red Gum in the Hunter catchment. Most of the occurrences are on private land and there are no known occurrences in conservation reserves (NSW DCCEEW 2024a).

Within the subject land, forty-eight *Eucalyptus camaldulensis* endangered individuals were recorded across 4 populations in the HTP North zone, along the Hunter River and its tributaries such as the Wollombi Brook (Hunter IBRA subregion) (see Photo 5.7). At the time of survey, there were signs of recruitment amongst some of the mature trees (see Photo 5.8).

The location of the *Eucalyptus camaldulensis* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Eucalyptus camaldulensis* has been recorded to occupy 1.50 hectares of habitat within the Hunter IBRA subregion. As an 'Area' species, the species polygon for *Eucalyptus camaldulensis* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species. (see Table 5.20).



Photo 5.7 *Eucalyptus camaldulensis* fringing Wollombi Brook



Photo 5.8 A juvenile *Eucalyptus camaldulensis*

5.2.1.5 *Eucalyptus fracta* (Broken Back Ironbark)

Eucalyptus fracta (Broken Back Ironbark) is listed as Endangered under the NSW BC Act, but it is currently not listed as a threatened species under Commonwealth legislation. *Eucalyptus fracta* is a small tree or mallee to 8 metres tall with grey-black ironbark on trunk and larger branches, and smooth whitish bark on smaller branches (NSW DCCEEW 2024a).

Eucalyptus fracta is confined largely to State Forest. Its described as being locally common but restricted to the northern Brocken Back Range near Cessnock, NSW. Hill (1997) describes the species as being locally frequent but restricted to shallow soils along the upper escarpment of the steep sandstone range. The species is the dominant tree in a narrow band along the upper edge of the escarpment. Associated species in slightly deeper soils include *Eucalyptus sparsifolia, E. punctata, Corymbia maculata* and, *Angophora euryphylla* (NSW DCCEEW 2024a).

Within the subject land, 189 *Eucalyptus fracta* individuals were recorded through the upper escarpments in the northern half of Pokolbin State Forest (Yengo IBRA subregion). Specimens of *Eucalyptus fracta* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22405 (see Appendix F (Herbarium correspondence)).

The location of the *Eucalyptus fracta* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Eucalyptus fracta* has been recorded to occupy 4.53 hectares of habitat within the Yengo IBRA subregion. Assumed habitat for non-surveyed areas has been applied to a further 16.15 hectares. As an 'Area' species, the species polygon for *Eucalyptus fracta* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species. (see Table 5.20).



Photo 5.9 *Eucalyptus fracta* fringing a rocky escarpment in Pokolbin State Forest



Photo 5.10 *Eucalyptus fracta* with multi stemmed mallee growth form

5.2.1.6 *Genoplesium insigne* (Variable Midge Orchid)

Genoplesium insigne is listed as Critically Endangered under both the NSW BC Act and Commonwealth EPBC Act. It is a terrestrial orchid with a solitary cylindrical leaf that encloses the flowering stem. A highly endemic species, the only known populations of *Genoplesium insigne* occur within the southern Lake Macquarie and northern Central Coast LGAs. Its distribution is recorded as far as Cooranbong in the north, Warnervale in the south and Chain Valley in the east. Recent and historic disturbance regimes (fire, clearing, routine slashing) appear to influence above ground emergence with several known sites exhibiting a removed/managed shrub layer and canopy (NSW DCCEEW 2024a).

Within the subject land, 17 *Genoplesium insigne* individuals were observed within the transmission line corridor, north of Cooranbong, within the Wyong IBRA subregion (see Photo 5.11 and Photo 5.12. Specimens of *Genoplesium insigne* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22795 (see Appendix F (Herbarium correspondence)).

The location of the *Genoplesium insigne* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. No individuals will be impacts with the subject land. As an 'Area' species, the species polygon for *Genoplesium insigne* was mapped to the extent of vegetation zones that contain assumed habitat that are likely to be suitable for the species (see Table 5.20).



Photo 5.11 *Genoplesium insigne* observed within an existing transmission line corridor, north of Cooranbong



Photo 5.12 *Genoplesium insigne* flower recorded during field surveys

5.2.1.7 *Melaleuca groveana* (Grove's Paperbark)

Melaleuca groveana (Grove's Paperbark) is listed as Vulnerable under the NSW BC Act, with no current listing under the EPBC Act. *Melaleuca groveana* is a shrub or small tree from 2–5 metres tall, rarely to 10 metres, with firm fibrous-papery bark (see Photo 5.13 and Photo 5.14). The species is widespread, with scattered populations in coastal districts north of Yengo National Park to southeast Queensland. *Melaleuca groveana* is also found as a disjunct population near Torrington on the northern tablelands. The species grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcropping granite, rhyolite and sandstone on rocky outcrops and cliffs. It also occurs in dry shrubby open forest and woodlands (NSW DCCEEW 2024a).

Within the subject land, 378 *Melaleuca groveana* individuals were only observed in areas of PCT 3087 (Lower North Ranges Riparian Turpentine Forest) and 3605 (Hunter Range Ironbark Forest) within the Yengo IBRA subregion, with 187 of these individuals expected to be impacted. The largest patch of recorded *Melaleuca groveana* occur along Crawfords Road within Corrabare State Forest. Other recorded patches are from an unnamed road between Lumbeys Road and Crawfords Road in Corrabare State Forest, and on Lumbeys Road (see *page 44 of* Figure 14.13*b*). A single individual was also recorded on edge of Trig Road also in Corrabare State Forest (see *page 46 of* Figure 14.13*b*). Patches of the species appeared to be affected by inappropriate fire regimes, with a notable absence of younger plants in fire affected section of the subject land.

Specimens of *Melaleuca groveana* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22774 (see Appendix F (Herbarium correspondence)).

The location of the *Melaleuca groveana* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. As an 'Count' species, the species polygon for *Melaleuca groveana* were mapped to a 30-metre buffer off each individual species within vegetation zones. Assumed habitat for non-surveyed areas has been applied to a further 25.45 hectares, which is estimated to equate to 3,155 assumed individuals.



Photo 5.13 *Melaleuca groveana* bark



Photo 5.14 *Melaleuca groveana* leaf

5.2.1.8 *Prostanthera cineolifera* (Singleton Mint Bush)

Prostanthera cineolifera (Singleton Mint Bush) is listed as Vulnerable under both the NSW BC Act and EPBC Act. *Prostanthera cineolifera* is an erect shrub, 1–4 metres high, strongly aromatic; branches moderately to densely covered with short, curled hairs and more or less sessile glands (NSW DCCEEW 2024a).

It's restricted to only a few localities near Scone, Cessnock and St Albans. However, it is now believed that the Scone and St Albans populations are likely undescribed taxons (Bell et al., 2019). This species grows in open woodland on exposed sandstone ridges, and usually found in association with shallow or skeletal sands. Its fire response is unknown, but other *Prostanthera* species are fire sensitive, with recruitment occurring from the soil seed bank following a fire (NSW DCCEEW 2024a).

Within the subject land, *Prostanthera cineolifera* was recorded extensively within Pokolbin State Forest and neighbouring private properties (Yengo and Hunter IBRA subregion) (see Photo 5.15 and Photo 5.16). It was frequently recorded within areas of disturbance, such as roadsides and old forestry coops.

Specimens of *Prostanthera cineolifera* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22405 (see Appendix F (Herbarium correspondence)).

The location of the *Prostanthera cineolifera* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Prostanthera cineolifera* has been recorded to occupy 30.01 hectares of habitat within the Yengo and Hunter IBRA subregions. Assumed habitat for non-surveyed areas has been applied to a further 27.71 hectares. As an 'Area' species, the species polygon for *Prostanthera cineolifera* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species. (see Table 5.20).



Photo 5.15 *Prostanthera cineolifera* within Pokolbin State Forest



Photo 5.16 *Prostanthera cineolifera* flower

5.2.1.9 *Pterostylis gibbosa* (Illawarra Greenhood)

Pterostylis gibbosa (Illawarra Greenhood) is listed as Endangered under both the NSW BC Act and the EPBC Act. The species is known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected . All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage (NSW DCCEEW 2024a).

Within the subject land, 4 individuals of *Pterostylis gibbosa* were recorded within the Singleton Military Area (Hunter IBRA subregion) within a patch of PCT 3431 (see Photo 5.17 and Photo 5.18), although this is not listed as a PCT for this species.

Specimens of *Pterostylis gibbosa* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22774 (see Appendix F (Herbarium correspondence)).

The location of the *Pterostylis gibbosa* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Pterostylis gibbosa* has been recorded to occupy 1.97 hectares of habitat within the Hunter IBRA subregion. Assumed habitat for non-surveyed areas has been applied to a further 0.21 hectares. As an 'Area' species, the species polygon for *Pterostylis gibbosa* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species (see Table 5.20).



Photo 5.17 *Pterostylis gibbosa* flower



Photo 5.18 *Pterostylis gibbosa* growing within the Singleton Military Area

5.2.1.10 *Rhodamnia rubescens* (Scrub Turpentine)

Rhodamia rubescens (Scrub Turpentine) is listed as Critically Endangered under both the NSW BC Act and EPBC Act. *Rhodamia* rubescens is a shrub or tree to 25 metres high with reddish/brown, fissured bark. The species occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 kilometres south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *Rhodamia rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 metres above sea level in areas with rainfall of 1000–1600 millimetres.

Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterized as highly to extremely susceptible to infection by Myrtle Rust, which can affect all parts of the plant (NSW DCCEEW 2024a).

Within the subject land, *Rhodamnia rubescens* was recorded extensively between Olney State Forests and Corrabare North Flora Reserve, with individuals also recorded in parts of Pokolbin (Wyong, Yengo and Hunter IBRA subregions) (see Photo 5.19 and Photo 5.20).

While a majority of these individuals were affected by Myrtle Rust to some extent, several individuals were identified as beginning to, were, or had gone to flower. Over 2,511 individuals were recorded during targeted threated flora surveys of which 1,226 individuals have been identified within the subject land.

The location of the *Rhodamnia rubescens* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. As an ‘Count’ species, the species polygon for *Rhodamnia rubescens* were mapped to a 30 metre buffer off each individual species within vegetation zones. Assumed habitat for non-surveyed areas has been applied to a further 40.34 hectares, which is estimated to equate to 1,230 assumed individuals.



Photo 5.19 *Rhodamnia rubescens* growing in Corrabare State Forest



Photo 5.20 *Rhodamnia rubescens* infected by Myrtle Rust

5.2.1.11 *Rhodomyrtus psidioides* (Native Guava)

Rhodomyrtus psidioides (Native Guava) is listed as Critically Endangered under both the NSW BC Act and EPBC Act. *Rhodomyrtus psidioides* is shrub or small tree to 12 metres high with brown scaly bark. The species occurs from Broken Bay, approximately 90 kilometres north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to 120 kilometres inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. It's a pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterized as being extremely susceptible to infection by Myrtle Rust, which can affect all parts of the plant (NSW DCCEEW 2024a).

Within the subject land, 4 individuals of *Rhodomyrtus psidioides* were recorded within Watagan State Forest (Wyong IBRA subregion) (see Photo 5.21 and Photo 5.22).

Specimens of *Rhodomyrtus psidioides* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22473 (see Appendix F (Herbarium correspondence)).

The location of the *Rhodomyrtus psidioides* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. Within the subject land *Rhodomyrtus psidioides* has been recorded to occupy 1.69 hectares of habitat within the Wyong IBRA subregion. Assumed habitat for non-surveyed areas has been applied to a further 18.30 hectares. As an 'Area' species, the species polygon for *Rhodomyrtus psidioides* were mapped to the extent of vegetation zones that contain the species and similar adjacent habitats that are likely to be suitable for the species (see Table 5.20).



Photo 5.21 *Rhodomyrtus psidioides* growing in Watagan State Forest



Photo 5.22 *Rhodomyrtus psidioides* leaf

5.2.1.12 *Senna acclinis* (Rainforest Cassia)

Senna acclinis (Rainforest Cassia) is listed as Vulnerable under the NSW BC Act, but it is currently not listed as a threatened species under Commonwealth legislation. *Senna acclinis* can easily be mistaken for introduced Senna (formerly Cassia) species which are environmental weeds. The species occurs in coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland (NSW DCCEEW 2024a).

During targeted threatened flora surveys, 1 individual *Senna acclinis* was recorded from Cedar Creek (Yengo IBRA subregion) (see Photo 5.23 and Photo 5.24).

Specimens of *Senna acclinis* were collected and forwarded to the National Herbarium of New South Wales and the species was positively identified under BIS Enquiry no: 22599 (see Appendix F (Herbarium correspondence)).

The location of the *Senna acclinis* plants recorded during the field surveys and mapped species polygons is shown in Figure 14.13. No individuals will be impacted with the subject land although 5.95 ha of assumed habitat has been applied to suitable habitat in non-surveyed areas. As an 'Area' species, the species polygon for *Senna acclinis* were mapped to the extent of vegetation zones that contain assumed habitat that are likely to be suitable for the species (see Table 5.20).



Photo 5.23 *Senna acclinis* at Cedar Creek



Photo 5.24 *Senna acclinis* herbarium sample with leaf and seed pod

5.2.2 *Recorded threatened fauna species credit species*

5.2.2.1 *Callocephalon fimbriatum* (Gang-gang Cockatoo)

The gang-gang cockatoo is listed as endangered under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. The species is distributed from southern Victoria through south- and central-eastern NSW. In NSW, the Gang-gang Cockatoo is distributed from the southeast coast to the Hunter region, and inland to the Central Tablelands and southwest slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee (NSW DCCEEW 2024a).

Within habitats associated with the subject land, the species is known to use forested habitats of the ranges, with occasional seasonal movements to lowland areas. They have been observed in both small (pairs) and larger groups of >20 in western Lake Macquarie hinterlands and lowland forests in the Stockrington and Kurri Kurri localities (WSP ecologist, pers. obs.). Such altitudinal movements are not consistent across their range but appear to be associated with availability of foraging resources, notably fruiting eucalypts (WSP ecologist pers. obs.).

The Gang-gang Cockatoo was recorded on 55 occurrences within Olney, Corrabare, Watagan and Pokolbin State forests (Wyong and Yengo IBRA subregions). Following, surveys throughout the species identified habitats during breeding season, 1 hollow bearing tree with observed nesting behaviour was identified in proximity to a proposed transmission line tower (see page 9 of Figure 14.13d).

Species polygons were created for 100 metre buffer on hollow bearing trees with observed nesting behaviour in associated habitats in patch sizes >5 hectares including PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3238, 3239, 3242, 3244, 3263, 3315, 3431, 3438, 3439, 3444, 3489, 3605, 3617, 3621 and 4039 (see Table 5.21 and Figure 14.13).

5.2.2.2 *Calyptorhynchus lathami lathami* (South-eastern Glossy Black-Cockatoo)

The South-eastern Glossy Black-Cockatoo is currently listed as vulnerable under both the BC Act and the EPBC Act. It has a widespread distribution from Mallacoota in Victoria to Eungella in eastern Queensland, and inland to the central western plains and southern tablelands of New South Wales. Important coastal foraging habitat includes Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*Allocasuarina torulosa*) both of which occur frequently within the subject land (NSW DCCEEW 2024a).

Locally the species is encountered in the ranges where *Allocasuarina torulosa* (Forest She-oak) is more prevalent on upland slopes and in the surrounding lowlands where *A. littoralis* (Black She-oak) dominates. It is most often encountered in pairs or family parties of 3 foraging quietly in native oak, when flying between foraging habitats, or going to roost.

Surveys for glossy black-cockatoos were made during formal bird surveys and via opportunistic searches undertaken during other fauna survey works. Habitat assessments were also undertaken, including forest age class and condition assessment, which might indicate suitable breeding habitats where large hollows were present. The presence of suitable foraging habitats was surveyed via secondary evidences associated with chewed cones under She-oak stands across Watagan and Corrabare State Forests, Corrabare North Flora Reserve and Bulga Mine (Wyong, Yengo and Hunter IBRA subregions). Previous foraging activity was recorded opportunistically throughout Watagan and Corrabare State Forests.

In total, 40 direct and 49 secondary observations of South-eastern Glossy Black-Cockatoo were made across the 3 IBRA subregions within the Pokolbin, Corrabare and Watagan State forests and Jilliby Conservation Area. Following, surveys throughout the species identified habitats during breeding season, no active nesting behaviour were identified in the subject land.

In areas of associated habitats with limited access, assumed presence was applied to patch sizes >5 hectares including PCT 3029, 3086, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3242, 3263, 3444, 3489, 3605 and 4039 (see Table 5.21 and Figure 14.13).

5.2.2.3 *Cercartetus nanus* (Eastern Pygmy-possum)

The Eastern Pygmy-possum is currently listed as vulnerable under the BC Act and is not listed under the EPBC Act. The species is found in a broad range of habitats from rainforest through to sclerophyllous (including Box-Ironbark) forests and woodlands to heath. Woodlands and heath are generally preferred in much of its range, excepting northeastern NSW where they are most frequently encountered in rainforest (NSW DCCEEW 2024a).

During targeted field surveys a single eastern pygmy-possum individual was recorded in the Wyong IBRA subregion, near the southern boundary of Olney State Forest.

Species polygons were created to all vegetation zone patches that have recorded species, including PCT 3029, 3150, 3230, 3242, 3244, 3250, 3263, 3581, 3617 and 3621 (see Table 5.21 and Figure 14.13).

5.2.2.4 *Chalinolobus dwyeri* (Large-eared Pied Bat)

The large-eared pied bat is listed as endangered under both the BC Act and the EPBC Act. It is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. The species roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features (NSW DCCEEW 2024a).

Throughout the ranges traversed by the subject land, there are occasional sandstone outcroppings forming cliffs and overhangs, containing caves and crevices suitable for the roosting purposes of this species, with suitable foraging habitats in the surrounding forests.

During targeted field surveys 73 individuals were recorded across all IBRA subregions, around Pokolbin, Corrabare and Watagan State forests and Singleton Military Area. Targeted survey of subterranean cave structures during breeding season identified 6 breeding sites for this species within the subject land.

Species polygons were created as a 2 km buffer from potential roost and habitat features within associated PCTs on the subject land, including PCT 3086, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617 and 3621 (see Table 5.21 and Figure 14.13).

5.2.2.5 *Delma vescolineata* (Hunter Valley Delma)

Hunter Valley Delma is listed as endangered under both the BC Act and under the EPBC Act. The Hunter Valley Delma is a legless or flap-footed lizard. The species is known almost entirely from a 25 kilometres wide corridor in the Hunter Valley NSW, between Maitland and Muswellbrook, however given a specimen has been identified ~80 kilometres northwest of Muswellbrook, it is likely that the species is more widespread in the region (NSW DCCEEW 2024a).

During targeted surveys 46 individuals were recorded in Bayswater-Liddell and Broke in the Hunter IBRA subregion (see Photo 5.25).

Species polygons were created for associated habitats lacking dense canopy in disturbed and derived grassland, thinned or poor conditions including PCT 3314, 3315, 3431 (see Table 5.21 and Figure 14.13).



Photo 5.25 Hunter Valley Delmar Bayswater

5.2.2.6 *Haliaeetus leucogaster* (White-bellied Sea-eagle)

The White-bellied Sea-eagle is currently listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. White-bellied Sea-eagles may be solitary or live in pairs or small family groups consisting of a pair of adults and dependent young. In NSW it is widespread along the east coast, and along all major inland rivers and watercourses (NSW DCCEEW 2024a).

Within the subject land, 1 individual has been recorded in the Hunter IBRA subregion, although no breeding nests were identified within or near the subject land. The species is included as an ecosystem credit species but excluded as a species credit species. No species polygons have been created for this species.

5.2.2.7 *Heleioporus australiacus* (Giant Burrowing Frog)

The Giant Burrowing Frog is currently listed as vulnerable under the BC Act and endangered under the EPBC Act. The species is distributed in southeastern NSW and Victoria and appears to exist as 2 distinct populations: the northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla (*Heleioporus australiacus australiacus*), and a separate southern population occurring from north of Narooma through to Walhalla, Victoria (*Heleioporus australiacus flavopunctatus*). The species relevant to this project is *Heleioporus australiacus australiacus.* It's found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat for this species is generally soaks or pools within first or second order streams and they are also commonly recorded from 'hanging swamp' seepage lines (NSW DCCEEW 2024a).

Giant burrowing frog tadpoles were identified in Olney State Forest (Wyong IBRA subregion) during targeted surveys (see Photo 5.26).

The species polygons align with aquatic habitats linked directly to the record and a 300 metre buffer from the top of bank, incorporating the associated PCTs 3150, 3230, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.26 Giant burrowing frog (*Heleioporus australiacus australiacus*) tadpole in Olney State Forest

5.2.2.8 *Hoplocephalus stephensii* (Stephens' Banded Snake)

The Stephens' Banded Snake is currently listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. The species is a medium-sized partly tree-dwelling snake up to 1 metre long. This species is distributed along the coast and ranges from Southern Queensland to Gosford in NSW. The snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day (NSW DCCEEW 2024a).

Two individuals were recorded within the Wyong IBRA subregion in Olney State Forest, one on 22 February 2024 at 12:10 am, and the other on 24 January 2024 at 4:05 am. The species was recorded in dense wet sclerophyll forest within PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition) (see Photo 5.27 and Figure 14.13). Species polygons were created for associated habitats including PCT 3029, 3150, 3230, 3242, 3244, 3250, 3263, 3581, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.27 A Stephens' banded snake recorded within Olney State Forest

5.2.2.9 *Litoria littlejohni* (Littlejohn's Tree Frog)

Littlejohn's Tree Frog is currently listed as vulnerable under both the BC Act and the EPBC Act. Littlejohn's Tree Frog has a distribution that includes the plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest (90 kilometres north of Sydney) south to the end of the Woronora Plateau. Most records are from within the Sydney Basin bioregion. This species breeds in the upper reaches of permanent streams and in perched swamps (NSW DCCEEW 2024a).

During targeted surveys, there were a total of 38 recordings of this species with varying numbers of frogs and tadpoles at each sighting. Most occurrences are within Olney State Forest and Jilliby State Conservation Area (see Figure 14.13). During the initial project design phase the easement was shifted to the south in Olney State Forest to avoid breeding habitat for this species (see Figure 14.23 and Figure 14.24).

The species polygons align with aquatic habitats linked directly to the record and a 100 metre buffer from the top of bank, incorporating the associated PCT 3150, 3230, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.28 Littlejohn's Tree Frog Olney State Forest



Photo 5.29 Littlejohn's Treefrog Tadpoles Olney State Forest

5.2.2.10 *Miniopterus australis* (Little Bent-winged Bat)

The Little Bent-winged Bat is currently listed as vulnerable under the BC Act and is not listed under the EPBC Act. The species is distributed along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW, generally inhabiting moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally, 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. (NSW DCCEEW 2024a).

Within the subject land, 30 little bent-winged bats were recorded across all IBRA subregions. Targeted harp trap surveys for active breeding at all identified cave structures did not capture or identify any evidence of breeding within the subject land as such no further assessment was required.

5.2.2.11 *Miniopterus orianae oceanensis* (Large Bent-winged Bat)

The Large Bent-winged Bat is listed as vulnerable under the BC Act and is not listed under the EPBC Act. The large bent-winged bat uses caves as its primary roosting habitat, but is known to also use derelict mines, storm-water tunnels, buildings and other man-made structures, forming discrete populations centres on a maternity cave that is used annually in spring and summer for the birth and rearing of young. It's breeding time is during warmer months and breeding or roosting colonies can number from 100 to 150,000 individuals (NSW DCCEEW 2024a).

Within the subject land, 24 Large Bent-winged Bats were recorded in all IBRA subregions. Targeted harp trap surveys for active breeding at all identified cave structures did not capture or identify any evidence of breeding within the subject land. As such no further assessment was required.

5.2.2.12 *Mixophyes balbus* (Stuttering Frog)

The Stuttering Frog is listed as endangered under the BC Act, and vulnerable under the EPBC Act. The stuttering frog is relatively large and muscular, growing to about 8 centimetres in length. It is superficially similar to other *Mixophyes* species but is separated in the field by the distribution and extent of markings on its body, head and legs. The tadpole is dark brown to black and grows to 6.5 centimetres in length (NSW DCCEEW 2024a).

Stuttering frogs occur along the east coast of Australia from southern Queensland to northeastern Victoria. It is considered to have disappeared from Victoria and to have undergone considerable range contraction in NSW, particularly in southeast NSW. It is the only *Mixophyes* species that occurs in southeast NSW and in recent surveys it has only been recorded at 3 locations south of Sydney. The Dorrigo region, in northeast NSW, appears to be a stronghold for this species. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. This species breeds in streams during summer after heavy rain, where eggs are laid on rock shelves or shallow riffles in small, flowing streams. As the tadpoles grow, they move to deep permanent pools and take approximately 12 months to metamorphose (NSW DCCEEW 2024a).

Surveys for *Mixophyes* frog species in the subject land found a distinct preference for stream habitats in comparison with *Mixophyes iteratus*. *Mixophyes balbus* which prefers shallow stream profiles with stoney substrates and *Mixophyes iteratus* using stream edges adjacent to deep pooled sections of streams.

One-hundred and forty stuttering frog adults and 36 records of tadpoles ranging from one to over 30 individuals were recorded within Olney and Watagan State Forests (Wyong IBRA subregion) during targeted surveys with sub-contractors.

Species polygons were created to encompass aquatic breeding habitats (creeklines) linked directly to the record and a 500 metre buffer from the top of bank, incorporating the PCTs 3029, 3150, 3230, 3239, 3242, 3244, 3263, 3581, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.30 Mixophyes australis (balbus) in amplexus Olney State Forest



Photo 5.31 *Mixophyes australis* (*balbus*) Olney State Forest

5.2.2.13 *Mixophyes iteratus* (Giant Barred Frog)

The Giant Barred Frog is currently listed as vulnerable under both the BC Act and the EPBC Act. Giant barred frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor (NSW DCCEEW 2024a).

Twenty-seven adult Giant Barred Frogs, and two records of tadpoles with over ten individuals present were recorded during targeted surveys within Olney and Watagan State forests (Wyong IBRA subregion) (see Photo 5.32 and Photo 5.33).

Species polygons were created to encompass aquatic habitats (creeklines) linked directly to the record and a 50 metre buffer from the top of bank, incorporating the PCTs 3029, 3150, 3230, 3242, 3263, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.32 Giant barred frog – Olney State Forest



Photo 5.33 Giant barred frog – Olney State Forest

5.2.2.14 *Myotis Macropus* (Southern Myotis)

The Southern Myotis is listed as vulnerable under the BC Act and is not listed under the EPBC Act. The species is found in the coastal band from the northwest of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 kilometres inland, except along major rivers, as the species uses streams and pools as foraging sites. Southern myotis generally roost in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and dense foliage (NSW DCCEEW 2024a).

During targeted field surveys 4 southern myotis were recorded across both the Yengo IBRA subregion, east of Sweetmans Creek along Wollombi Road, and the and Hunter IBRA subregion, between the Singleton Military Area and Mount Thornley.

Species polygons comprise of a 200 metre buffer to bank of any medium to large permanent creeks, rivers, lakes or other waterway where associated habitats occur including PCT 3086, 3151, 3238, 3239, 3241, 3314, 3315, 3328, 3431, 3438, 3444, 3605, 3636, 4015, 4039, 4072 and 4089 (see Table 5.21 and Figure 14.13).

5.2.2.15 *Ninox connivens* (Barking Owl)

The Barking Owl is listed as vulnerable under the BC Act, but it is currently not listed as a threatened species under Commonwealth legislation. The Barking Owl prefers woodland and open forest habitat, including forest remnant patches, but requires a large permanent territory – with breeding pairs requiring areas of up to 2000 hectares for foraging and permanent home ranges of up to 6000 hectares. The species roost in shaded portions of tree canopies, including tall mid-storey trees. They prefer living eucalypts, but dead trees are also used as nest sites. Pairs often repeatedly use the same site over years. Nesting occurs during mid-winter and spring (NSW DCCEEW 2024a).

This species is rarely recorded within the lower to central Hunter Region, with records associated with the Yengo wilderness, Bow Wow Gorge and adjacent lands in Quorrobolong and a single record at Green Point on the eastern side of Lake Macquarie.

Territorial pairs respond strongly to playback of calls, and through this method an individual was identified within Corrabare State Forest in the Wyong IBRA subregion (see Photo 5.34).

Species polygons were applied within 800 metres from the location of a detected owl and includes associated habitats including PCT 3087, 3150, 3239, 3242, 3263, 3431, 3444, 3489, 3605 and 4015 (see Table 5.21 and Figure 14.13).



Photo 5.34 Barking Owl Corrabare State Forest

5.2.2.16 *Ninox strenua* (Powerful Owl)

The Powerful Owl is currently listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. The Powerful Owl is endemic to eastern and southeastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to southwestern Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing (NSW DCCEEW 2024a).

The Powerful Owl was detected on 22 occasions from within the Singleton Military Area, Corrabare, Pokolbin and Watagan State forests, across all 3 IBRA subregions. Species polygons were applied within 800 metres from the location of a detected owl and includes associated habitats including PCT 3087, 3150, 3152, 3230, 3237, 3239, 3242, 3244, 3263, 3315, 3431, 3438, 3439, 3444, 3446, 3489, 3605, 4015, 4039 and 4072 (see Table 5.21 and Figure 14.13).



Photo 5.35 Powerful Owl Singleton Military Area

5.2.2.17 *Notamacropus parma* (Parma Wallaby)

The Parma Wallaby is listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. The species once occurred in northeastern NSW from the Queensland boarder to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest (NSW DCCEEW 2024a).

Twenty Parma Wallaby were recorded within the Corrabare State Forest, within the Wyong IBRA subregion. Species polygons were created for associated habitats including PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3239, 3242, 3244, 3250, 3263, 3581, 3605, 3617 and 3621 (see Table 5.21 and Figure 14.13).

5.2.2.18 *Petauroides volans* (Southern Greater Glider)

The Southern Greater Glider is currently listed as endangered under both the NSW BC Act and the EPBC Act. The species occurs in eastern Australia, in eucalypt forests and woodlands, where it has a broad distribution from around Proserpine in Queensland, south through NSW and the Australian Capital Territory into Victoria. They shelter during the day in tree hollows and will use up to 18 hollows in their home range. Their home range is relatively small, averaging around 1 to 3 ha (NSW DCCEEW 2024a).

Forty-eight observations of southern greater glider were recorded across the Pokolbin, Watagan and Corrabare State forests, within the Wyong and Yengo IBRA subregions (see Photo 5.36 and Figure 14.13). Species polygons were created for associated habitats including PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3489, 3581, 3599, 3605, 3617, 3621, 4039 and 4072 (see Table 5.21 and Figure 14.13).



Photo 5.36 Southern Greater Glider Corrabare State Forest north

5.2.2.19 *Petaurus norfolkensis* (Squirrel Glider)

While not listed as threatened under the EPBC Act, the Squirrel Glider's conservation status within NSW is considered vulnerable under the BC Act. This Species Credit species has a wide, albeit sparse, distribution throughout eastern Australia, from northern Queensland to western Victoria. Although not distinguished legislatively, squirrel gliders can be split into 2 genetically distinct geographical groups, the northern coastal population and the southern population west of the Great Dividing Range (Pavlova et al. 2010).

It 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. The Squirrel Glider relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 metres apart) (NSW DCCEEW 2024a).

Twelve squirrel gliders were recorded across all 3 IBRA subregions within the subject land, with detection made through both IR camaras and targeted spotlighting. The species was recorded from Centennial Coal owned lands in the east near Eraring to AGL owned lands in the west near Bayswater. The Squirrel Glider was also recorded from Watagan State Forest, Corrabare State Forest and from the Singleton Military Area (see Photo 5.37 and Figure 14.13).



Photo 5.37 Squirrel glider Singleton Military Area

Species polygons were created to all vegetation zone patches that have recorded species and assumed habitat for non-survey lands where associated vegetation zones occurs in PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3239, 3241, 3242, 3244, 3250, 3263, 3314, 3315, 3328, 3431, 3438, 3439, 3444, 3446, 3581, 3599, 3605, 3617, 3621, 3636, 4039 and 4072 (see Table 5.21 and Figure 14.13).

5.2.2.20 *Petrogale penicillata* (Brush-tailed Rock-wallaby)

The Brush-tailed Rock-wallaby is currently listed as endangered under the BC Act and vulnerable under the EPBC Act. The range of the Brush-tailed Rock-wallaby extends from southeast Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. The species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north (NSW DCCEEW 2024a).

During targeted field surveys 27 Brush-tailed Rock-wallabies were recorded across the Pokolbin, Corrabare and Watagan State Forests, within all 3 IBRA subregions (see Photo 5.38, Photo 5.39 and Figure 14.13).

Species polygons were created for areas within a 1 kilometre buffer of recorded habitat for associated habitats including PCT 3029, 3087, 3150, 3152, 3230, 3237, 3239, 3241, 3242, 3244, 3250, 3263, 3315, 3438, 3439, 3444, 3446, 3581, 3605 and 4039 (see Table 5.21 and Figure 14.13).



Photo 5.38 A Brush-tailed Rock-wallaby at Pokolbin State Forest



Photo 5.39 A Brush-tailed Rock-wallaby

5.2.2.21 *Phascogale tapoatafa* (Brush-tailed Phascogale)

The Brush-tailed Phascogale is currently listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. The species 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. It nests and shelters in tree hollows with entrances 2.5–4 centimetres wide and use many different hollows over a short time span (NSW DCCEEW 2024a).

During targeted surveys two individuals were recorded in the Bayswater-Liddell area in the Hunter IBRA subregion.

Species polygons were created for associated habitats including PCT 3314, 3431, 3438, 3636, 4015 and 4089 (see Table 5.21 and Figure 14.13).

5.2.2.22 *Phascolarctos cinereus* (Koala)

The Koala is currently listed as endangered under both the NSW BC Act and the EPBC Act. The Koala is an arboreal marsupial with fur ranging from grey to brown above, and white below. In NSW, Koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range (NSW DCCEEW 2024a).

Ten Koalas were recorded during field surveys with occurrences in Pokolbin State Forest, Corrabare State Forest, Watagan State Forest and Centennial Coal lands near Eraring (see Photo 5.40, Photo 5.41 and Figure 14.13). The species was recorded from both the Wyong and Yengo IBRA subregions.

Species polygons were created for associated habitats including PCT 3029, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3263, 3438, 3439, 3446, 3489, 3599, 3605 and 3617 (see Table 5.21 and Figure 14.13).



Photo 5.40 A koala in Corrabare State Forest



Photo 5.41 A koala sitting in a eucalypt tree in Corrabare State Forest

5.2.2.23 *Planigale maculata* (Common Planigale)

The Common Planigale is currently listed as vulnerable under the BC Act and is not listed under the Commonwealth EPBC Act. Common Planigales are small marsupial carnivores about the size of a common house mouse. The species breeds from October to January, using grass, eucalypt leaves or shredded bark to build their nests, they are active at night and during the day shelter in saucer-shaped nests located in crevices, hollow logs, beneath bark or under rocks (NSW DCCEEW 2024a).

During targeted field surveys three individuals were recorded within the Hunter IBRA subregion, south of Bayswater Ash Dam under tiles deployed for targeted reptile surveys and in the Singleton Military Area via remote camera.

A species polygon was applied to all associated PCTs (PCT 3314, 3315, 3431 & 3438) within a 500 m radius of the record, incorporating the ecotonal boundary of all associated PCTs.

5.2.2.24 *Potorous tridactylus tridactylus* (Long-nosed Potoroo)

The Long-nosed Potoroo is currently listed as vulnerable under the NSW BC Act and is currently not listed as a threatened species under Commonwealth legislation. Potoroos are a small wallaby-like marsupial favouring vegetation communities with heathy understories. Its fur is greyish-brown above and light grey below. It is the only Potoroo occurring in central NSW. The superficially similar long-footed potoroo occurs within a very small range around the border of NSW and Victoria (NSW DCCEEW 2024a).

The Long-nosed Potoroo is found on the southeastern coast of Australia, from Queensland to Victoria and Tasmania, including some of the Bass Strait islands and geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 millimetres. It inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of its habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature (NSW DCCEEW 2024a).

Two individuals were recorded immediately south of Olney State Forest, within the Wyong IBRA subregion and multiple individuals were captured by remote cameras in Olney State Forest (see Photo 5.42, Photo 5.43 and Figure 14.13).

Species polygons were created for associated habitats including PCT 3150, 3230, 3242, 3244, 3250, 3263, 3581 and 3617 (see Table 5.21 and Figure 14.13).



Photo 5.42 Long-nosed Potoroo attending bait station in Olney State Forest



Photo 5.43 Long-nosed Potoroo attending bait station in Olney State Forest

5.2.2.25 *Pseudophryne australis* (Red-crowned Toadlet)

Red-crowned Toadlet is listed as vulnerable under the BC Act, but it is currently not listed as a threatened species under Commonwealth legislation. It occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones, and inhabiting periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. It also shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters (NSW DCCEEW 2024a).

One-hundred and eighty-two red-crowned toadlet adults alongside two records of tadpoles ranging over 20 individuals were recorded within Olney, Corrabare, Watagan and Pokolbin State Forests (Wyong and Yengo IBRA subregions) during targeted surveys.

The species polygons align with aquatic habitats linked directly to the record and a 100 metre buffer from the top of bank of nearest 1st order stream, incorporating the associated PCTs 3029, 3152, 3230, 3237, 3239, 3242, 3263, 3605, 3617 and 3621 (see Table 5.21 and Figure 14.13).



Photo 5.44 Red-crowned toadlet recorded from Watagan State Forest

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

The Grey-headed Flying-fox is currently listed as vulnerable under the BC Act and the EPBC Act. Grey-headed Flying-foxes are generally found within 200 kilometres of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Roosting camps are generally located within 20 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. They can travel up to 50 kilometres from the camp to forage; commuting distances are more often <20 kilometres (NSW DCCEEW 2024a).

Within the subject land, 58 grey-headed flying-fox individuals were recorded across the Singleton Military Area, Pokolbin State Forest and Corrabare State Forest within all 3 IBRA subregions (see Photo 5.45 and Figure 14.13).

Individuals were recorded foraging although no maternity breeding or roosting camp occurs within or near the subject land. The species is included as an ecosystem credit species but excluded as a species credit species. No species polygons have been created for this species.



Photo 5.45 Grey-headed flying-fox feeding on Spotted Gum blossom Singleton Military Area

5.2.2.27 *Tyto novaehollandiae* (Masked Owl)

The Masked Owl is currently listed as vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. The species roost generally in eucalypts hollows greater than 5 metres above ground, live or dead, or dense foliage in moist eucalypt gullies, and recesses in cliffs or caves (NSW DCCEEW 2024a).

Three Masked Owls were heard responding to call playback within Watagan and Pokolbin State forests (Wyong and Yengo IBRA subregions).

Species polygons were applied within 800 metres from the location of a detected owl and includes associated habitats including PCT 3150, 3152, 3230, 3237, 3239, 3244, 3263, 3431, 3438, 3439, 3444, 3489 and 3605 (see Table 5.21 and Figure 14.13).

5.2.2.28 *Tyto tenebricosa* (Sooty Owl)

The Sooty Owl is currently listed as Vulnerable under the BC Act and is currently not listed as a threatened species under Commonwealth legislation. It occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently (NSW DCCEEW 2024a).

The Sooty Owl was recorded on 49 occasions within the Watagan, Corrabare and Pokolbin State forests (Wyong and Yengo IBRA subregions) (see Photo 5.46 and Photo 5.47). Within Corrabare State Forest a pair of Sooty Owl were observed within a cave indicating a likely breeding site. Design changes and easement realignment in this area has avoided all impact (direct and indirect) to this cave (see Figure 14.23 and Figure 14.24, with location shown as *Sooty Owl cave*). Two other *Sooty Owl cave* locations were recorded in the gullies to the north of Wollombi Road at Cedar Creek, though these are outside of the biodiversity study area. Three other caves were also observed within Corrabare State Forest and were considered to be *Likely Sooty Owl caves*, with glider bones, bone fragments, whitewash and owl pellets present. No owls were actually recorded in these caves and the locations on the mapping are identified as *Likely Sooty Owl cave.* Potential breeding use of these caves is unknown although was not recorded.

Species polygons were applied within 800 metres from the location of a detected owl and includes associated habitats including PCT 3029, 3087, 3150, 3230, 3237, 3239, 3242, 3244, 3263, 3605 and 3617 (see Table 5.21 and Figure 14.13).



Photo 5.46 Two Sooty Owls – LH bird from Watagan Ck Olney State Forest; RH bird from Pokolbin State Forest



Photo 5.47 Two Sooty Owls from separate territories in Corrabare State Forest

5.2.2.29 *Vespadelus troughtoni* (Eastern Cave Bat)

The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW (NSW DCCEEW 2024a).

A number of potential Eastern Cave Bat calls were recorded throughout the subject land using ultrasonic detectors, however the call range overlaps with that of other *Vespadelu*s species in the area and potential calls cannot be relied upon without trapping to gain a definitive species identification. Harp trapping at these locations resulted in the capture of a single Eastern Cave Bat individual in an overhang near the proposed location for proposed transmission line tower in Corrabare State Forest (see page 14 of Figure 14.13f).

No breeding habitat was detected within the subject land during surveys, and as such this species is only considered as a species credit species and not a SAII entity based on impact being restricted to foraging habitat within 2 kilometres from roost sites.

5.3 Threatened species surveys

Threatened species surveys were undertaken with regard to the various published guidelines as outlined in section 2.3.2 for threatened plant species and section 2.4.2 for threatened animal species.

The surveys undertaken for threatened flora species are outlined in detail in section 2.3. Table 5.13 to Table 5.15 outline the survey effort undertaken for threatened plant species in the subject land to date.

The surveys undertaken for threatened fauna species are outlined in detail in section 2.4. Table 5.16 to Table 5.18 outline the survey effort undertaken for threatened animal species in the subject land to date.

Table 5.13 Threatened species surveys for candidate flora species credit species within the Wyong IBRA subregion

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Bynoe's Wattle	*Acacia bynoeana*	2-phase grid Year round	All year	☒ Yes 13 Sep 2024 23 Sep 2024 24 Sep 2024 25 Sep 2024 27 Sep 2024	☐ No	13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs	3617-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on survey the species is not considered to occur within the subject land and is not considered further in respect to BAM subsections 5.2.5 and 5.2.6.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Charmhaven Apple	*Angophora inopina*	2-phase grid Transect Year round	All year	☒ Yes 24-25 Oct 2023 30 Sep 2024 8-10 Oct 2024 31 Oct 2024 22 Nov 2024	☐ No	24-25 Oct 2023: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 8-10 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat. 3581-Mod-good – entire extent subject to linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3250-Mod-good – 0.90 ha.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Trailing Woodruff	*Asperula asthenes*	2-phase grid Transect Oct – Dec	October November December	☒ Yes 1 Oct 2024 4 Oct 2024 22 Nov 2024	☒ No 24 Jun 2024 25 Jun 2024 15 Aug 2024 9 Sep 2024	24 Jun 2024: 2 people x 7.5 hrs 25 Jun 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 9 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 20.31 ha or 78% of potential habitat during recommended survey period and covered up to 22.25 ha or 86% of all potential habitat. Within this area, 4.17 ha resides within the restricted access sites. 3244-Mod-good – entire extent subject to 2-phase grid survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3424-Mod-good – 1.08 ha within Disturbance area A. 3250-Mod-good – 0.90 ha within Disturbance area A.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Netted Bottle Brush	*Callistemon linearifolius*	2-phase grid Transect Oct – Jan	October November December January	☒ Yes 24 Oct 2023 25 Oct 2023 31 Oct 2024 22 Nov 2024	☒ No 9-13 Sep 2024 23 Sep 2024 24 Sep 2024 25 Sep 2024 27 Sep 2024 30 Sep 2024	24 Oct 2023: 2 people x 7.5 hrs 25 Oct 2023: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 23 Set 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3230-Mod-good – 43.53 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 38.07 ha or 87% of potential habitat during recommended survey period and covered up to 39.74 ha or 91% of all potential habitat throughout all surveys. Within this area, 0.20 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3230-Mod-good – 3.79 ha or 190 (count) 3230-Plantation – 0.30 ha or 15 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3230-Plantation – 11.63 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.87 ha or 76% of potential habitat during recommended survey period and covered up to 11.33 ha or 97% of all potential habitat throughout all surveys. 3581-Mod-good – entire extent subject to linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3617-Mod-good – entire extent subject to 2-phase grid survey. 3621-Mod-good – entire extent subject to 2-phase grid survey.		
Red Helmet Orchid	*Corybas dowlingii*	2-phase grid Transect June – July	June July	☒ Yes 17 Jun 2024 19 Jun 2024 21 Jun 2024 24 Jun 2024 25 Jun 2024 26 Jun 2024 27 Jun 2024	☐ No	17 Jun 2024: 2 people x 7.5 hrs 19 Jun 2024: 2 people x 7.5 hrs 21 Jun 2024: 2 people x 7.5 hrs 24 Jun 2024: 2 people x 7.5 hrs 25 Jun 2024: 2 people x 7.5 hrs 26 Jun 2024: 2 people x 7.5 hrs 27 Jun 2024: 2 people x 7.5 hrs	3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 17.54 ha or 54% of potential habitat during recommended survey period. Within this area, 2.37 ha resides within the	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3150-Mod-good – 7.70 ha 3150-Plantation – 0.45 ha 3244-Mod-good – 0.23 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period. 3244-Mod-good – 1.31 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.98 ha or 74% of potential habitat during		3250-Mod-good – 0.90 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							recommended survey period. 3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period. 3581-Mod-good – not surveyed during seasonal period.		
Leafless Tongue Orchid	*Cryptostylis hunteriana*	Transect Nov - Jan	November December January	☒ Yes 11-13 Dec 2023 22 Nov 2024	☐ No	11-13 Dec 2023: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3250-Mod-good – entire extent subject to linear transect survey 3581-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
White-flowered Wax Plant	*Cynanchum elegans*	2-phase grid Transect Year round	All year	☒ Yes 17 Jun 2024 19-20 Jun 2024 24-27 Jun 2024 30 Jul 2024 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 13 Sep 2024 23-25 Sep 2024 27 Sep 2024 30 Sep-1 Oct 2024 4 Oct 2024 31 Oct 2024	☐ No	17 Jun 2024: 2 people x 7.5 hrs 19-20 Jun 2024: 2 people x 7.5 hrs 24-27 Jun 2024: 4 people x 7.5 hrs 30 Jul 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 3 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-10 Sep 2024: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of potential habitat. Within this area, 0.89 ha resides within the restricted access sites. 3239-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey 3244-Mod-good – entire extent subject to 2-phase grid survey	Assumed Present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3029-Mod-good – 0.92 ha 3250-Mod-good – 0.90 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						13 Sep 2024: 3 people x 7.5 hrs 23-24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 3 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep-1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat. 3617-Mod-good – entire extent subject to 2-phase grid survey 3621-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Spider Orchid	*Dendrobium melaleucaphilum*	Transect Aug - Sep	August September	☐ Yes	☒ No 22 Nov 2024	22 Nov 2024: 2 people x 7.5 hrs	3250-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.
-	*Epacris purpurascens* var. *purpurascens*	2-phase grid Transect Sep – Oct	September October	☒ Yes 9 Sep 2024 13 Sep 2024 23 Sep 2024 24 Sep 2024 25 Sep 2024 27 Sep 2024 30 Sep 2024 4 Oct 2024 22 Nov 2024	☒ No 17 Jun 2024 19 Jun 2024 20 Jun 2024 21 Jun 2024 24 Jun 2024 25 Jun 2024 27 Jun 2024 12 Aug 2024	17 Jun 2024: 2 people x 7.5 hrs 19 Jun 2024: 2 people x 7.5 hrs 20 Jun 2024: 2 people x 7.5 hrs 21 Jun 2024: 2 people x 7.5 hrs 24-27 June 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 9 Sep 2024: 4 people x 7.5 hrs	3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 25.68 ha or 76% of potential habitat during recommended survey period and covered up to 30.15 ha or 89% of all potential habitat	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 25 Sep 2024: 3 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	throughout all surveys. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 0.43 ha or 21% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							sampled 1.12 ha or 55% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3617-Mod-good – entire extent subject to 2-phase grid survey 3621-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Camfield's Stringybark	*Eucalyptus camfieldii*	2-phase grid Year round	All year	☒ Yes 31 Oct 2024	☐ No	31 Oct 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.
Slaty Red Gum	*Eucalyptus glaucina*	2-phase grid Transect Year round	All year	☒ Yes 1 Oct 2024 4 Oct 2024 23 Sep 2024	☐ No	1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 23 Sep 2024: 4 people x 7.5 hrs	3239-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
-	*Eucalyptus parramattensis* subsp. *decadens*	2-phase grid Year round	All year	☒ Yes 29-31 Aug 2024 1 Sep 2024 6 Sep 2024 31 Oct 2024	☐ No	29-31 Aug 2023: 2 people x 7.5 hrs 1 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.
-	*Genoplesium branwhiteorum*	Transect Nov - Apr	November December January February March April	☒ Yes 22 Nov 2024	☐ No	22 Nov 2024: 2 people x 7.5 hrs	3581-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Variable Midge Orchid	*Genoplesium insigne*	Transect Sep – Nov	September October November	☒ Yes 9-11 Oct 2024 22 Nov 2024	☐ No	9-11 Oct 2024: 2 people x 7.5 22 Nov 2024: 2 people x 7.5 hrs	3581-Mod-good – entire extent subject to linear transect survey	No	No Based on survey the species is not considered to occur within the subject land and is not considered further in respect to BAM subsections 5.2.5 and 5.2.6. Whilst the species was recorded during field surveys, the occurrence was within an existing electrical transmission easement and does for form part of impacts for this project.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Narrow-leaf Finger Fern	*Grammitis stenophylla*	2-phase grid Transect Year round	All year	☒ Yes 24 June 2024 25 June 2024 30 Jul 2024 15 Aug 2024 13 Sep 2024 23 Sep 2024 24 Sep 2024 25 Sep 2024 27 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 30 Oct 2024	☐ No	24 June 2024: 2 people x 7.5 hrs 25 June 2024: 2 people x 7.5 hrs 30 Jul 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of all potential habitat throughout all surveys. Within this area, 0.89 ha resides within the restricted access sites. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 30.15 or 89% of all potential	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3029-Mod-good – 0.37 ha 3150-Mod-good – 1.31 ha 3150-Plantation – 0.45 ha 3242-Mod-good – 1.08 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						4 Oct 2024: 3 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs	habitat throughout all surveys. Within this area, 2.37 ha resides within the restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of all potential habitat throughout all surveys. 3239-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 22.25 ha or 86% of all potential habitat throughout all surveys. Within this area, 4.17 ha resides within the restricted access sites. 3617-Mod-good – entire extent subject to 2-phase grid survey 3621-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Small-flower Grevillea	*Grevillea parviflora* subsp. *parviflora*	2-phase grid Transects Aug – Nov	August September October November	☒ Yes 29-31 Aug 2023 1 Sep 2023 6 Sep 2023 9-11 Oct 2024 22 Nov 2024	☐ No	29-31 Aug 2023: 2 people x 7.5 hrs 1 Sep 2023: 2 people x 7.5 hrs 6 Sep 2023: 2 people x 7.5 hrs 9-11 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3581-Mod-good – entire extent subject to linear transect survey	No	No Based on survey the species is not considered to occur within the subject land and is not considered further in respect to BAM subsections 5.2.5 and 5.2.6.
Biconvex Paperbark	*Melaleuca biconvexa*	2-phase grid Transects Year round	All year	☒ Yes 24-25 Oct 2023 17 Jun 2024 19 Jun 2042 20 Jun 2024 21 Jun 2024 24 Jun 2024 25 Jun 2024 26 Jun 2024 27 Jun 2024	☐ No	24-25 Oct 2023: 2 people x 7.5 hrs 17 Jun 2024: 2 people x 7.5 hrs 19 Jun 2024: 2 people x 7.5 hrs 20 Jun 2024: 2 people x 7.5 hrs 21 Jun 2024: 2 people x 7.5 hrs 24 Jun 2024: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of all potential habitat throughout all surveys. Within this area, 0.89 ha resides within the	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3029-Mod-good – 0.92 ha 3150-Mod-good – 3.83 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
				12 Aug 2024 15 Aug 2024 9 Sep 2024 13 Sep 2024 23-25 Sep 2024 27 Sep 2024 30 Sep-1 Oct 2024 4 Oct 2024 8-10 Oct 2024 31 Oct 2024 22 Nov 2024		25 Jun 2024: 2 people x 7.5 hrs 26 Jun 2024: 2 people x 7.5 hrs 27 Jun 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 9 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs	restricted access sites. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 30.15 or 98% of all potential habitat throughout all surveys. Within this area, 2.37 ha resides within the restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey		3150-Plantation – 0.92 ha 3242-Mod-good – 3.68 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						30 Sep 2024: 2 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 9-11 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	representatively sampled 1.12 ha or 55% of all potential habitat throughout all surveys. 3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 22.25 or 86% of all potential habitat throughout all surveys. Within this area, 4.17 ha resides within the restricted access sites. 3244-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3250-Mod-good – entire extent subject to linear transect survey		
Grove's Paperbark	*Melaleuca groveana*	2-phase grid Transects Year round	All year	☒ Yes 12 Aug 2024 15 Aug 2024 9 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 31 Oct 2024 22 Nov 2024	☐ No	12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 9 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3239-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey 3244-Mod-good – entire extent subject to 2-phase grid survey 3250-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Eastern Australian Underground Orchid	*Rhizanthella slateri*	2-phase grid Transect Sep-Nov	September October November	☒ Yes 3-6 Sep 2024 9 Sep 2024 13 Sep 2024 23-25 Sep 2024 27 Sep 2024 30 Sep 2024 31 Oct 2024 22 Nov 2024	☒ No 5-9 Aug 2024 12 Aug 2024 15 Aug 2024	12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3-6 Sep 2024: 2 people x 7.5 hrs 9 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 2.60 ha or 54% of potential habitat during recommended survey period and covered up to 3.90 ha or 81% of all potential habitat throughout all surveys. Within this area, 0.89 ha resides within the restricted access sites. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3029-Mod-good – 0.37 ha 3150-Mod-good – 1.31 ha 3150-Plantation – 0.45 ha 3230-Mod-good – 2.62 ha 3230-Plantation – 0.30 ha 3242-Mod-good – 1.08 ha 3250-Mod-good – 0.90 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						22 Nov 2024: 2 people x 7.5 hrs	targeted survey and linear transect survey representatively sampled 25.68 ha or 76% of potential habitat during recommended survey period and covered up to 30.15 ha or 89% of all potential habitat throughout all surveys. Within this area, 2.37 ha resides within the restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively		3263-Mod-good – 0.63 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							sampled 0.43 ha or 21% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3230-Mod-good – 43.53 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 38.07 ha or 87% of potential habitat during recommended survey period and covered up to 39.74 ha or 91% of		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							all potential habitat throughout all surveys. Within this area, 0.20 ha resides within the restricted access sites. 3230-Plantation – 11.63 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.87 ha or 76% of potential habitat during recommended survey period and covered up to 11.33 ha or 97% of all potential habitat throughout all surveys.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 20.31 ha or 78% of potential habitat during recommended survey period and covered up to 22.25 ha or 86% of all potential habitat throughout all surveys. Within this area, 4.17 ha resides within the restricted access sites. 3244-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3263-Mod-good – 39.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 35.25 ha		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							or 90% of potential habitat during recommended survey period and covered up to 38.08 ha or 97% of all potential habitat throughout all surveys. Within this area, 2.30 ha resides within the restricted access sites. 3581-Mod-good – entire extent subject to linear transect survey 3617-Mod-good – entire extent subject to 2-phase grid survey 3621-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Scrub Turpentine	*Rhodamnia rubescens*	2-phase grid Transect Year round	All year	☒ Yes 15-18 August 2023 24-25 Oct 2023 17 Jun 2024 19 Jun 2042 20 Jun 2024 21 Jun 2024 24 Jun 2024 25 Jun 2024 27 Jun 2024 5-9 Aug 2024 12 Aug 204 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 13 Sep 2024 23-25 Sep 2024	☐ No	15-18 August 2023: 2 people x 7.5 hrs 24-25 Oct 2023: 2 people x 7.5 hrs 17 Jun 2024: 2 people x 7.5 hrs 19 Jun 2024: 2 people x 7.5 hrs 20 Jun 2024: 2 people x 7.5 hrs 21 Jun 2024: 2 people x 7.5 hrs 24 Jun 2024: 2 people x 7.5 hrs 25 Jun 2024: 2 people x 7.5 hrs 27 Jun 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 204: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of potential habitat during recommended survey period. Within this area, 0.89 ha resides within the restricted access sites. Recorded within vegetation zone. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect	Yes Recorded and assumed present	Yes Recorded during the survey with 646 individuals identified. These include: 3029-Mod-good – 35 individuals 3150-Mod-good – 123 individuals 3150-Plantation – 9 individuals 3230-Mod-good – 109 individuals 3230-Plantation – 146 individuals 3239-Mod-good – 19 individuals

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
				27 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 31 Oct 2024 8 Nov 2024 22 Nov 2024		15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 4 people x 7.5 hrs 4 Sep 2024: 6 people x 7.5 hrs 5-6 Sep 2024: 4 people x 7.5 hrs 9-10 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs	survey representatively sampled 30.15 ha or 89% of potential habitat during recommended survey period. Within this area, 2.37 ha resides within the restricted access sites. Recorded within vegetation zone. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended		3242-Mod-good – 131 individuals 3263-Mod-good – 74 individuals Presence assumed where survey not undertaken. Counts estimated by 29 individuals/ha. Assumed habitat: 3029-Mod-good – 1.80 ha or 52 (count) 3150-Mod-good – 6.20 ha or 180 (count) 3150-Plantation – 0.92 ha or 27 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 8 Nov 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	survey period. Recorded within vegetation zone. 3230-Mod-good – 43.53 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 39.74 ha or 91% of potential habitat during recommended survey period. Within this area, 0.20 ha resides within the restricted access sites. Recorded within vegetation zone		3230-Mod-good – 3.99 ha or 116 (count) 3230-Plantation – 0.30 ha or 9 (count) 3242-Mod-good – 7.86 ha or 228 (count) 3263-Mod-good – 3.32 ha or 96 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3230-Plantation – 11.63 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 11.33 ha or 97% of potential habitat during recommended survey period. Recorded within vegetation zone. 3239-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey. Recorded within vegetation zone. 3242-Mod-good – 25.93 ha of		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 22.25 ha or 86% of potential habitat during recommended survey period. Within this area, 4.17 ha resides within the restricted access sites. Recorded within vegetation zone. 3244-Mod-good – entire extent subject to 2-phase grid survey 3250-Mod-good – entire extent subject to linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3263-Mod-good – 39.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 38.03 ha or 97% of potential habitat during recommended survey period. Within this area, 2.30 ha resides within the restricted access sites. Recorded within vegetation zone 3617-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Native Guava	*Rhodomyrtus psidioides*	2-phase grid Transect Year round	All year	☒ Yes 24-25 Oct 2023 13 Sep 2024 24-25 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 31 Oct 2024 8 Nov 2024 22 Nov 2024	☐ No	24-25 Oct 2023: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 5 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 8 Nov 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of potential habitat during recommended survey period. Within this area, 0.89 ha resides within the restricted access sites. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively	Yes	Yes Recorded during the survey with 4 individuals within 1.69 ha identified within 3263-Mod-good. Presence assumed where survey not undertaken. Assumed habitat: 3029-Mod-good – 1.80 ha 3150-Mod-good – 6.20 ha 3150-Plantation – 0.92 ha 3242-Mod-good – 7.86 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							sampled 30.15 ha or 89% of potential habitat during recommended survey period. Within this area, 2.37 ha resides within the restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period. 3242-Mod-good – 25.93 ha of potential habitat		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							within the subject land. 2-phase grid targeted survey representatively sampled 22.25 ha or 86% of potential habitat during recommended survey period. Within this area, 4.17 ha resides within the restricted access sites. 3250-Mod-good – entire extent subject to linear transect survey 3621-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Heath Wrinklewort	*Rutidosis heterogama*	2-phase grid Transect Year round	All year	☒ Yes 19 Dec 2023 30 Sep 2024 31 Oct 2024 22 Nov 2024	☐ No	19 Dec 2023: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period. 3581-Mod-good – entire extent subject to linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3250-Mod-good – 0.90 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Rainforest Cassia	*Senna acclinis*	2-phase grid Transect Year round	All year	☒ Yes 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 13 Sep 2024 23-25 Sep 2024 27 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 31 Oct 2024	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9 Sep 2024: 2 people x 7.5 hrs 10 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.90 ha or 81% of potential habitat during recommended survey period. Within this area, 0.89 ha resides within the restricted access sites. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted and linear transect survey representatively sampled 30.15 ha	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3029-Mod-good – 0.63 ha 3150-Mod-good – 2.12 ha 3150-Plantation – 0.45 ha 3242-Mod-good – 2.75 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						25 Sep 2024: 5 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs	or 89% of potential habitat during recommended survey period. Within this area, 2.37 ha resides within the restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period. 3242-Mod-good – 25.93 ha of potential habitat within the subject		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							land. 2-phase grid targeted survey representatively sampled 22.25 ha or 86% of potential habitat during recommended survey period. Within this area, 4.17 ha resides within the restricted access sites.		
Magenta Lilly Pilly	*Syzygium paniculatum*	2-phase grid Transect April – June	April May June	☒ Yes 17 Jun 2024 24-27 Jun 2024	☐ No	17 Jun 2024: 2 people x 7.5 hrs 24-27 Jun 2024: 2 people x 7.5 hrs	3029-Mod-good – 4.81 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.37 ha or 70% of potential habitat during recommended survey period and covered up to	Assumed present	Yes Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat:

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							3.90 ha or 81% of all potential habitat throughout all surveys. 3150-Mod-good – 33.98 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 17.54 ha or 54% of potential habitat during recommended survey period and covered up to 30.15 ha or 89% of all potential habitat throughout all surveys. Within this area, 2.37 ha resides within the		3029-Mod-good – 0.91 ha or 46 (count) 3150-Mod-good – 3.83 ha or 192 (count) 3150-Plantation – 0.92 ha or 46 (count) 3242-Mod-good – 3.68 ha or 184 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							restricted access sites. 3150-Plantation – 2.05 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							representatively sampled 8.80 ha or 34% of potential habitat during recommended survey period and covered up to 22.25 ha or 86% of all potential habitat throughout all surveys. Within this area, 4.17 ha resides within the restricted access sites. 3244-Mod-good – 1.31 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.98 ha or 74% of potential habitat during recommended		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
							survey period and covered the entire extent of all potential habitat throughout all surveys. 3250-Mod-good – entire extent subject to linear transect survey		
-	*Tetratheca glandulosa*	2-phase grid Aug – Nov	August September October November	☒ Yes 13 Sep 2024 23-25 Sep 2024 27 Sep 2024	☐ No	13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 3 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs	3617-Mod-good – entire extent subject to 2-phase grid survey 3621-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Black-eyed Susan	*Tetratheca juncea*	2-phase grid Transect Sep – Oct	September October	☒ Yes 6 Sep 2023 24-25 Oct 2023 13 Sep 2024 23 Sep 2024 24 Sep 2024 25 Sep 2024 27 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 8-10 Oct 2024 29 Oct 2024 31 Oct 2024 22 Nov 2024	☒ No 22 Nov 2024	6 Sep 2023: 2 people x 7.5 hrs 24-25 Oct 2023: 2 people x 7.5 hrs 13 Sep 2024: 3 people x 7.5 hrs 23 Sep 2024: 4 people x 7.5 hrs 24 Sep 2024: 4 people x 7.5 hrs 25 Sep 2024: 3 people x 7.5 hrs 27 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 8-10 Oct 2024: 2 people x 7.5 hrs	3242-Mod-good – 25.93 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 20.31 ha or 78% of potential habitat during recommended survey period and covered up to 22.25 ha or 86% of all potential habitat throughout all surveys. Within this area, 4.17 ha resides within the restricted access sites. 3244-Mod-good – entire extent subject to 2-phase grid survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3242-Mod-good – 1.95 ha 3250-Mod-good – 0.90 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
						29 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 22 Nov 2024: 2 people x 7.5 hrs	3250-Mod-good – 2.02 ha of potential habitat within the subject land. Linear transect survey representatively sampled 1.12 ha or 55% of potential habitat during recommended survey period and covered up to 1.12 ha or 55% of all potential habitat throughout all surveys. 3581-Mod-good – entire extent subject to linear transect survey 3617-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (per vegetation zone)		
Wyong Sun Orchid	*Thelymitra adorata*	2-phase grid Sep – Oct	September October	☒ Yes 13 Sep 2024 1 Oct 2024 31 Oct 2024	☐ No	13 Sep 2024: 3 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Table 5.14 Threatened species surveys for candidate flora species credit species within the Yengo IBRA subregion

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Bynoe's Wattle	*Acacia bynoeana*	Transect Year round	All year	☒ Yes 07 Jan 2024 30 Jul 2024 15 Sep 29 Oct 2024	☐ No	07 Jan 2024: 2 people x 7.5 hrs 30 Jul 2024: 2 people x 7.5 hrs 15 Sep 2024: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs	3617-Mod-good – entire extent subject to linear transect survey 4039-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.
Acacia pendula population in the Hunter catchment	*Acacia pendula* – endangered population	2-phase grid Transect Year round	All year	☒ Yes 07 Jan 2024 3-4 Sep 2024 6 Sep 2024 15 Sep 2024	☐ No	07 Jan 2024: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 15 Sep 2024: 2 people x 7.5 hrs	3438-Mod-good – entire extent subject to 2-phase grid survey 4039-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Androcalva rosea* Syn. *Commersonia rosea*	2-phase grid Year round	All year	☒ Yes 13 Sep 2024	☐ No	13 Sep 2024: 2 people x 7.5 hrs	3439-Mod-good – entire extent subject to 2-phase grid survey.	No	No Based on adequate representative targeted surveys the species is not considered further. The patch of PCT 3439 occurs within the Singelton Military Area and was subject to a fire event in 2019/20 (NSW DCCEEW 2025). Survey comments in TBDC (2025) state that the species is fire ephemeral, and that survey are to be conducted 18 months to 5 years post fire.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
									Surveys during 2024 were completed within this post fire survey window.
-	*Brachyscome brownii*	2-phase grid Transect Summer	N/A (not listed in TBDC)	☒ Yes 30 July 2024 13 Sep 2024 29 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025	☐ No	30 July 2024: 2 people x 7.5 hrs 13 Sep: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs	3239-Mod-good – 96.43. ha of potential habitat within the subject land. 2-phase grid targeted and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period with 7.87 ha of recorded habitat with 16.88 ha occurring within Disturbance area A	Yes	Yes Recorded during the survey. The species has been recorded to occupy 24.56 ha of habitat within Disturbance area A. 3239-Mod-good – 16.88 ha 3241-Mod-good – 7.67 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3241-Mod-good – entire extent subject to linear transect survey with 7.67 ha of recorded habitat within Disturbance area A		
Netted Bottle Brush	*Callistemon linearifolius*	2-phase grid Transect Oct – Jan	October November December January	☒ Yes 29 Oct 2024	☒ No 30 July 2024 13 Sep 2024	30 July 2024: 2 people x 7.5 hrs 13 Sep: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs	3230-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey 3444-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey 3617-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* – endangered population	2-phase grid Year round	All year	☒ Yes 13 Sep 2024	☐ No	13 Sep 2024: 2 people x 7.5 hrs	3438-Mod-good – entire extent subject to 2-phase grid survey 3439-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.
White-flowered Wax Plant	*Cynanchum elegans*	2-phase grid Transect Year round	All year	☒ Yes 16 May 2024 30 July 2024 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 24 Sep 2024 4 Oct 2024 29 Oct 2024 30 Oct 2024 6 Feb 2025	☐ No	16 May 2024: 2 people x 7.5 hrs 30 July 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 3 people x 7.5 hrs	3086-Mod-good – entire extent subject to 2-phase grid survey 3087-Mod-good – 2.82 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 2.23 ha or 79% of potential habitat during survey period	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good – 0.59 ha 3152-Mod-good – 0.08 ha 3239-Mod-good – 3.59 ha 3489-Mod-good – 0.29 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
				17 Feb 2025 18 Feb 2025		6 Sep 2024: 2 people x 7.5 hrs 9-10 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3151-Mod-good – 1.85 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.70 ha or 92% of potential habitat during survey period 3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during survey period. Within this area, 0.39 ha resides		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							within the restricted access sites. 3237-Mod-good – 5.46 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.32 ha or 61% of potential habitat during survey period 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							Within this area, 3.05 ha resides within the restricted access sites. 3239-Plantation – entire extent subject to 2-phase grid survey 3244-Mod-good – entire extent subject to 2-phase grid survey 3489-Mod-good – 5.67 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 5.38 ha or 95% of potential habitat during survey period. Within this area, 0.45 ha resides		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							within the restricted access sites. 3617-Mod-good – entire extent subject to linear transect survey		
-	*Dillwynia tenuifolia*	2-phase grid Transect Aug – Oct	August September October	☒ Yes 5-9 Aug 2024 24 Sep 2024 29 Oct 2024 30 Oct 2024	☒ No 6 Feb 2025 17 Feb 2025 18 Feb 2025	5-9 Aug 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 44.49 ha or 78% of potential habitat during recommended survey period and covered up to 54.99 ha or 96% of all potential habitat throughout all surveys. Within this area, 13.32 ha	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							resides within the restricted access sites. 3617-Mod-good – entire extent subject to linear transect survey		
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis* – endangered population	Transect Year round	All year	☒ Yes 29 Oct 2024	☐ No	29 Oct 2024: 2 people x 7.5 hrs	4072-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.
Broken Back Ironbark	*Eucalyptus fracta*	2-phase grid Transect Year round	All year	☒ Yes 5-9 Aug 2024 3 Sep 2024 24 Sep 2024 30 Oct 2024 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs	3489-Mod-good – 5.67 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 5.38 ha or 95% of potential habitat during survey period. Within this area,	Yes	Yes Recorded during the survey. The species has been recorded to occupy 4.53 ha of habitat. Presence assumed where survey not undertaken.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	0.45 ha resides within the restricted access sites. 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites. Recorded within vegetation zone.		Assumed habitat 3489-Mod-good – 0.73 ha 3605-Mod-good – 15.42 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Slaty Red Gum	*Eucalyptus glaucina*	2-phase grid Transect Year round	All year	☒ Yes 4 Oct 2024 29 Oct 2024 30 Oct 2024 4-6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people 7.5 hrs 4-6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during survey period. Within this area, 0.39 ha resides within the restricted access sites. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential	Assumed Present	Yes Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat: 3152-Mod-good – 0.08 ha or 4 (count) 3239-Mod-good – 3.59 ha or 179 (count) 3605-Mod-good – 2.10 ha or 105 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							habitat during survey period. Within this area, 3.05 ha resides within the restricted access sites. 3239- Plantation – entire extent subject to 2-phase grid survey 3241-Mod-good – entire extent subject to linear transect survey 3438-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pokolbin Mallee	*Eucalyptus pumila*	2-phase grid Transect Year round	All year	☒ Yes 5-9 Aug 2024 3 Sep 2024 24 Sep 2024 30 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during survey period. Within this area, 0.39 ha resides within the restricted access sites. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3152-Mod-good – 0.08 ha 3239-Mod-good – 3.59 ha 3605-Mod-good – 2.10 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							habitat during survey period. Within this area, 3.05 ha resides within the restricted access sites. 3239- Plantation – entire extent subject to 2-phase grid survey 3444-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites.		
Narrow-leaf Finger Fern	*Grammitis stenophylla*	2-phase grid Transect Year round	All year	☒ Yes 30 Sep 2024 4 Oct 2024 29 Oct 2024 31 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025	☐ No	30 July 2024: 2 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 31 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs	3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period. Within this area, 3.05 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3239-Mod-good – 2.55 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3239-Plantation – entire extent subject to 2-phase grid survey 3242-Mod-good – entire extent subject to 2-phase grid survey 3617-Mod-good – entire extent subject to linear transect survey		
Small-flower Grevillea	*Grevillea parviflora* subsp. *parviflora*	2-phase grid Aug – Nov	August September October November	☒ Yes 3 Sep 2024 13 Sep 2024	☐ No	3 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3444-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Hibbertia puberula*	Transect Oct – Dec	October November December	☒ Yes 29 Oct 2024	☐ No	29 Oct 2024: 2 people x 7.5 hrs	3617-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Leionema lamprophyllum* subsp. *fractum*	2-phase grid Transect Sep – Nov	September October November	☒ Yes 3 Sep 2024 24 Sep 2024 30 Oct 2024	☐ No	3 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 44.49 ha or 78% of potential habitat during recommended survey period and covered up to 54.99 ha or 96% of all potential habitat throughout all surveys. Within this area, 1.43 ha resides within the restricted access sites.	No	No While survey effort hasn't covered all of 3605-Mod-good, it has covered all potential habitat within its habitat constraint of 100 m of sandstone cliffs / ledges / footslopes. Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Biconvex Paperbark	*Melaleuca biconvexa*	2-phase grid Transect Year round	All year	☒ Yes 5-9 Aug 2024 12 Aug 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3241-Mod-good – entire extent subject to linear transect survey 3242-Mod-good – entire extent subject to 2-phase grid survey 3244-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Grove's Paperbark	*Melaleuca groveana*	2-phase grid Transect Year round	All year	☒ Yes 17-19 Apr 2024 5-9 Aug 2024 12 Aug 2024 3 Sep 2024 4-5 Sep 2024 3-6 Sep 2024 10 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	17-19 Apr 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 10 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 2 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs	3087-Mod-good – 2.82 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 2.23 ha or 79% of potential habitat during survey period. Recorded within vegetation zone. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period.	Yes	Yes Recorded during field survey from the Yengo IBRA subregion with 187 individuals recorded within the subject land (refer Figure 14.13). the species was recorded from PCT 3087 – 8 individuals and PCT 3605 – 179 individuals. Presence assumed where survey not undertaken. Counts estimated by 124 individuals/ha. Assumed habitat: 3239-Mod-good – 6.64 ha or 823 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	Within this area, 3.05 ha resides within the restricted access sites. 3244-Mod-good – entire extent subject to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites. Recorded within vegetation zone.		3605-Mod-good – 15.43 ha or 1913 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Olearia cordata*	2-phase grid Transects Year round	All year	☒ Yes 30 July 2024 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3 Sep 2024 24 Sep 2024 29 Oct 2024 30 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	30 July 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs	3151-Mod-good – 1.85 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.70 ha or 92% of potential habitat during survey period 3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during survey period. Within this area, 0.39 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3151-Mod-good – 0.01 ha 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	3238-Mod-good – entire extent subject to 2-phase grid survey. Within this area, 0.05 ha resides within the restricted access sites. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period. Within this area, 3.05 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3239- Plantation – entire extent subject to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites. 3617-Mod-good – entire extent subject to linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Hairy Geebung	*Persoonia hirsuta*	2-phase grid Transects Year round	All year	☒ Yes 30 July 2024 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3 Sep 2024 29 Oct 2024	☐ No	30 July 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs	3238-Mod-good – entire extent subject to 2-phase grid survey. Within this area, 0.05 ha resides within the restricted access sites. 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3617-Mod-good – entire extent subject to linear transect survey		
Singleton Mint Bush	*Prostanthera cineolifera*	2-phase grid Transect Sep – Oct	September October	☒ Yes 13 Sep 2024 19 Sep 2024 24 Sep 2024 30 Oct 2024	☐ No	13 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 30 Oct 2024: 2 people x 7.5 hrs	3237-Mod-good – 5.46 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.07 ha or 56% of potential habitat during recommended survey period and covered up to 3.32 ha or 61% of all potential habitat throughout all surveys. Recorded within vegetation zone.	Yes	Yes Recorded during the survey. Area of occupancy within Disturbance area A is 23.74 ha, being: 3237-Mod-good – 0.64 ha 3239-Mod-good – 19.54 ha 3605-Mod-good – 3.56 ha Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A 3239-Mod-good – 4.15 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 91.68 ha or 95% of potential habitat during recommended survey period and covered up to 92.84 ha or 96% of all potential habitat throughout all surveys. Within this area, 3.05 ha resides within the restricted access sites. Recorded within vegetation zone.		3605-Mod-good – 11.57 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3239-Plantation – 2.83 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 2.10 ha or 74% of potential habitat during recommended survey period and covered the entire extent of all potential habitat throughout all surveys. 3438-Mod-good – entire extent subject to 2-phase grid survey 3444-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 44.49 ha or 78% of potential habitat during recommended survey period and covered up to 54.99 ha or 96% of all potential habitat throughout all surveys. Within this area, 13.32 ha resides within the restricted access sites. Recorded within vegetation zone.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Illawarra Greenhood	*Pterostylis gibbosa*	2-phase grid Sep – Oct	September October	☒ Yes 15 Sep 2024	☐ No	15 Sep 2024: 2 people x 7.5 hrs	3438-Mod-good – entire extent subject to 2-phase grid survey	No	No Based on adequate representative targeted surveys the species is not considered further.
Eastern Australian Underground Orchid	*Rhizanthella slateri*	2-phase grid Transect Sep – Nov	September October November	☒ Yes 5-9 Aug 2024 12 Aug 2024 3-6 Sep 2024 24 Sep 2024 1 Oct 2024 4 Oct 2024 29-31 Oct 2024 17 Feb 2025 18 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 10 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs	3086-Mod-good – 1.90 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 1.37 ha or 72% of potential habitat during recommended survey period and covered the entire extent of all potential habitat throughout all surveys. 3087-Mod-good – 2.82 ha of potential	Assumed present	Yes Presence assumed where survey not undertaken. Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A 3087-Mod-good – 0.35 ha 3237-Mod-good – 0.80 ha 3599-Mod-good – 0.64 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						4 Oct 2024: 3 people x 7.5 hrs 29-31 Oct 2024: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 2.00 ha or 71% of potential habitat during recommended survey period and covered up to 2.23 ha or 79% of all potential habitat throughout all surveys. 3230-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey 3237-Mod-good – 5.46 ha of potential habitat within the subject land. 2-phase grid targeted		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							survey representatively sampled 3.07 ha or 56% of potential habitat during recommended survey period and covered up to 3.32 ha or 61% of all potential habitat throughout all surveys. 3241-Mod-good – entire extent subject to 2-phase grid survey 3242-Mod-good – 10.57 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 9.78 ha or 93% of potential habitat during		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							recommended survey period and covered the entire extent of all potential habitat throughout all surveys. 3244-Mod-good – entire extent subject to 2-phase grid survey 3599-Mod-good – 7.24 ha of potential habitat within the subject land. Linear transect survey representatively sampled 6.40 ha or 88% of potential habitat during recommended survey period and covered up to 6.60 ha or 91% of all potential habitat		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							throughout all surveys. 3617-Mod-good – entire extent subject to linear transect survey		
Scrub Turpentine	*Rhodamnia rubescens*	2-phase grid Transect Year round	All year	☒ Yes 30 July 2024 5-9 Aug 2024 12 Aug 204 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 18-20 Sep 2024 23 Sep 2024 27 Sep 2024 30 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024	☐ No	30 July 2024: 2 people x 7.5 hrs 5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-10 Sep 2024: 2 people x 7.5 hrs	3086-Mod-good – entire extent subject to 2-phase grid survey. Recorded within vegetation zone. 3087-Mod-good – 2.82 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 2.23 ha or 79% of potential habitat during survey period.	Yes	Yes Recorded during the survey with 508 individuals identified. These include: 3086-Mod-good – 16 individuals 3087-Mod-good – 56 individuals 3151-Mod-good – 3 individuals 3230-Mod-good – 23 individuals 3237-Mod-good – 10 individual

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
				4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025		18-20 Sep 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	Recorded within vegetation zone. 3151-Mod-good – 1.85 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 1.70 ha or 92% of potential habitat during survey period. Recorded within vegetation zone. 3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during		3239-Mod-good – 137 individuals 3241-Mod-good – 120 individuals 3242-Mod-good – 38 individuals 3605-Mod-good – 105 individuals Presence assumed where survey not undertaken. Counts estimated by 35 individuals/ha. Assumed habitat: 3087-Mod-good – 0.59 ha or 21 (count) 3152-Mod-good – 0.47 ha or 16 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							survey period. Within this area, 0.39 ha resides within the restricted access sites. 3230-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey. Recorded within vegetation zone. 3237-Mod-good – 5.46 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 3.32 ha or 61% of potential habitat during survey period. Recorded within vegetation zone.		3237-Mod-good – 2.13 ha or 75 (count) 3239-Mod-good – 6.64 ha or 232 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3238-Mod-good – entire extent subject to 2-phase grid survey 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 92.84 ha or 96% of potential habitat during survey period. Within this area, 3.05 ha resides within the restricted access sites. Recorded within vegetation zone.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3239- Plantation – entire extent subject to 2-phase grid survey. 3241-Mod-good – entire extent subject to linear transect survey. Recorded within vegetation zone. 3242-Mod-good – entire extent subject to 2-phase grid survey. Recorded within vegetation zone. 3244-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3617-Mod-good – entire extent subject to linear transect survey		
Native Guava	*Rhodomyrtus psidioides*	2-phase grid Transect Year round	All year	☒ Yes 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs	3086-Mod-good – entire extent subject to 2-phase grid survey 3087-Mod-good – 2.82 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 2.23 ha or 79% of potential habitat during survey period 3151-Mod-good – 1.85 ha of potential habitat within the subject land. 2-phase grid targeted	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3087-Mod-good – 0.59 ha 3151-Mod-good – 0.15 ha 3152-Mod-good – 0.47 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	survey and linear transect survey representatively sampled 1.70 ha or 92% of potential habitat during survey period 3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.84 ha or 91% of potential habitat during survey period. Within this area, 0.39 ha resides within the restricted access sites. 3242-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							4072-Mod-good – entire extent subject to 2-phase grid survey		
Heath Wrinklewort	*Rutidosis heterogama*	2-phase grid Transect Year round	All year	☒ Yes 19 Dec 2023 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 13 Sep 2024 30 Sep 2024 31 Oct 2024	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 13 Sep 2024: 2 people x 7.5 hrs 30 Sep 2024: 4 people x 7.5 hrs	3244-Mod-good – entire extent subject to 2-phase grid survey 3444-Mod-good – entire extent subject to 2-phase grid survey 3446-Mod-good – entire extent subject to 2-phase grid survey 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							sampled 54.99 ha or 96% of potential habitat during survey period. Within this area, 13.32 ha resides within the restricted access sites. 4039-Mod-good – entire extent subject to linear transect survey		
Rainforest Cassia	*Senna acclinis*	2-phase grid Year round	All year	☒ Yes 5-9 Aug 2024 12 Aug 2024 15 Aug 2024 3-6 Sep 2024 9-10 Sep 2024 1 Oct 2024 4 Oct 2024 29 Oct 2024 4 Feb 2025 5 Feb 2025	☐ No	5-9 Aug 2024: 2 people x 7.5 hrs 12 Aug 2024: 2 people x 7.5 hrs 15 Aug 2024: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs	3086-Mod-good – entire extent subject to 2-phase grid survey 3242-Mod-good – entire extent subject to 2-phase grid survey	No	No Recorded during surveys outside the subject land (refer Figure 14.13). The species occurs on Cedar Creek and the species, and its habitat will be span by the project and not subject to disturbance.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
				6 Feb 2025 17 Feb 2025 18 Feb 2025		9-10 Sep 2024: 2 people x 7.5 hrs 18 Sep 2024: 2 people x 7.5 hrs 20 Sep 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs 1 Oct 2024: 4 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 29 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs			Based on avoidance and adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Magenta Lilly Pilly	*Syzygium paniculatum*	2-phase grid Transect Apr – June	April May June	☒ Yes 18-20 Sep 2024 23 Sep 2024	☐ No	18-20 Sep 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs	3087-Mod-good – 2.82 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey wasn't undertaken during the recommended survey period and covered up to 2.23 ha or 79% of all potential habitat throughout all surveys. 3241-Mod-good – entire extent subject to linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat: 3087-Mod-good – 0.59 ha or 30 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3242-Mod-good – 10.57 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.31 ha or 3% of potential habitat during recommended survey period and covered the entire extent of all potential habitat throughout all surveys.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3244-Mod-good – 0.31 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.18 ha or 58% of potential habitat during recommended survey period and covered the entire extent of all potential habitat throughout all surveys.		
-	*Tetratheca glandulosa*	Transect Aug – Nov	August September October November	☒ Yes 29 Oct 2024	☐ No	29 Oct 2024: 2 people x 7.5 hrs	3617-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Velleia perfoliata*	2-phase grid Transect Sep – Nov	September October November	☒ Yes 3-6 Sep 2024 19 Sep 2024 24 Sep 2024 29-30 Oct 2024	☐ No	3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 29-30 Oct 2024: 2 people x 7.5 hrs	3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.48 ha or 52% of potential habitat during recommended survey period and covered up to 0.84 ha or 91% of all potential habitat throughout all surveys. Within this area, 0.39 ha resides within the restricted access sites. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							targeted survey and linear transect survey representatively sampled 91.68 ha or 95% of potential habitat during recommended survey period and covered up to 92.84 ha or 96% of all potential habitat throughout all surveys. Within this area, 3.05 ha resides within the restricted access sites. 3239-Plantation – 2.83 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 2.10 ha or		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							74% of potential habitat during recommended survey period and covered the entire extent throughout all surveys 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 44.49 ha or 78% of potential habitat during recommended survey period and covered up to 54.99 ha or 96% of all potential habitat throughout all surveys. Within this		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							area, 13.32 ha resides within the restricted access sites. 3617-Mod-good – entire extent subject to linear transect survey.		
-	*Zieria involucrata*	2-phase grid Transect Sep – Nov	All year	☒ Yes 3-6 Sep 2024 19 Sep 2024 24 Sep 2024 29-30 Oct 2024 4 Feb 2025 5 Feb 2025 6 Feb 2025 17 Feb 2025 18 Feb 2025	☐ No	3 Sep 2024: 2 people x 7.5 hrs 4-5 Sep 2024: 4 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 24 Sep 2024: 2 people x 7.5 hrs 29-30 Oct 2024: 2 people x 7.5 hrs 4 Feb 2025: 2 people x 7.5 hrs	3151-Mod-good – 1.85 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 0.27 ha or 14% of potential habitat during recommended survey period and covered up to 1.70 ha or 92% of all potential habitat	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3151-Mod-good – 0.01 ha 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs 17 Feb 2025: 2 people x 7.5 hrs 18 Feb 2025: 2 people x 7.5 hrs	throughout all surveys. 3152-Mod-good – 0.92 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 0.48 ha or 52% of potential habitat during recommended survey period and covered up to 0.84 ha or 91% of all potential habitat throughout all surveys. Within this area, 0.39 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3238-Mod-good – entire extent subject to 2-phase grid survey. Within this area, 0.05 ha resides within the restricted access sites. 3239-Mod-good – 96.43 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 91.68 ha or 95% of potential habitat during recommended survey period and covered up to 92.84 ha or 96% of all potential habitat throughout all		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							surveys. Within this area, 3.05 ha resides within the restricted access sites. 3239-Plantation – 2.83 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 2.10 ha or 74% of potential habitat during recommended survey period and covered the entire extent throughout all surveys 3605-Mod-good – 57.10 ha of potential habitat within the subject land. 2-phase grid targeted survey and		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							linear transect survey representatively sampled 44.49 ha or 78% of potential habitat during recommended survey period and covered up to 54.99 ha or 96% of all potential habitat throughout all surveys. Within this area, 13.32 ha resides within the restricted access sites. 3617-Mod-good – entire extent subject to linear transect survey		

Table 5.15 Threatened species surveys for candidate flora species credit species within the Hunter subregion

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Bynoe's Wattle	*Acacia bynoeana*	2-phase grid Transect Year round	All year	☒ Yes 9-13 Sep 2024	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							habitat during survey period. 4039-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey		
Acacia pendula population in the Hunter catchment	*Acacia pendula* – endangered population	2-phase grid Transect Year round	All year	☒ Yes 3-4 Sep 2024 6 Sep 2024 16-20 Sep 2024 2-3 Oct 2024 14-15 Oct 2024 21 Jan 2025	☐ No	3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs 21 Jan 2024: 2 people x 7.5 hrs	3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.82 ha or 96% of potential habitat during survey period. 3314-Poor – 19.40 ha of potential habitat within the subject	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3314-Poor – 2.06 ha 3314-Thinned – 1.64 ha 3315-Thinned – 0.84 ha 3431-Plantation – 3.73 ha 3431-Thinned – 8.14 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							land. 2-phase grid targeted survey and linear transect survey representatively sampled 17.34 ha or 89% of potential habitat during survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid		3431-Poor – 0.30 ha 3438-Mod-good – 0.21 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							targeted survey and linear transect survey representatively sampled 55.28 ha or 87% of potential habitat during survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.90 ha or 94% of potential habitat during survey period. Within this area,		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3.17 ha resides within the restricted access sites. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during survey period. 4039-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Charmhaven Apple	*Angophora inopina*	2-phase grid Transect Year round	All year	☒ Yes 9-13 Sep 2024 21 Jan 2025	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs 21 Jan 2025: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3315-Thinned – 0.84 ha
Trailing Woodruff	*Asperula asthenes*	2-phase grid Transect Oct – Dec	October November December	☐ Yes	☒ No 9-13 Sep 2024 18 Sep 2024 23 Sep 2024	9-13 Sep 2024: 2 people x 7.5 hrs 18 Sep 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs	3086-Mod-good – entire extent subject to linear transect survey 3087-Mod-good – not subject to survey 3241-Mod-good – entire extent subject to linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3087-Mod-good – 0.31 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3446-Mod-good – entire extent subject to 2-phase grid survey.		
-	*Brachyscome brownii*	Transect Summer	N/A (not listed in TBDC)	☒ Yes 4 Feb 2025 5 Feb 2025 6 Feb 2025	☐ No	4 Feb 2025: 2 people x 7.5 hrs 5 Feb 2025: 2 people x 7.5 hrs 6 Feb 2025: 2 people x 7.5 hrs	3241-Mod-good – entire extent subject to linear transect survey with 0.87 ha of recorded habitat	Yes	Yes Recorded during the survey. The species has been recorded to occupy 0.87 ha of habitat. 3241-Mod-good – 0.87 ha within Disturbance area A

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Netted Bottle Brush	*Callistemon linearifolius*	2-phase grid Transect Oct – Jan	October November December January	☐ Yes	☒ No 9-13 Sep 2024	9-13 Sep 2024: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during recommended survey period and covered up to 8.02 ha or 91% of all potential habitat throughout all surveys. 3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat: 3315-Thinned – 0.84 ha or 42 (count) 3444-Mod-good – 3.55 ha or 178 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							representatively sampled 31.98 ha or 87% of potential habitat during recommended survey period and covered up to 32.65 ha or 89% of all potential habitat throughout all surveys. Within this area, 1.58 ha resides within the restricted access sites.		
Red Helmet Orchid	*Corybas dowlingii*	2-phase grid Transect June – July	June July	☒ Yes 25 Jul 2024	☐ No	25 Jul 2024: 2 people x 7.5 hrs	3241-Mod-good – not subject to survey 3446-Mod-good – not subject to survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3241-Mod-good – 2.09 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
									3446-Mod-good – not within Disturbance area A
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* – endangered population	2-phase grid Transect Year round	All year	☒ Yes 6 Oct 2023 30 Oct – 1 Nov 2023 21-23 Nov 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-20 Sep 2024 2-3 Oct 2024 14-15 Oct 2024 21 Jan 2025	☐ No	6 Oct 2023: 3 people x 7.5 hrs 30 Oct 2023: 5 people x 7.5 hrs 31 Oct – 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs	3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.82 ha or 96% of potential habitat during survey period. Recorded within vegetation zone. 3314-Poor – 19.40 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey	Yes	Yes Recorded during the survey. 1 individual recorded within the subject land in PCT 3444. An additional 4 individuals recorded outside the subject land (refer Figure 14.13). Presence assumed where survey not undertaken. Counts estimated by 1 individual/ha. Assumed habitat: 3314-Poor – 2.06 ha or 2 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						15 Oct 2024: 3 people x 7.5 hrs 21 Jan 2024: 2 people x 7.5 hrs	representatively sampled 17.34 ha or 89% of potential habitat during survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively		3314-Thinned – 1.64 ha or 2 (count) 3315-Thinned – 0.84 ha or 1 (count) 3431-Plantation – 3.73 ha or 4 (count) 3431-Poor – 3.48 ha or 3 (count) 3431-Thinned – 8.30 ha or 8 (count) 3438-Mod-good – 0.21 ha or 1 (count) 3636-Thinned – 1.18 ha or 1 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							sampled 55.28 ha or 87% of potential habitat during survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.90 ha or 94% of potential habitat during survey period. Within this area, 3.17 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during survey period. 3636-Thinned – 7.51 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 6.33 ha or 84% of potential habitat during survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
White-flowered Wax Plant	*Cynanchum elegans*	Transect Year round	All year	☒ Yes 30 July 2024 9-13 Sep 2024 19 Sep 2024 4 Oct 2024 14-15 Oct 2024	☐ No	13-15 May 2024: 2 people x 7.5 hrs 17 May 2024: 2 people x 7.5 hrs 30 July 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 19 Sep 2024: 2 people x 7.5 hrs 4 Oct 2024: 3 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	3086-Mod-good – entire extent subject to linear transect survey 3239-Mod-good – 5.81 ha of potential habitat within the subject land. linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during survey period. Within this area, 2.42 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3239-Mod-good – 3.38 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pine Donkey Orchid	*Diuris tricolor*	2-phase grid Transect Sep – Nov	September October	☒ Yes 6 Oct 2023 30 Oct – 31 Oct 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-20 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☒ No 1 Nov 2023 21-23 Nov 2023	6 Oct 2023: 3 people x 7.5 hrs 30 Oct 2023: 5 people x 7.5 hrs 31 Oct – 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.15 ha or 94% of potential habitat during spring survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during	Yes	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha 3431-Thinned – 10.38 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							spring survey period. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during spring survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 42.75 ha		3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							or 67% of potential habitat during spring survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.51 ha or 70% of potential habitat during spring survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.85 ha or 93% of potential habitat during spring survey period. Within this area, 3.17 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor* – endangered population	2-phase grid Transects Sep – Nov	September October	☒ Yes 6 Oct 2023 30 Oct – 31 Oct 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-20 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☒ No 1 Nov 2023 21-23 Nov 2023	6 Oct 2023: 3 people x 7.5 hrs 30 Oct 2023: 5 people x 7.5 hrs 31 Oct – 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	As above	Yes	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Presence assumed for the species listing as stated above.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis* – endangered population	2-phase grid Transect Year round	All year	☒ Yes 30-31 Oct 2023 1 Nov 2023 21-23 Nov 2023 4-5 Dec 2023 9-13 Sep 2024 2-3 Oct 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-5 Dec 2023: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs	4072-Thinned – entire extent subject to linear transect survey 4089-Poor – 4.22 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 2.42 ha or 57% of potential habitat during spring survey period. Recorded within vegetation zone.	Yes	Yes Recorded during the survey within 1.50 ha area of PCT 4089-Poor (refer Figure 14.13). Presence assumed where survey not undertaken. Assumed habitat: 4089-Poor – 1.80 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Singleton Mallee	*Eucalyptus castrensis*	2-phase grid Transect Year round	All year	☒ Yes 25 July 2024 9-13 Sep 2024	☐ No	25 July 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs	3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during survey period. 3446-Mod-good – entire extent subject to 2-phase grid survey.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3438-Mod-good – 0.21 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Slaty Red Gum	*Eucalyptus glaucina*	2-phase grid Transect Year round	All year	☒ Yes 30 Oct -1 Nov 2023 21-23 Nov 2023 4-6 Dec 2023 12-16 Feb 2024 23 Feb 2024 26-29 Feb 2024 1 Mar 2024 4-5 Mar 2024 13-17 May 2024 30 Aug 2024 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-19 Sep 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-6 Dec 2023: 2 people x 7.5 hrs 12-16 Feb 2024: 2 people x 7.5 hrs 23 Feb 2024: 2 people x 7.5 hrs 26-29 Feb 2024: 2 people 7.5 x hrs 1 Mar 2024: 2 people x 7.5 hrs 4-5 Mar 2024: 2 people x 7.5 hrs 13-17 May 2024: 2 people x 7.5 hrs	3239-Mod-good – 5.81 ha of potential habitat within the subject land. Linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during survey period. Within this area, 2.42 ha resides within the restricted access sites. 3241-Mod-good – entire extent subject to linear transect survey 3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and	Assumed present	Yes Recorded during the survey but outside the subject land (refer Figure 14.13). Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat: 3239-Mod-good – 3.38 ha or 169 (count) 3314-Poor – 2.06 ha or 103 (count) 3314-Thinned – 1.64 ha or 82 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
				2-3 Oct 2024 14-15 Oct 2024 21 Jan 2025 24 Jan 2025		30 Aug 2024: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 9-13 Sep 2024: 2 people x 7.5 hrs 16-19 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs 21 Jan 2025: 2 people x 5 hrs 24 Jan 2025: 2 people 7.5 hrs	linear transect survey representatively sampled 36.82 ha or 96% of potential habitat during survey period. 3314-Poor – 19.40 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 17.34 ha or 89% of potential habitat during survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear		3315-Thinned – 0.84 ha or 42 (count) 3431-Poor – 0.30 ha or 15 (count) 3431-Thinned – 8.14 ha or 407 (count) 3438-Mod-good – 0.21 ha or 11 (count) 3636-Thinned – 1.18 ha or 59 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 55.28 ha or 87% of potential habitat during survey period. Within this area, 0.16 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.90 ha or 94% of potential habitat during survey period. Within this area, 3.17 ha resides within the restricted access sites. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							sampled 10.02 ha or 98% of potential habitat during survey period. 3446-Mod-good – entire extent subject to 2-phase grid survey 3636-Thinned – 7.51 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 6.33 ha or 84% of potential habitat during survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Eucalyptus parramattensis* subsp. *decadens*	2-phase grid Year round	All year	☒ Yes 30 Oct 2024	☐ No	30 Oct 2024: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period.	No	No Based on adequate representative targeted surveys the species is not considered further.
Pokolbin Mallee	*Eucalyptus pumila*	2-phase grid Transect Year round	All year	☒ Yes 30 Oct -1 Nov 2023 21-23 Nov 2023 4-6 Dec 2023 9-13 Sep 2024 16-19 Sep 2024 2-3 Oct 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-6 Dec 2023: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs	3239-Mod-good – 5.81 ha of potential habitat within the subject land. Linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during survey period. Within this area, 2.42 ha resides within the	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat: 3239-Mod-good – 3.38 ha 3314-Poor – 2.06 ha 3314-Thinned – 1.64 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
				14-15 Oct 2024 21 Jan 2025		16-19 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs 21 Jan 2024: 2 people x 7.5 hrs	restricted access sites. 3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.82 ha or 96% of potential habitat during survey period. 3314-Poor – 19.40 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 17.34 ha or 89% of potential		3315-Thinned – 0.84 ha 3444-Mod-good – 3.99 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							habitat during survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 32.65 ha or 89% of potential habitat during		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							survey period. Within this area, 1.58 ha resides within the restricted access sites. 3446-Mod-good – entire extent subject to 2-phase grid survey		
Small-flower Grevillea	*Grevillea parviflora* subsp. *parviflora*	2-phase grid Transect Aug – Nov	August September October November	☒ Yes 9-13 Sep 2024	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs	3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 31.98 ha or 87% of potential habitat during recommended survey period and covered up to 32.65 ha or 89% of	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3444-Thinned – 3.55 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							all potential habitat throughout all surveys. Within this area, 1.58 ha resides within the restricted access sites. 3446-Mod-good – entire extent subject to 2-phase grid survey		
Biconvex Paperbark	*Melaleuca biconvexa*	Transect Year round	All year	☒ Yes 21-23 Nov 2023	☐ No	21-23 Nov 2023: 2 people x 7.5 hrs	3241-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Grove's Paperbark	*Melaleuca groveana*	2-phase grid Year round	All year	☒ Yes 21-23 Nov 2023 3 Sep 2024	☐ No	21-23 Nov 2023: 2 people x 7.5 hrs 3 Sep 2024: 2 people x 7.5 hrs	3239-Mod-good – 5.81 ha of potential habitat within the subject land. Linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during survey period. Within this area, 2.42 ha resides within the restricted access sites.	Assumed present	Yes Presence assumed where survey not undertaken. Counts estimated by 124 individuals/ha. Assumed habitat: 3239-Mod-good – 3.38 ha or 419 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Ozothamnus tesselatus*	2-phase grid Transect Sep – Oct	September October	☒ Yes 30-31 Oct 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-20 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☒ No 1 Nov 2023 21-23 Nov 2023 4-6 Dec 2023	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-6 Dec 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during recommended survey period and covered up to 8.02 ha or 91% of all potential habitat throughout all surveys. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3315-Thinned – 0.84 ha 3431-Thinned – 4.73 ha 3431-Poor – 0.30 ha 3431-Plantation – 1.82 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						15 Oct 2024: 3 people x 7.5 hrs	representatively sampled 42.75 ha or 67% of potential habitat during recommended survey period and covered up to 55.28 ha or 87% of all potential habitat throughout all surveys. Within this area, 0.16 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.51 ha or 70% of potential		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							habitat during recommended survey period and covered up to 11.18 ha or 75% of all potential habitat throughout all surveys. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.85 ha or 93% of potential habitat during recommended survey period and covered up to 4.90 ha or 94% of all potential habitat throughout all surveys. Within		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							this area, 3.17 ha resides within the restricted access sites.		
Scant Pomaderris	*Pomaderris queenslandica*	2-phase grid Transect Year round	All year	☒ Yes 30 Oct -1 Nov 2023 21-23 Nov 2023 4-6 Dec 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-19 Sep 2024 2-3 Oct 2024 14-15 Oct 2024 21 Jan 2025	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-6 Dec 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs	3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 55.28 ha or 87% of potential habitat during survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3431-Thinned – 4.73 ha 3431-Poor – 0.30 ha 3431-Plantation – 1.82 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs 21 Jan 2024: 2 people x 7.5 hrs	phase grid targeted survey and linear transect survey representatively sampled 4.90 ha or 94% of potential habitat during survey period. Within this area, 3.17 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 11.18 ha or 75% of potential habitat during survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Tarengo Leek Orchid	*Prasophyllum petilum*	2-phase grid Transect Sep – Dec	September October November December	☒ Yes 30 Oct -1 Nov 2023 21-23 Nov 2023 4-6 Dec 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-19 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 4-6 Dec 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs	3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.15 ha or 94% of potential habitat during spring survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha 3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						15 Oct 2024: 3 people x 7.5 hrs	spring survey period. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during spring survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 42.75 ha		3444-Mod-good – 4.22 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							or 67% of potential habitat during spring survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.51 ha or 70% of potential habitat during spring survey period. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							phase grid targeted survey and linear transect survey representatively sampled 4.85 ha or 93% of potential habitat during spring survey period. Within this area, 3.17 ha resides within the restricted access sites. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							spring survey period. 3444-Derived – entire extent subject to linear transect survey 3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 31.98 ha or 87% of potential habitat during spring survey period. Within this area, 1.58 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
-	*Prasophyllum* sp. Wybong	2-phase grid Transect Sep – Oct	September October	☒ Yes 30-31 Oct 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-19 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.15 ha or 94% of potential habitat during spring survey period. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey representatively sampled 8.02 ha or 91% of potential habitat during spring survey period.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha 3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during spring survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 42.75 ha or 67% of potential habitat during		3444-Mod-good – 4.22 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							spring survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.51 ha or 70% of potential habitat during spring survey period. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							transect survey representatively sampled 4.85 ha or 93% of potential habitat during spring survey period. Within this area, 3.17 ha resides within the restricted access sites. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during spring survey period.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 31.98 ha or 87% of potential habitat during spring survey period. Within this area, 1.58 ha resides within the restricted access sites. 3444-Derived – entire extent subject to linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Singleton Mint Bush	*Prostanthera cineolifera*	2-phase grid Transect Sep – Dec	September October November December	☒ Yes 9-13 Sep 2024 20 Sep 2024 14-15 Oct 2024	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs 20 Sep 2024: 3 people x 7.5 hrs 14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	3239-Mod-good – 5.81 ha of potential habitat within the subject land. Linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during recommended survey period and covered up to 2.42 ha or 42% of all potential habitat throughout all surveys. Within this area, 2.42 ha resides within the restricted access sites. 3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear	Yes	Yes Recorded during the survey within 4.54 ha area of PCT 3438-Mod-good within Disturbance area A and 1.73 ha of PCT 3444-Mod-good within Disturbance area A (refer Figure 14.13). Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3239-Mod-good – 5.81 ha 3315-Derived – 8.93 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							transect survey representatively sampled 8.02 ha or 91% of potential habitat during recommended survey period and covered up to 8.02 ha or 91% of all potential habitat throughout all surveys. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during recommended survey period and		3315-Thinned – 0.84 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 5.13 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							covered up to 10.67 ha or 54% of all potential habitat throughout all surveys. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during recommended survey period and covered up to 10.02 ha or 98% of all potential habitat throughout all surveys. Recorded within vegetation zone.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 31.98 ha or 87% of potential habitat during recommended survey period and covered up to 32.65 ha or 89% of all potential habitat throughout all surveys. Within this area, 1.58 ha resides within the restricted access sites. Recorded within vegetation zone.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3446- Mod-good – entire extent subject to 2-phase grid survey		
-	*Pterostylis chaetophora*	2-phase grid Transects Sep – Nov	September October November	☒ Yes 30 Oct -1 Nov 2023 21-23 Nov 2023 3-4 Sep 2024 6 Sep 2024 9-13 Sep 2024 16-19 Sep 2024 2-3 Oct 2024 14-15 Oct 2024	☐ No	30 Oct 2023: 5 people x 7.5 hrs 31 Oct 2023: 4 people x 7.5 hrs 1 Nov 2023: 4 people x 7.5 hrs 21-23 Nov 2023: 2 people x 7.5 hrs 3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs 16-20 Sep 2024: 3 people x 7.5 hrs 2-3 Oct 2024: 4 people x 7.5 hrs	3241-Mod-good – entire extent subject to linear transect survey 3314-Thinned – 38.46 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 36.15 ha or 94% of potential habitat during spring survey period.	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
						14 Oct 2024: 2 people x 7.5 hrs 15 Oct 2024: 3 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during spring survey period. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during		3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 4.22 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							spring survey period. 3431-Thinned – 63.42 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 42.75 ha or 67% of potential habitat during spring survey period. Within this area, 0.16 ha resides within the restricted access sites. 3431-Plantation – 14.90 ha of potential habitat within the subject land. 2-phase grid targeted survey and		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							linear transect survey representatively sampled 10.51 ha or 70% of potential habitat during spring survey period. 3431-Poor – 5.20 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 4.85 ha or 93% of potential habitat during spring survey period. Within this area, 3.17 ha resides within the restricted access sites.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during spring survey period. 3444-Derived – entire extent subject to linear transect survey 3444-Mod-good – 36.64 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							representatively sampled 31.98 ha or 87% of potential habitat during spring survey period. Within this area, 1.58 ha resides within the restricted access sites. 3446-Mod-good – entire extent subject to 2-phase grid survey		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Illawarra Greenhood	*Pterostylis gibbosa*	2-phase grid Transect Sep – Oct	September October	☒ Yes 9-13 Sep 2024	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs	3431-Thinned – recorded within vegetation zone, but not associated with PCT. 3438-Mod-good – 10.22 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.02 ha or 98% of potential habitat during survey period.	Yes	Yes Recorded during the survey within 1.97 ha area of PCT 3431-Thinned within Disturbance area A (refer Figure 14.13). Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3438-Mod-good – 0.21 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Scrub Turpentine	*Rhodamnia rubescens*	2-phase grid Transect Year round	All year	☒ Yes 3-4 Sep 2024 6 Sep 2024 18 Sep 2024 23 Sep 2024	☐ No	3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs 18 Sep 2024: 2 people x 7.5 hrs 23 Sep 2024: 2 people x 7.5 hrs	3086- Mod-good – entire extent subject to linear transect survey 3087-Mod-good – not subject to survey 3239-Mod-good – 5.81 ha of potential habitat within the subject land. Linear transect survey representatively sampled 2.42 ha or 42% of potential habitat during survey period. Within this area, 2.42 ha resides within the restricted access sites.	Yes	Yes Recorded during the survey with 10 individuals identified recorded within the subject land in the Hunter IBRA subregion (refer Figure 14.13) 3241-Mod-good – 10 individuals Presence assumed where survey not undertaken. Counts estimated by 29 individuals/ha. Assumed habitat: 3087-Mod-good – 0.31 ha or 9 (count)

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							3241- Mod-good – entire extent subject to linear transect survey. Recorded within vegetation zone. 3446- Mod-good – entire extent subject to 2-phase grid survey		3239-Mod-good – 5.81 ha or 169 (count)
Native Guava	*Rhodomyrtus psidioides*	Transect Year round	All year	☒ Yes 9-13 Sep 2024	☐ No	9-13 Sep 2024: 2 people x 7.5 hrs	3086-Mod-good – entire extent subject to linear transect survey 3087-Mod-good – not subject to survey 4072-Thinned – entire extent subject to linear transect survey	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good – 0.31 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Heath Wrinklewort	*Rutidosis heterogama*	2-phase grid Transect Year round	All year	☒ Yes 19 Dec 2023 9-13 Sep 2024	☐ No	19 Dec 2023: 2 people x 7.5 hrs 9-13 Sep 2024: 2 people x 7.5 hrs	3315-Thinned – 8.86 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 8.02 ha or 91% of potential habitat during survey period. 3315-Derived – 17.44 ha of potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 10.67 ha or 54% of potential habitat during survey period. 3444-Mod-good – 36.64 ha of	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat within Disturbance area A: 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha 3444-Mod-good – 3.55 ha

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
							potential habitat within the subject land. 2-phase grid targeted survey and linear transect survey representatively sampled 32.65 ha or 89% of potential habitat during survey period. Within this area, 1.58 ha resides within the restricted access sites. 3446-Mod-good – entire extent subject to 2-phase grid survey. 4039-Mod-good – entire extent subject to 2-phase grid survey and linear transect survey.		

Common name	Scientific name	Threatened flora species surveys						Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Specified survey timing in TBDC	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Magenta Lilly Pilly	*Syzygium paniculatum*	Transect Apr – June	April May June	☐ Yes	☒ No 3-4 Sep 2024 6 Sep 2024	3-4 Sep 2024: 2 people x 7.5 hrs 6 Sep 2024: 2 people x 7.5 hrs	3087-Mod-good – not subject to survey 3241-Mod-good – 2.09 ha of potential habitat within the subject land. Linear transect survey weren't undertaken in potential habitat during recommended survey period and covered the entire extent of all potential habitat throughout all surveys.	Assumed present	Yes Presence assumed where survey not undertaken. Counts estimated by 50 individuals/ha. Assumed habitat: 3087-Mod-good – 0.31 ha or 15 (count)
Black-eyed Susan	*Tetratheca juncea*	Transect Sep – Oct	September October	☒ Yes 3-4 Sep 2024	☐ No	3-4 Sep 2024: 2 people x 7.5 hrs	3241-Mod-good – entire extent subject to linear transect survey	No	No Based on adequate representative targeted surveys the species is not considered further.

Table 5.16 Threatened species surveys for candidate fauna species credit species within the Wyong IBRA subregion

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Frogs							
Giant Burrowing Frog	*Heleioporus australiacus*	Frog survey (Sep-May) Tadpole searches (Feb-May)	☒ Yes January February October November	☐ No	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs Tadpole searches: 21 Feb 24: 2 people x 10 mins	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 20.29 ha, being: 3150-Mod-good 2.05 ha 3230-Mod-good 15.73 ha 3617-Mod-good 2.15 ha 3621-Mod-good 0.36 ha Presence assumed where survey not undertaken. Assumed habitat 3150-Mod-good 2.57 ha 3230-Mod-good 10.16 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3617-Mod-good 28.70 ha 3621-Mod-good 4.50 ha
Green and Golden Bell Frog	*Litoria aurea*	Frog survey (Nov-Mar) Tadpole searches (Nov-Mar)	☒ Yes January February	☒ No September October	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs Tadpole searches: 21 Feb 24: 2 people x 10 mins Opportunistic (frog survey): 26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Green-thighed Frog	*Litoria brevipalmata*	Frog survey (Sep-Apr)	☒ Yes January February October	☐ No	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys)
Littlejohn's Tree Frog	*Litoria littlejohni*	Frog survey (Jul-Nov) Tadpole searches (Jul-Nov)	☒ Yes September October	☒ No January February	Frog survey: 26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs Opportunistic (frog survey): 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs Tadpole searches: 21 Feb 24: 2 people x 10 mins	Yes Recorded	Yes Recorded during the survey. Area of confirmed habitat is 71.44 ha, being: 3150-Mod-good 14.16 ha 3230-Mod-good 18.53 ha 3230-Plantation 2.79 ha 3617-Mod-good 31.10 ha 3621-Mod-good 4.86 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Stuttering Frog	*Mixophyes balbus*	Frog survey (Sep-Mar)	☒ Yes January February September October	☐ No	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs	Yes Recorded	Yes Recorded during the survey. Area of confirmed habitat is 190.26 ha, being: 3029-Mod-good 4.71 ha 3150-Mod-good 29.92 ha 3150-Plantation 2.05 ha 3230-Mod-good 39.82 ha 3230-Mod-good 10.07 ha 3239-Mod-good 3.31 ha 3242-Mod-good 24.94 ha 3244-Mod-good 1.31 ha 3263-Mod-good 35.59 ha 3581-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							0.03 ha 3617-Mod-good 33.65 ha 3621-Mod-good 4.86 ha
Giant Barred Frog	*Mixophyes iteratus*	Frog survey (Oct-Mar)	☒ Yes January February October	☒ No September	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs Opportunistic (frog survey): 26 Sep 24: 2 people x 4 hrs	Yes Recorded	Yes Recorded during the survey. Area of confirmed habitat is 2.33 ha, being: 3029-Mod-good 0.35 ha 3150-Mod-good 0.19 ha 3230-Mod-good 1.04 ha 3263-Mod-good 0.02 ha 3617-Mod-good 0.37 ha 3621-Mod-good 0.36 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Red-crowned Toadlet	*Pseudophryne australis*	Frog survey (All year)	☒ Yes January February September October	☐ No	Frog survey: 22-25 Jan 24: 2 people x 4 hrs 19 Feb 24: 2 people x 4 hrs 21 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 26 Sep 24: 2 people x 4 hrs 7-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 46.06 ha, being: 3029-Mod-good 1.70 ha 3230-Mod-good 15.79 ha 3230-Plantation 2.72 ha 3239-Mod-good 0.01 ha 3242-Mod-good 1.25 ha 3263-Mod-good 0.41 ha 3617-Mod-good 21.69 ha 3621-Mod-good 2.49 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Birds							
Regent Honeyeater	*Anthochaera phrygia*	Diurnal bird surveys	N/A	N/A	Diurnal bird survey: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr 25 Sep 24: 2 people x 1 hr	Assumed present	Yes Subject land is mapped on important habitat map. Area of confirmed important habitat is 0.51 ha, being: 3263-Mod-good 0.51 ha
Bush Stone-curlew	*Burhinus grallarius*	(All year) Spotlight Call playback	☒ Yes January February August September October	☐ No	Call playback: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	(Oct-Jan) Diurnal bird surveys	☐ Yes	☒ No April August September	Diurnal bird surveys: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr 25 Sep 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 2.96 ha, being: 3242-Mod-good 2.42 ha 3244-Mod-good 0.03 3263-Mod-good 0.51 ha Presence assumed where survey not undertaken. Assumed habitat 3029-Mod-good 0.73 ha 3150-Mod-good 6.09 ha 3150-Plantation 0.36 ha 3230-Mod-good 9.89 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3230-Plantation 2.09 ha 3242-Mod-good 5.65 ha 3263-Mod-good 6.46 ha 3617-Mod-good 1.07 ha
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	(Apr-Aug) Diurnal bird surveys	☒ Yes April August September	☐ No	Diurnal bird surveys: 15-17 Aug 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr 4-8 Sep 23: 2 people x 1 hr 25 Sep 24: 2 people x 1 hr	Yes	Yes Recorded during the survey, however breeding hollows not identified. Presence assumed where survey not undertaken. Assumed habitat 3029-Mod-good 0.39 ha 3150-Mod-good 3.75 ha 3150-Plantation 0.36 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3230-Mod-good 9.30 ha 3230-Plantation 1.66 ha 3242-Mod-good 7.07 ha 3263-Mod-good 3.58 ha 3617-Mod-good 1.07 ha
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	(Jul-Dec) Diurnal bird survey	☒ Yes August September	☒ No April	Diurnal bird surveys: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 25 Sep 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 18 Apr 24: 2 people x 1hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Little Eagle	*Hieraaetus morphnoides*	(Aug-Oct) Diurnal bird survey	☒ Yes August September	☒ No April	Diurnal bird surveys: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 25 Sep 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 18 Apr 24: 2 people x 1hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4).
Square-tailed Kite	*Lophoictinia isura*	(Sep-Jan) Diurnal bird surveys	☒ Yes September	☒ No April August	Diurnal bird survey: 4-8 Sep 23: 2 people x 1 hr 25 Sep 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 15-17 Aug 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4).
Cotton Pygmy-Goose	*Nettapus coromandelianus*	(All year) Diurnal bird survey	☒ Yes April August September	☐ No	Diurnal bird survey: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr 25 Sep 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Barking Owl	*Ninox connivens*	(All year) Spotlight Call playback	☒ Yes January February August September October	☐ No	Call playback: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 15.55 ha, being: 3150-Mod-good 2.73 ha 3239-Mod-good 0.46 ha 3242-Mod-good 3.34 ha 3263-Mod-good 9.02 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Powerful Owl	*Ninox strenua*	(All year) Spotlight Call playback	☒ Yes January February August September October	☐ No	Call playback: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 29.86 ha, being: 3150-Mod-good 1.36 ha 3239-Mod-good 4.90 ha 3242-Mod-good 11.10 ha 3263-Mod-good 12.50 ha
Eastern Osprey	*Pandion cristatus*	(Apr-Nov) Diurnal bird survey	☒ Yes August September	☐ No	Diurnal bird surveys: 15-17 Aug 23: 2 people x 1 hr 4-8 Sep 23: 2 people x 1 hr 18 Apr 24: 2 people x 1hr 25 Sep 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
Masked Owl	*Tyto novaehollandiae*	(All year) Spotlight Call playback	☒ Yes January February August September October	☐ No	Call playback: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 4.75 ha, being: 3150-Mod-good 2.12 ha 3230-Mod-good 0.55 ha 3263-Mod-good 2.08 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Sooty Owl	*Tyto tenebricosa*	(All year) Spotlight Call playback	☒ Yes January February August September October	☐ No	Call playback: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 72.06 ha, being: 3029-Mod-good 1.80 ha 3150-Mod-good 13.20 ha 3230-Mod-good 11.18 ha 3239-Mod-good 4.88 ha 3242-Mod-good 14.25 ha 3244-Mod-good 1.31 ha 3263-Mod-good 25.44 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	(Oct-Mar) Camera traps Spotlighting	☒ Yes January February October November December	☒ No August September	Arboreal camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 27 Nov 24 – 8 Jan 25: 252 traps (6 cameras x 42 nights) 28 Nov 24 – 8 Jan 25: 492 traps (12 cameras x 41 nights) Spotlighting: 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Opportunistic (spotlighting): 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 152.24 ha, being: 3029-Mod-good 4.23 ha 3150-Mod-good 27.95 ha 3150-Plantation 2.05 ha 3230-Mod-good 42.43 ha 3230-Plantation 11.63 ha 3242-Mod-good 10.25 ha 3244-Mod-good 1.31 ha 3250-Mod-good 2.02 ha

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
						3263-Mod-good 11.19 ha 3581-Mod-good 0.67 ha 3617-Mod-good 33.65 ha 3621-Mod-good 4.86 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Large-eared Pied Bat	*Chalinolobus dwyeri*	(Nov-Jan) Anabats Harp traps Roost searches	☒ Yes January November December	☒ No February September	Harp traps: 25 Jan 24 – 26 Jan 24: 4 traps (4 harps x 1 night) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) Opportunistic (harp traps): 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 22 Jan 24 – 25 Jan 24: 6 recorder nights (2 Anabats x 3 nights) 28 Nov 24 – 11 Dec 24: 52 recorder nights (4 Anabats x 13 nights) 29 Nov 24 – 12 Dec 24: 13 recorder nights (1 Anabat x 13 nights) 12 Dec 24 – 18 Dec 24: 24 recorder nights (4 Anabats x 6 nights) Roost searches: 12 Dec 24: 2 people Opportunistic (roost searches): 11-12 Sep 24: 2 people	Yes	Yes Recorded during the survey. Area of confirmed habitat is 3.15 ha, being: 3242-Mod-good 0.54 ha 3244-Mod-good 0.70 ha 3263-Mod-good 1.91 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Little Bent-winged Bat	*Miniopterus australis*	(Dec-Feb) Harp traps	☒ Yes January February	☐No	Harp traps: 25 Jan 24 – 26 Jan 24: 4 traps (4 harps x 1 night) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights)	Yes	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	(Dec-Feb) Harp traps	☒ Yes January February	☐ No	Harp traps: 25 Jan 24 – 26 Jan 24: 4 traps (4 harps x 1 night) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights)	Yes	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Southern Myotis	*Myotis macropus*	(Oct-Mar) Harp traps Anabats (passive) Roost searches	☒ Yes January February November December	☒ No September	Harp traps: 25 Jan 24 – 26 Jan 24: 4 traps (4 harps x 1 night) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 22 Jan 24 – 25 Jan 24: 6 recorder nights (2 Anabats x 3 nights) 28 Nov 24 – 11 Dec 24: 52 recorder nights (4 Anabats x 13 nights) 29 Nov 24 – 12 Dec 24: 13 recorder nights (1 Anabat x 13 nights) 12 Dec 24 – 18 Dec 24: 24 recorder nights (4 Anabats x 6 nights) Roost searches: 12 Dec 24: 2 people Opportunistic (roost searches): 11-12 Sep 24: 2 people	Yes	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	
Parma Wallaby	*Notamacropus parma*	(All year) Camera traps	☒ Yes January February September October November December	☐ No	Terrestrial camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 2 Feb 24 – 28 Feb 24: 26 traps (1 camera x 26 nights) 28 Nov 24 – 8 Jan 25: 246 traps (6 cameras x 41 nights) 29 Nov 24 – 8 Jan 25: 240 traps (6 cameras x 40 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 52.83 ha, being: 3029-Mod-good 0.49 ha 3150-Mod-good 3.99 ha 3239-Mod-good 4.90 ha 3242-Mod-good 15.61 ha 3263-Mod-good 27.84 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Southern Greater Glider	*Petauroides volans*	(All year) Camera traps Call playback Drones	☒ Yes January February August September October November December	☐ No	Arboreal camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 27 Nov 24 – 8 Jan 25: 252 traps (6 cameras x 42 nights) 28 Nov 24 – 8 Jan 25: 492 traps (12 cameras x 41 nights) Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Drones 2-7 Sep 24: 2 x 7.5 hrs 9-11 Oct 24: 2 x 7.5 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 148.52 ha, being: 3230-Mod-good 42.43 ha 3242-Mod-good 25.85 ha 3250-Mod-good 2.02 ha 3263-Mod-good 39.04 ha 3581-Mod-good 0.67 ha 3617-Mod-good 33.65 ha 3621-Mod-good 4.86 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Squirrel Glider	*Petaurus norfolkensis*	(All year) Camera traps Call playback Spotlighting	☒ Yes January February August September October November December	☐ No	Arboreal camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 27 Nov 24 – 8 Jan 25: 252 traps (6 cameras x 42 nights) 28 Nov 24 – 8 Jan 25: 492 traps (12 cameras x 41 nights) Call playback: 14-18 Aug 23: 2 people x 3 hrs 4-8 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 3 hrs 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr	Yes	Yes Recorded during the survey. Area of confirmed habitat is 200.34 ha, being: 3150-Mod-good 31.93 ha 3150-Plantation 2.05 ha 3230-Mod-good 42.43 ha 3230-Plantation 11.63 ha 3239-Mod-good 4.90 ha 3242-Mod-good 25.85 ha 3244-Mod-good 1.31 ha 3250-Mod-good 2.02 ha 3263-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					9 Oct 24: 2 people x 1 hr		39.04 ha 3581-Mod-good 0.67 ha 3617-Mod-good 33.65 ha 3621-Mod-good 4.86 ha
Brush-tailed Rock-wallaby	*Petrogale penicillata*	(All year) Camera traps Habitat assessment	☒ Yes January February September October November December	☐ No	Terrestrial camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 2 Feb 24 – 28 Feb 24: 26 traps (1 camera x 26 nights) 28 Nov 24 – 8 Jan 25: 246 traps (6 cameras x 41 nights) 29 Nov 24 – 8 Jan 25: 240 traps (6 cameras x 40 nights) Habitat assessment: 2 Feb 24: 2 people x 4hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 70.83 ha, being: 3029-Mod-good 0.49 ha 3150-Mod-good 3.99 ha 3230-Mod-good 0.34 ha 3239-Mod-good 4.90 ha 3242-Mod-good 24.20 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3244-Mod-good 1.31 ha 3250-Mod-good 1.44 ha 3263-Mod-good 33.49 ha 3581-Mod-good 0.67 ha
Brush-tailed Phascogale	*Phascogale tapoatafa*	(Dec-Jun) Camera traps	☒ Yes January February December	☒ No September October November	Arboreal Camera traps: 27 Nov 24 – 8 Jan 25: 252 traps (6 cameras x 42 nights) 28 Nov 24 – 8 Jan 25: 492 traps (12 cameras x 41 nights) Opportunistic (arboreal camera traps): 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights)	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	
Koala	*Phascolarctos cinereus*	(All year) SATs Call playback Spotlighting	☒ Yes January February August September October	☐ No	SATs: 17 Aug 23: 2 people x 3 hrs 4-8 Sep 23: 2 people x 2 hrs Call playback: 14-18 Aug 23: 2 people x 3 hrs 4-8 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 3 hrs 19 Feb 24: 2 people x 4 hrs 21-23 Feb 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 3 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 3 hrs 25 Jan 24: 2 people x 1 hr 20-23 Feb 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Drones 2-7 Sep 24: 2 x 7.5 hrs 9-11 Oct 24: 2 x 7.5 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 52.83 ha, being: 3029-Mod-good 0.49 ha 3150-Mod-good 3.99 ha 3239-Mod-good 4.90 ha 3242-Mod-good 15.61 ha 3263-Mod-good 27.84 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Common Planigale	*Planigale maculata*	(All year) Camera traps	☒ Yes September October	☐ No	Terrestrial camera traps: 25 Sep 24 – 9 Oct 24: 84 traps (6 cameras x 14 nights)	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).
Long-nosed Potoroo	*Potorous tridactylus*	(All year) Camera traps	☒ Yes January February September October November December	☐ No	Terrestrial camera traps: 20 Sep 23 – 23 Oct 23: 396 traps (12 cameras x 33 nights) 25 Sep 23 – 23 Oct 23: 336 traps (12 cameras x 28 nights) 2 Feb 24 – 28 Feb 24: 26 traps (1 camera x 26 nights) 28 Nov 24 – 8 Jan 25: 246 traps (6 cameras x 41 nights) 29 Nov 24 – 8 Jan 25: 240 traps (6 cameras x 40 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 131.96 ha, being: 3150-Mod-good 27.95 ha 3150-Plantation 2.05 ha 3230-Mod-good 42.43 ha 3230-Plantation 11.63 ha 3242-Mod-good 10.25 ha 3244-Mod-good 1.31 ha 3250-Mod-good 2.02 ha 3581-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							0.67 ha 3617-Mod-good 33.65 ha
Eastern Cave Bat	*Vespadelus troughtoni*	(Nov-Jan) Anabats Harp traps	☒ Yes January November December	☒ No February September	Harp traps: 25 Jan 24 – 26 Jan 24: 4 traps (4 harps x 1 night) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) Opportunistic (harp traps): 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 22 Jan 24 – 25 Jan 24: 6 recorder nights (2 Anabats x 3 nights) 28 Nov 24 – 11 Dec 24: 52 recorder nights (4 Anabats x 13 nights) 29 Nov 24 – 12 Dec 24: 13 recorder nights (1 Anabat x 13 nights) 12 Dec 24 – 18 Dec 24: 24 recorder nights (4 Anabats x 6 nights)	Assumed present	Yes Recorded during the survey. Area of confirmed habitat is 105.22 ha, being: 3150-Mod-good 31.93 ha 3150-Plantation 2.05 ha 3239-Mod-good 4.90 ha 3242-Mod-good 25.85 ha 3244-Mod-good 1.31 ha 3581-Mod-good 0.67 ha 3617-Mod-good 33.65 ha 3621-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					Roost searches: 12 Dec 24: 2 people Opportunistic (roost searches): 11-12 Sep 24: 2 people		4.86 ha
Reptiles							
Pale-headed Snake	*Hoplocephalus bitorquatus*	(Nov-Mar) Spotlighting	☒ Yes January	☐ No	Spotlighting: 14-17 Aug 23: 2 people x 2 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 2 hrs 25 Jan 24: 2 people x 2 hrs 20-23 Feb 24: 2 people x 2 hrs 9 Oct 24: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).
Broad-headed Snake	*Hoplocephalus bungaroides*	Spotlighting (Dec-Feb) Habitat assessment (Aug-Sep)	☒ Yes January February August September	☒ No October	Habitat assessment: 26-27 Sep 24: 2 people x 2 hrs Spotlighting: 14-17 Aug 23: 2 people x 2 hrs 4-7 Sep 23: 2 people x 2 hrs 22-23 Jan 24: 2 people x 2 hrs 25 Jan 24: 2 people x 2 hrs 20-23 Feb 24: 2 people x 2 hrs Opportunistic (spotlighting): 9 Oct 24: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Stephens' Banded Snake	*Hoplocephalus stephensii*	(Oct-Mar) Road transects Spotlighting	☒ Yes January February October	☐ No August September	Road transects: 22 Jan 24: 4 people x 2 hrs 23 Jan 24: 2 people x 2 hrs 25 Jan 24: 4 people x 2 hrs 13-16 Jan 25: 2 people x 2hrs 20-24 Jan 25: 2 people x 2hrs 3-6 Feb 25: 2 people x 2hrs Spotlighting: 22-23 Jan 24: 2 people x 2 hrs 25 Jan 24: 2 people x 2 hrs 20-23 Feb 24: 2 people x 2 hrs 9 Oct 24: 2 people x 2 hrs Opportunistic (spotlighting): 14-17 Aug 23: 2 people x 2 hrs 4-7 Sep 23: 2 people x 2 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 138.56 ha, being: 3029-Mod-good 4.23 ha 3150-Mod-good 27.95 ha 3230-Mod-good 42.43 ha 3242-Mod-good 10.25 ha 3244-Mod-good 1.31 ha 3250-Mod-good 2.02 ha 3263-Mod-good 11.19 ha 3581-Mod-good 0.67 ha 3617-Mod-good 33.65 ha 3621-Mod-good 4.86 ha

Table 5.17 Threatened species surveys for candidate fauna species credit species within the Yengo IBRA subregion

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Frogs							
Giant Burrowing Frog	*Heleioporus australiacus*	Frog survey (Sep-May)	☒ Yes January February October November	☐ No	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Green and Golden Bell Frog	*Litoria aurea*	Frog survey (Nov-Mar)	☒ Yes January February November	☒ No October	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs Opportunistic (frog survey): 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Booroolong Frog	*Litoria booroolongensis*	Frog survey (Oct-Dec)	☒ Yes October November	☐ No January February	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs Opportunistic (frog survey): 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Littlejohn's Tree Frog	*Litoria littlejohni*	Frog survey (Jul-Nov)	☒ Yes October November	☒ No January February	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs Opportunistic (frog survey): 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Stuttering Frog	*Mixophyes balbus*	Frog survey (Sep-Mar)	☒ Yes January February October November	☐ No	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).
Giant Barred Frog	*Mixophyes iteratus*	Frog survey (Oct-Mar)	☒ Yes January February October November	☐ No	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Red-crowned Toadlet	*Pseudophryne australis*	Frog survey (All year)	☒ Yes January February October November	☐ No	Frog survey: 27-29 Nov 23: 2 people x 4 hrs 22-25 Jan 24: 4 people x 4 hrs 12 Feb 24: 2 people x 4 hrs 16-17 Feb 24: 2 people x 4 hrs 22 Feb 24: 2 people x 4 hrs 8-11 Oct 24: 2 people x 4 hrs 14-18 Oct 24: 2 people x 4 hrs 25-29 Nov 24: 2 people x 4 hrs 3-6 Feb 24: 2 people x 4 hrs	Yes Recorded	Yes Recorded during the survey. Area of confirmed habitat is 9.71 ha, being: 3230-Mod-good 0.85 ha 3237-Mod-good 0.22 ha 3239-Mod-good 6.33 ha 3242-Mod-good 2.27 ha 3605-Mod-good 0.04 ha Presence assumed where survey not undertaken. Assumed habitat 3152-Mod-good 0.08 ha 3237-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							1.97 ha 3239-Mod-good 6.79 ha 3242-Mod-good 0.63 ha 3605-Mod-good 0.24 ha
Birds							
Regent Honeyeater	*Anthochaera phrygia*	Diurnal bird surveys	N/A	N/A	Diurnal bird survey: 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Assumed present	Yes Subject land is mapped on important habitat map. Area of confirmed important habitat is 42.68 ha, being: 3086-Mod-good 0.21 ha 3087-Mod-good 0.04 ha 3151-Mod-good 0.32 ha 3152-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							0.16 ha 3230-Mod-good 0.04 ha 3238-Mod-good 0.36 ha 3239-Mod-good 16.29 ha 3241-Mod-good 2.47 ha 3328-Mod-good 0.31 ha 3444-Mod-good 0.27 ha 3489-Mod-good 4.87 ha 3605-Mod-good 17.34 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Bush Stone-curlew	*Burhinus grallarius*	(All year) Diurnal bird surveys Spotlighting Call playback	☒ Yes January February April May June July August September	☐ No	Call playback: 14-18 Aug 23: 2 people x 3 hrs 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 2 people x 8 hrs 1 Aug 24: 2 people x 8 hrs 20-22 Aug 24: 4 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat).

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	(Oct-Jan) Diurnal bird surveys	☒ Yes October	☒ No February April May August	Diurnal bird survey: 9 Oct 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr	Yes Recorded and Assumed presence	Yes Recorded during the survey, however no breeding habitat recorded. Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good 0.18 ha 3152-Mod-good 0.38 ha 3230-Mod-good 2.22 ha 3237-Mod-good 1.79 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3239-Mod-good 14.71 ha 3242-Mod-good 0.85 ha 3439-Mod-good 0.76 ha 3605-Mod-good 9.56 ha
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	(Apr-Aug) Diurnal bird surveys	☒ Yes April May August	☒ No January February October	Diurnal bird survey: 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 9 Oct 24: 2 people x 1 hr	Yes Recorded and Assumed presence	Yes Recorded during the survey, however no breeding habitat recorded. Presence assumed where survey not undertaken. Assumed habitat 3237-Mod-good 0.81 ha 3239-Mod-good 7.99 ha 3605-Mod-good 4.77 ha

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	(Jul-Dec) Diurnal bird surveys	☒ Yes August October	☒ No January February April May	Diurnal bird survey: 22 Aug 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Little Eagle	*Hieraaetus morphnoides*	(Aug-Oct) Diurnal bird surveys	☐ Yes August October	☒ No February April May	Diurnal bird survey: 22 Aug 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Swift Parrot	*Lathamus discolor*	Diurnal bird surveys	N/A	N/A	Diurnal bird survey: 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr	Yes	Yes Subject land is mapped on important habitat map. Area of confirmed important habitat is 1.67 ha, being: 3239-Mod-good 0.63 ha 3444-Mod-good 0.27 ha 3489-Mod-good 0.61 ha 3605-Mod-good 0.16 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Square-tailed Kite	*Lophoictinia isura*	(Sep-Jan) Diurnal bird surveys	☒ Yes October	☒ No February April May August	Diurnal bird survey: 9 Oct 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Barking Owl	*Ninox connivens*	(All year) Call playback Spotlight	☒ Yes February April May June July August September	☐ No	Call playback: 14-18 Aug 23: 2 people x 3 hrs 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 2 people x 8 hrs 1 Aug 24: 2 people x 8 hrs 20-22 Aug 24: 4 people x 4 hrs 25 Sep 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Powerful Owl	*Ninox strenua*	(All year) Call playback Spotlight	☒ Yes February April May June July August September	☐ No	Call playback: 14-18 Aug 23: 2 people x 3 hrs 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 2 people x 8 hrs 1 Aug 24: 2 people x 8 hrs 20-22 Aug 24: 4 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 60.13 ha, being: 3087-Mod-good 0.80 ha 3152-Mod-good 0.08 ha 3230-Mod-good 5.76 ha 3237-Mod-good 4.67 ha 3239-Mod-good 38.12 ha 3242-Mod-good 0.87 ha 3244-Mod-good 0.31 ha 3438-Mod-good 1.97 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		3439-Mod-good 1.62 ha 3444-Mod-good 0.11 ha 3605-Mod-good 5.82 ha Presence assumed where survey not undertaken. Assumed habitat 3239-Mod-good 0.44 ha 3605-Mod-good 6.90 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Eastern Osprey	*Pandion cristatus*	(Apr-Nov) Diurnal bird surveys	☒ Yes April May August October	☒ No February	Diurnal bird survey: 15-18 Apr 24: 2 people x 1 hr 20-23 May 24: 2 people x 1 hr 22 Aug 24: 2 people x 1 hr 9 Oct 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Feb 24: 2 people x 1 hr 20-22 Feb 24: 2 people x 1hr	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Masked Owl	*Tyto novaehollandiae*	(All year) Call playback Spotlight	☒ Yes February April May June July August September	☐ No	Call playback: 14-18 Aug 23: 2 people x 3 hrs 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 2 people x 8 hrs 1 Aug 24: 2 people x 8 hrs 20-22 Aug 24: 4 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 17.63 ha, being: 3152-Mod-good 0.08 ha 3237-Mod-good 3.27 ha 3239-Mod-good 8.26 ha 3244-Mod-good 0.31 ha 3438-Mod-good 0.02 ha 3439-Mod-good 1.49 ha 3605-Mod-good 4.20 ha Presence assumed where survey not undertaken.

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		Assumed habitat 3239-Mod-good 0.44 ha 3605-Mod-good 6.90 ha
Sooty Owl	*Tyto tenebricosa*	(All year) Call playback Spotlight	☒ Yes February April May June July August September	☐ No	Call playback: 14-18 Aug 23: 2 people x 3 hrs 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 2 people x 8 hrs 1 Aug 24: 2 people x 8 hrs 20-22 Aug 24: 4 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 108.09 ha, being: 3087-Mod-good 2.11 ha 3230-Mod-good 14.95 ha 3237-Mod-good 4.50 ha 3239-Mod-good 52.66 ha 3242-Mod-good

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		9.39 ha 3605-Mod-good 23.31 ha 3617-Mod-good 1.17 ha Presence assumed where survey not undertaken. Assumed habitat 3239-Mod-good 0.44 ha 3605-Mod-good 6.90 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	(Oct-Mar) Camera traps Spotlighting	☒ Yes January February October	☐ No August April May June July August September	Arboreal camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) Spotlighting: 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs Opportunistic (spotlighting): 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Large-eared Pied Bat	*Chalinolobus dwyeri*	(Nov-Jan) Harp traps Anabats (passive) Roost searches	☒ Yes January November December	☒ No February March April May	Harp traps: 24-25 Jan 24: 1 trap (1 harp x 1 night) 9-11 Dec 24: 12 traps (4 harps x 3 nights) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) Opportunistic (harp traps): 13-15 Feb 24: 12 traps (4 harps x 3 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 29 Jan 24 – 26 Feb 24: 28 recorder nights (1 Anabat x 28 nights) 30 Jan 24 – 26 Feb 24: 27 recorder nights (1 Anabat x 27 nights) 31 Jan 24 – 26 Feb 24: 26 recorder nights (1 Anabat x 26 nights)	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 1.90 ha, being: 3239-Mod-good 1.04 ha 3242-Mod-good 0.15 ha 3605-Mod-good 0.71 ha Presence assumed where survey not undertaken. Assumed habitat 3152-Mod-good 0.39 ha 3605-Mod-good 0.98 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					19 Dec 24 – 9 Jan 25: 63 recorder nights (3 Anabats x 21 nights) Opportunistic (Anabats): 1 Feb 24 – 26 Feb 24: 25 recorder nights (1 Anabat x 25 nights) 20 Feb 24 – 20 May 24: 180 recorder nights (2 Anabats x 90 nights) Roost searches: 13 Dec 24: 2 people Opportunistic (roost searches): 9-10 Sep 24: 2 people 13 Sep 24: 2 people 24 Sep 24: 2 people		

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	
Little Bent-winged Bat	*Miniopterus australis*	(Dec-Feb) Harp traps	☒ Yes January February December	☒ No	Harp traps: 24-25 Jan 24: 1 trap (1 harp x 1 night) 13-15 Feb 24: 12 traps (4 harps x 3 nights) 9-11 Dec 24: 12 traps (4 harps x 3 nights) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights)	Yes Recorded and Assumed presence	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	(Dec-Feb) Harp traps	☒ Yes January February December	☒ No	Harp traps: 24-25 Jan 24: 1 trap (1 harp x 1 night) 13-15 Feb 24: 12 traps (4 harps x 3 nights) 9-11 Dec 24: 12 traps (4 harps x 3 nights) 13-17 Jan 25: 16 traps (4 harps x 4 nights) 20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights)	Yes Recorded and Assumed presence	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Southern Myotis	*Myotis macropus*	(Oct-Mar) Harp traps Anabats (passive) Roost searches	☒ Yes January February March December	☒ No April May September	Harp traps: 24-25 Jan 24: 1 trap (1 harp x 1 night) 13-15 Feb 24: 12 traps (4 harps x 3 nights) 9-11 Dec 24: 12 traps (4 harps x 3 nights) 13-17 Jan 25: 16 traps (4 harps x 4 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 1.84 ha, being: 3239-Mod-good 0.47 ha 3444-Mod-good 0.33 ha 3605-Mod-good

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				20-24 Jan 25: 16 traps (4 harps x 4 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 29 Jan 24 – 26 Feb 24: 28 recorder nights (1 Anabat x 28 nights) 30 Jan 24 – 26 Feb 24: 27 recorder nights (1 Anabat x 27 nights) 31 Jan 24 – 26 Feb 24: 26 recorder nights (1 Anabat x 26 nights) 1 Feb 24 – 26 Feb 24: 25 recorder nights (1 Anabat x 25 nights) 20 Feb 24 – 20 May 24: 180 recorder nights (2 Anabats x 90 nights) 19 Dec 24 – 9 Jan 25: 63 recorder nights (3 Anabats x 21 nights) Roost searches: 13 Dec 24: 2 people Opportunistic (roost searches): 9-10 Sep 24: 2 people 13 Sep 24: 2 people 24 Sep 24: 2 people		1.04 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Parma Wallaby	*Notamacropus parma*	(All year) Camera traps	☒ Yes January February September October November	☐ No	Terrestrial camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) 29 Jan 24 – 26 Feb 24: 84 traps (3 cameras x 28 nights) 30 Jan 24 – 26 Feb 24: 189 traps (7 cameras x 27 nights) 31 Jan 24 – 26 Feb 24: 78 traps (3 cameras x 26 nights) 1 Feb 24 – 26 Feb 24: 150 traps (6 cameras x 25 nights) 7 Feb 24 – 26 Feb 24: 114 traps (6 cameras x 19 nights) 8 Feb 24 – 28 Feb 24: 60 traps (3 cameras x 20 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 94.02 ha, being: 3087-Mod-good 2.43 ha 3152-Mod-good 0.37 ha 3230-Mod-good 15.30 ha 3239-Mod-good 24.79 ha 3242-Mod-good 10.50 ha 3605-Mod-good 38.72 ha 3617-Mod-good 1.91 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Southern Greater Glider	*Petauroides volans*	(All year) Camera traps Spotlighting Drones	☒ Yes February April May June July August September October	☐ No	Arboreal camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 112.09 ha, being: 3230-Mod-good 15.30 ha 3237-Mod-good 5.46 ha 3241-Mod-good 10.21 ha 3242-Mod-good 10.50 ha 3438-Mod-good 1.97 ha 3439-Mod-good 1.62 ha 3444-Mod-good 0.92 ha 3599-Mod-good 7.24 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					Drones 26-30 Aug 24: 2 people x 7.5 hrs 14-18 Oct 24: 2 people x 7.5 hrs		3605-Mod-good 56.82 ha 3617-Mod-good 1.91 ha 4039-Mod-good 0.07 ha 4072-Mod-good 0.07 ha
Squirrel Glider	*Petaurus norfolkensis*	(All year) Camera traps Spotlighting	☒ Yes February April May June July August September October	☐ No	Arboreal camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) Call playback: 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 4 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs	Yes	Yes Recorded during the survey. Area of confirmed habitat is 212.33 ha, being: 3152-Mod-good 0.92 ha 3230-Mod-good 15.30 ha 3237-Mod-good 5.46 ha 3239-Mod-good 96.25 ha 3239-Plantation

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 4 people x 4hrs 4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs		2.83 ha 3241-Mod-good 10.21 ha 3242-Mod-good 10.50 ha 3244-Mod-good 0.31 ha 3438-Mod-good 1.97 ha 3439-Mod-good 1.62 ha 3444-Mod-good 0.92 ha 3599-Mod-good 7.24 ha 3605-Mod-good 56.82 ha 3617-Mod-good 1.91 ha 4039-Mod-good 0.07 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Brush-tailed Rock-wallaby	*Petrogale penicillata*	(All year) Habitat assessment Camera traps	☒ Yes January February September October November	☐ No	Habitat assessment: 29-31 Jan 24: 2 people x 4 hrs 1 Feb 24: 2 people x 4 hrs 6-8 Feb 24: 2 people x 4 hrs 26-27 Feb 24: 2 people x 4 hrs Terrestrial camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) 29 Jan 24 – 26 Feb 24: 84 traps (3 cameras x 28 nights) 30 Jan 24 – 26 Feb 24: 189 traps (7 cameras x 27 nights) 31 Jan 24 – 26 Feb 24: 78 traps (3 cameras x 26 nights) 1 Feb 24 – 26 Feb 24: 150 traps (6 cameras x 25 nights) 7 Feb 24 – 26 Feb 24: 114 traps (6 cameras x 19 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 60.77 ha, being: 3087-Mod-good 0.80 ha 3230-Mod-good 14.62 ha 3237-Mod-good 0.09 ha 3239-Mod-good 22.65 ha 3241-Mod-good 4.98 ha 3242-Mod-good 7.67 ha 3244-Mod-good 0.31 ha 3438-Mod-good 1.97 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					8 Feb 24 – 28 Feb 24: 60 traps (3 cameras x 20 nights)		3439-Mod-good 1.62 ha 3444-Mod-good 0.24 ha 3605-Mod-good 5.82 ha
Brush-tailed Phascogale	*Phascogale tapoatafa*	(Dec-Jun) Camera traps Spotlighting	☒ Yes February April May June	☒ No July August October September November	Arboreal camera traps: 24 Oct 23 – 20 Nov 23: 405 traps (15 cameras x 27 nights) 25 Oct 23 – 20 Nov 23: 260 traps (10 cameras x 26 nights) 26 Oct 23 – 20 Nov 23: 125 traps (5 cameras x 25 nights) Spotlighting: 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 4-6 Feb 25: 2 people x 2 hrs Opportunistic (spotlighting):	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr		
Koala	*Phascolarctos cinereus*	(All year) Spotlighting SATs Call playback Drones	☒ Yes January February April May June July August September	☐ No	SATs: 15-18 Aug 23: 2 people x 5 hrs 20 Feb 24: 2 people x 2 hrs 22 Feb 24: 2 people x 6 hrs Call playback: 16-18 Feb 24: 2 people x 3 hrs 20 Feb 24: 2 people x 4 hrs 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs	Yes Recorded and Assumed present	Yes Recorded during the survey. Area of confirmed habitat is 180.72 ha, being: 3087-Mod-good 2.82 ha 3152-Mod-good 0.54 ha 3230-Mod-good 15.30 ha 3237-Mod-good 5.46 ha 3239-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					20-22 Aug 24: 4 people x 4hrs 4-6 Feb 25: 2 people x 2hrs Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs Drones 26-30 Aug 24: 2 people x 7.5 hrs 14-18 Oct 24: 2 people x 7.5 hrs		76.75 ha 3239-Plantation 2.83 ha 3241-Mod-good 10.21 ha 3242-Mod-good 10.50 ha 3244-Mod-good 0.31 ha 3438-Mod-good 1.97 ha 3439-Mod-good 1.62 ha 3599-Mod-good 7.24 ha 3605-Mod-good 43.26 ha 3617-Mod-good 1.91 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							Presence assumed where survey not undertaken. Assumed habitat 3152-Mod-good 0.39 ha 3239-Mod-good 19.50 ha 3605-Mod-good 13.56 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Grey-headed Flying-fox	*Pteropus poliocephalus*	(Oct-Dec) Roost searches Spotlighting	☐ Yes	☒ No February April May June July August September	Spotlighting: 14-15 Aug 23: 2 people x 3 hrs 17-18 Aug 23: 2 people x 3 hrs 12-14 Feb 24: 2 people x 1 hr 16-19 Feb 24: 2 people x 1 hr 15-18 Apr 24: 2 people x 3 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 5 hrs 8-11 Jul 24: 2 people x 4 hrs 30-31 Jul 24: 4 people x 4 hrs 1 Aug 24: 4 people x 4 hrs 20-22 Aug 24: 2 people x 4 hrs 25 Sep 24: 2 people x 1 hr 4-6 Feb 25: 2 people x 2 hrs	Yes Individual recorded foraging although no maternity breeding camp occurs within or near the subject land. The species is included as an ecosystem credit species but excluded as a species credit species.	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Eastern Cave Bat	*Vespadelus troughtoni*	(Nov-Jan) Anabats (passive and active) Harp traps Cave searches	☒ Yes January November December	☒ No February March April May September	Harp traps: 24-25 Jan 24: 1 trap (1 harp x 1 night) 9-11 Dec 24: 12 traps (4 harps x 3 nights) 13-17 Jan 25: 16 traps (4 harps x 4 nights)	Assumed present	Yes Recorded during the survey. Area of confirmed habitat is 196.11 ha, being: 3237-Mod-good 5.46 ha

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				20-24 Jan 25: 16 traps (4 harps x 4 nights) Opportunistic (harp traps): 13-15 Feb 24: 12 traps (4 harps x 3 nights) 3-7 Feb 25: 16 traps (4 harps x 4 nights) Anabats (passive): 29 Jan 24 – 26 Feb 24: 28 recorder nights (1 Anabat x 28 nights) 30 Jan 24 – 26 Feb 24: 27 recorder nights (1 Anabat x 27 nights) 31 Jan 24 – 26 Feb 24: 26 recorder nights (1 Anabat x 26 nights) 19 Dec 24 – 9 Jan 25: 63 recorder nights (3 Anabats x 21 nights) Opportunistic (Anabats): 1 Feb 24 – 26 Feb 24: 25 recorder nights (1 Anabat x 25 nights) 20 Feb 24 – 20 May 24: 180 recorder nights (2 Anabats x 90 nights)		3239-Mod-good 96.25 ha 3239-Plantation 2.83 ha 3241-Mod-good 10.21 ha 3242-Mod-good 10.50 ha 3244-Mod-good 0.31 ha 3438-Mod-good 1.97 ha 3439-Mod-good 1.62 ha 3444-Mod-good 0.92 ha 3599-Mod-good 7.24 ha 3605-Mod-good 56.82 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					Roost searches: 13 Dec 24: 2 people Opportunistic (roost searches): 9-10 Sep 24: 2 people 13 Sep 24: 2 people 24 Sep 24: 2 people		3617-Mod-good 1.91 ha 4039-Mod-good 0.07 ha
Reptiles							
Broad-headed Snake	*Hoplocephalus bungaroides*	Habitat assessment (Aug-Sep) Spotlighting (Dec-Feb)	☒ Yes February September	☒ No April May June July August September	Habitat assessment: 20 Feb 24: 2 people x 2 hrs 22 Feb 24: 2 people x 2 hrs 23-25 Sep 24: 2 people x 2 hrs Spotlighting: 12-14 Feb 24: 2 people x 2 hrs 16-19 Feb 24: 2 people x 2 hrs 4-6 Feb 25: 2 people x 2 hrs Opportunistic (spotlighting): 14-15 Aug 23: 2 people x 2 hrs 17-18 Aug 23: 2 people x 2 hrs 15-18 Apr 24: 2 people x 2 hrs 20-23 May 24: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					17-20 Jun 24: 2 people x 2 hrs 8-11 Jul 24: 2 people x 2 hrs 30-31 Jul 24: 4 people x 2 hrs 1 Aug 24: 4 people x 2 hrs 20-22 Aug 24: 2 people x 2 hrs 25 Sep 24: 2 people x 2 hrs		
Stephens' Banded Snake	*Hoplocephalus stephensii*	(Oct-Mar) Road transects Spotlight	☒ Yes January February	☒ No April May June July August September	Road transects: 24 Jan 24: 2 people x 2 hrs 30-31 Jan 24: 2 people x 2 hrs 1 Feb 24: 2 people x 2hrs 15-18 Ap: 2 people x 2 hrs 21-23 May 24: 2 people x 2hrs 13-14 Jan 25: 2 people x 2hrs 21-24 Jan 25: 2 people x 2hrs 3-6 Feb 25: 2 people x 2hrs Spotlighting: 12-14 Feb 24: 2 people x 2 hrs 16-19 Feb 24: 2 people x 2 hrs 4-6 Feb 25: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				Opportunistic (spotlighting): 14-15 Aug 23: 2 people x 2 hrs 17-18 Aug 23: 2 people x 2 hrs 15-18 Apr 24: 2 people x 2 hrs 20-23 May 24: 2 people x 2 hrs 17-20 Jun 24: 2 people x 2 hrs 8-11 Jul 24: 2 people x 2 hrs 30-31 Jul 24: 4 people x 2 hrs 1 Aug 24: 4 people x 2 hrs 20-22 Aug 24: 2 people x 2 hrs 25 Sep 24: 2 people x 2 hrs		

Table 5.18 Threatened species surveys for candidate fauna species credit species within the Hunter IBRA subregion

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Frogs							
Green and Golden Bell Frog	*Litoria aurea*	(Nov-Mar) Frog survey	☒ Yes January February	☒ No April May	Frog survey: 12 Feb 24: 2 people x 4 hrs 15 Feb 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 4 hrs Opportunistic (frog survey): 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys)
Green-thighed Frog	*Litoria brevipalmata*	(Sep-Apr) Frog survey	☒ Yes January February April	☒ No May	Frog survey: 12 Feb 24: 2 people x 4 hr 15 Feb 24: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 6-7 Jan 25: 2 people 4 hrs Opportunistic (frog survey): 1-3 May 24: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Red-crowned Toadlet	*Pseudophryne australis*	(All year) Frog survey	☒ Yes January February April May	☐ No	Frog survey: 12 Feb 24: 2 people x 4 hrs 15 Feb 24: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 6-7 Jan 25: 2 people 4 hrs	No	No (species excluded through extensive and exhaustive surveys)
Birds							
Regent Honeyeater	*Anthochaera phrygia*	Diurnal bird survey	N/A	N/A	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 6 Oct 23: 2 people x 1 hr 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr	Assumed present	Yes Subject land is mapped on important habitat map. Area of confirmed important habitat is 50.71 ha, being: 3086-Mod-good 0.67 ha 3087-Mod-good 0.09 ha 3239-Mod-good 5.63 ha 3241-Mod-good 0.08 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3314-Thinned 0.10 ha 3315-Thinned 0.18 ha 3431-Disturbed Grassland 0.34 ha 3431-Thinned 14.35 ha 3444-Derived 0.01 ha 3444-Mod-good 29.13 ha 4039-Mod-good 0.13 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Bush Stone-curlew	*Burhinus grallarius*	(All year) Call playback Spotlighting	☒ Yes January April May June July August	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	(Oct-Jan) Diurnal bird survey	☒ Yes October	☒ No February May June August	Diurnal bird survey: 6 Oct 23: 2 people x 1 hr Opportunistic (diurnal bird survey): 29-31 Aug 23: 2 people x 1 hr 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr	Yes Recorded and Assumed presence	Yes Recorded during the survey, however no breeding habitat recorded. Presence assumed where survey not undertaken. Assumed habitat 3315-Thinned 0.01 ha 3438-Mod-good 0.09 ha 3444-Mod-good 2.78 ha 4039-Mod-good 0.23 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	(Apr-Aug) Diurnal bird survey	☒ Yes May June August	☐ No February October	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 6 Oct 23: 2 people x 1 hr 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr	Yes Recorded and Assumed presence	Yes Recorded during the survey, however no breeding habitat recorded. Presence assumed where survey not undertaken. Assumed habitat 3315-Thinned 0.01 ha 3438-Mod-good 0.09 ha 3444-Mod-good 2.78 ha 4039-Mod-good 0.23 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	(Jul-Dec) Diurnal bird survey Raptor nest searches	☒ Yes August October December	☒ No February April May June	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 6 Oct 23: 2 people x 1 hr Opportunistic (diurnal bird survey): 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr Opportunistic (raptor nest searches): 12-16 Feb 24: 2 people 30 Apr 24: 2 people 1-3 May 24: 2 people	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Little Eagle	*Hieraaetus morphnoides*	(Aug-Oct) Habitat assessment Diurnal bird surveys Raptor nest searches	☒ Yes August October	☒ No February April May June	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 6 Oct 23: 2 people x 1 hr Opportunistic (diurnal bird survey): 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr Opportunistic (raptor nest searches): 12-16 Feb 24: 2 people 30 Apr 24: 2 people 1-3 May 24: 2 people	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Swift Parrot	*Lathamus discolor*	Diurnal bird survey	N/A	N/A	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 6 Oct 23: 2 people x 1 hr 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr	Yes	Yes Subject land is mapped on important habitat map. Area of confirmed important habitat is 41.09 ha, being: 3314-Thinned 0.10 ha 3315-Thinned 0.18 ha 3431-Disturbed Grassland 0.28 ha 3431-Thinned 13.83 ha 3444-Derived 0.01 ha 3444-Mod-good 26.69 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Square-tailed Kite	*Lophoictinia isura*	(Sep-Jan) Diurnal bird survey Raptor nest searches	☒ Yes October	☒ No February April May June August	Diurnal bird survey: 6 Oct 23: 2 people x 1 hr Opportunistic (diurnal bird survey): 29-31 Aug 23: 2 people x 1 hr 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr Opportunistic (raptor nest searches): 12-16 Feb 24: 2 people 30 Apr 24: 2 people 1-3 May 24: 2 people	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
Barking Owl	*Ninox connivens*	(All year) Spotlight Call playback Stag watch	☒ Yes January April May June July August	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs Stag watch: 29-31 August 23: 2 people x 2.5 hrs	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Powerful Owl	*Ninox strenua*	(All year) Spotlight Call playback Stag watch	☒ Yes January April May June July August	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs Stag watch: 29-31 August 23: 2 people x 2.5 hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 12.28 ha, being: 3315-Thinned 5.72 ha 3431-Thinned 0.13 ha 3438-Mod-good 5.65 ha 3444-Mod-good 0.58 ha 4039-Mod-good 0.12 ha 4072-Mod-good 0.08 ha Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good 0.31 ha 3239-Mod-good

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							5.12 ha 3444-Mod-good 2.33 ha
Eastern Osprey	*Pandion cristatus*	(Apr-Nov) Diurnal bird survey Raptor nest searches	☒ Yes April May June August October	☒ No February	Diurnal bird survey: 29-31 Aug 23: 2 people x 1 hr 6 Oct 23: 2 people x 1 hr 2-3 May 24: 2 people x 1 hr 13-14 May 24: 2 people x 1 hr 17 May 24: 2 people x 1 hr 5 Jun 24: 2 people x 1 hr 5-6 Jun 24: 2 people x 1hr 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 1 hr Opportunistic (diurnal bird survey): 12-16 Feb 24: 2 people x 1 hr 26-29 Feb 24: 2 people x 1 hr Raptor nest searches: 30 Apr 24: 2 people 1-3 May 24: 2 people Opportunistic (raptor nest searches): 12-16 Feb 24: 2 people	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Masked Owl	*Tyto novaehollandiae*	(All year) Spotlight Call playback Stag watch	☒ Yes January April May June July August	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs Stag watch: 29-31 August 23: 2 people x 2.5 hrs	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3239-Mod-good 5.12 ha 3444-Mod-good 2.33 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Sooty Owl	*Tyto tenebricosa*	(All year) Spotlight Call playback Stag watch	☒ Yes January April May June July August	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs Stag watch: 29-31 August 23: 2 people x 2.5 hrs	Assumed present	Yes Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good 0.31 ha 3239-Mod-good 5.12 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Mammals							
Eastern Pygmy-possum	*Cercartetus nanus*	(Oct-Mar) Camera traps Spotlighting	☒ Yes January February October November December	☐ No April May June July August September	Arboreal Camera Traps: 18 Sep 23 – 12 Oct 23: 200 traps (8 cameras x 25 nights) 23 Nov 23 – 15 Jan 24: 368 traps (16 cameras x 23 nights) 24 Nov 23 – 15 Jan 24: 242 traps (11 cameras x 22 nights) 16 Jan 24 – 28 Feb 24: 516 traps (12 cameras x 43 nights) 17 Jan 24 – 28 Feb 24: 210 traps (5 cameras x 42 nights) Opportunistic (arboreal camera traps): 15 May 24 – 25 Jun 24: 246 traps (6 cameras x 41 nights) 16 May 24 – 26 Jun 24: 492 traps (12 cameras x 41 nights) 17 May 24 – 25 Jun 24: 240 traps (6 cameras x 40 nights) 4 Jun 24 – 3 Jul 24: 319 traps (11 cameras x 29 nights) 5 Jun 24 – 3 Jul 24: 336 traps (12 cameras x 28 nights)	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Large-eared Pied Bat	*Chalinolobus dwyeri*	(Nov-Jan) Harp traps Anabats (passive) Roost searches	☐ Yes	☒ No February	Opportunistic (Anabats): 12 Feb 24 – 16 Feb 24: 16 recorder nights (4 Anabats x 4 nights) 26 Feb 24 – 29 Feb 24: 6 recorder nights (2 Anabats x 3 nights)	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Little Bent-winged Bat	*Miniopterus australis*	(Dec-Feb) Harp traps	☐ Yes	☐ No	Opportunistic (Anabats): 12 Feb 24 – 16 Feb 24: 16 recorder nights (4 Anabats x 4 nights) 26 Feb 24 – 29 Feb 24: 6 recorder nights (2 Anabats x 3 nights)	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	(Dec-Feb) Harp traps	☐ Yes	☐ No	Opportunistic (Anabats): 12 Feb 24 – 16 Feb 24: 16 recorder nights (4 Anabats x 4 nights) 26 Feb 24 – 29 Feb 24: 6 recorder nights (2 Anabats x 3 nights)	No	No (species excluded through extensive and exhaustive surveys for breeding habitat. Species retained as a predicted ecosystem credit species see Table 5.4)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Southern Myotis	*Myotis macropus*	(Oct-Mar) Harp traps Anabats (passive) Roost searches	☒ Yes February	☐ No	Anabats (passive): 12 Feb 24 – 16 Feb 24: 16 recorder nights (4 Anabats x 4 nights) 26 Feb 24 – 29 Feb 24: 6 recorder nights (2 Anabats x 3 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 73.73 ha, being: 3239-Mod-good 1.79 ha 3241-Mod-good 0.54 ha 3314-Poor 6.74 ha 3314-Thinned 8.11 ha 3315-Thinned 3.04 ha 3431-Plantation 4.88 ha 3431-Poor 3.08 ha 3431-Thinned 27.45 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
							3438-Mod-good 1.85 ha 3444-Mod-good 7.25 ha 3636-Thinned 4.76 ha 4015-Thinned 3.74 ha 4039-Mod-good 0.43 ha 4072-Mod-good 0.07 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Southern Greater Glider	*Petauroides volans*	(All year) Spotlighting Camera traps	☒ Yes January February April May June July August September October November December	☐ No	Arboreal Camera Traps: 18 Sep 23 – 12 Oct 23: 200 traps (8 cameras x 25 nights) 23 Nov 23 – 15 Jan 24: 368 traps (16 cameras x 23 nights) 24 Nov 23 – 15 Jan 24: 242 traps (11 cameras x 22 nights) 16 Jan 24 – 28 Feb 24: 516 traps (12 cameras x 43 nights) 17 Jan 24 – 28 Feb 24: 210 traps (5 cameras x 42 nights) 15 May 24 – 25 Jun 24: 246 traps (6 cameras x 41 nights) 16 May 24 – 26 Jun 24: 492 traps (12 cameras x 41 nights) 17 May 24 – 25 Jun 24: 240 traps (6 cameras x 40 nights) 4 Jun 24 – 3 Jul 24: 319 traps (11 cameras x 29 nights) 5 Jun 24 – 3 Jul 24: 336 traps (12 cameras x 28 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 31.44 ha, being: 3241-Mod-good 2.09 ha 3315-Thinned 8.66 ha 3431-Thinned 0.13 ha 3438-Mod-good 9.92 ha 3444-Mod-good 9.66 ha 4039-Mod-good 0.84 ha 4072-Mod-good 0.14 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs		
Squirrel Glider	*Petaurus norfolkensis*	(All year) Spotlighting Call playback Camera traps	☒ Yes January April May June July August September October November December	☐ No	Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Arboreal Camera Traps: 18 Sep 23 – 12 Oct 23: 200 traps (8 cameras x 25 nights) 23 Nov 23 – 15 Jan 24: 368 traps (16 cameras x 23 nights) 24 Nov 23 – 15 Jan 24: 242 traps (11 cameras x 22 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 205.82 ha, being: 3239-Mod-good 5.81 ha 3241-Mod-good 2.09 ha 3314-Poor 19.40 ha 3314-Thinned 38.46 ha 3315-Thinned

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)	Effort (hours & no. people)		
				16 Jan 24 – 28 Feb 24: 516 traps (12 cameras x 43 nights) 17 Jan 24 – 28 Feb 24: 210 traps (5 cameras x 42 nights) 15 May 24 – 25 Jun 24: 246 traps (6 cameras x 41 nights) 16 May 24 – 26 Jun 24: 492 traps (12 cameras x 41 nights) 17 May 24 – 25 Jun 24: 240 traps (6 cameras x 40 nights) 4 Jun 24 – 3 Jul 24: 319 traps (11 cameras x 29 nights) 5 Jun 24 – 3 Jul 24: 336 traps (12 cameras x 28 nights) Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs		8.86 ha 3431-Plantation 14.90 ha 3431-Poor 5.20 ha 3431-Thinned 63.40 ha 3438-Mod-good 10.22 ha 3444-Mod-good 36.64 ha 4039-Mod-good 0.84 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Brush-tailed Rock-wallaby	*Petrogale penicillata*	(All year) Camera traps	☒ Yes January February September October November December	☐ No	Terrestrial camera traps: 18 Sep 23 – 12 Oct 23: 200 traps (8 cameras x 25 nights) 23 Nov 23 – 15 Jan 24: 368 traps (16 cameras x 23 nights) 24 Nov 23 – 15 Jan 24: 242 traps (11 cameras x 22 nights) 16 Jan 24 – 28 Feb 24: 516 traps (12 cameras x 43 nights) 17 Jan 24 – 28 Feb 24: 210 traps (5 cameras x 42 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 11.45 ha, being: 3241-Mod-good 1.50 ha 3315-Derived 1.07 ha 3315-Thinned 5.17 ha 3438-Mod-good 1.42 ha 3444-Mod-good 1.85 ha 4039-Mod-good 0.44 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Brush-tailed Phascogale	*Phascogale tapoatafa*	(Dec-Jun) Spotlighting Camera traps	☒ Yes January February April May June December	☒ No July August November	Arboreal Camera Traps: 23 Nov 23 – 15 Jan 24: 368 traps (16 cameras x 23 nights) 24 Nov 23 – 15 Jan 24: 242 traps (11 cameras x 22 nights) 16 Jan 24 – 28 Feb 24: 516 traps (12 cameras x 43 nights) 17 Jan 24 – 28 Feb 24: 210 traps (5 cameras x 42 nights) 15 May 24 – 25 Jun 24: 246 traps (6 cameras x 41 nights) 16 May 24 – 26 Jun 24: 492 traps (12 cameras x 41 nights) 17 May 24 – 25 Jun 24: 240 traps (6 cameras x 40 nights) 4 Jun 24 – 3 Jul 24: 319 traps (11 cameras x 29 nights) 5 Jun 24 – 3 Jul 24: 336 traps (12 cameras x 28 nights) Opportunistic (arboreal camera traps): 18 Sep 23 – 12 Oct 23: 200 traps (8 cameras x 25 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 86.68 ha, being: 3314-Poor 19.40 ha 3314-Thinned 38.33 ha 3431-Plantation 10.97 ha 3431-Poor 0.36 ha 3431-Thinned 13.01 ha 3438-Mod-good 0.22 ha 3636-Thinned 2.19 ha 4015-Thinned 2.20 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					Spotlighting: 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 6-7 Jan 25: 2 people x 5 hrs Opportunistic (spotlighting): 29-31 Aug 23: 2 people x 3 hrs 22-23 Jul 24: 2 people x 4 hrs 16 May – 25 Jun 24: 240 trap nights 16 May – 26 Jun 24: 246 trap nights 17 May – 26 Jun 24: 240 trap nights 5 Jun – 3 Jul 24: 336 trap nights 4 Jun – 3 Jul 24: 319 trap nights		

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Koala	*Phascolarctos cinereus*	(All year) Spotlighting SAT (Spot Assessment Technique) Call playback	☒ Yes January February April May June July August	☐ No	SATs: 29-31 Aug 23: 2 people x 4 hrs 12-15 Feb 24: 2 people x 5 hrs 26-29 Feb 24: 2 people x 8 hrs 4 Jun 24: 2 people x 7 hrs 20 Jun 24: 2 people x 1 hr 27 Jun 24: 2 people x 7 hrs Call playback: 29-31 Aug 23: 2 people x 4 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs Spotlighting: 29-31 Aug 23: 2 people x 3 hrs 30 Apr 24: 2 people x 4 hrs 1-3 May 24: 2 people x 4 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 5 hrs 22-23 Jul 24: 2 people x 4 hrs 6-7 Jan 25: 2 people x 5 hrs	Yes Recorded and Assumed presence	Yes Recorded during the survey. Area of confirmed habitat is 2.09 ha, being: 3241-Mod-good 2.09 ha Presence assumed where survey not undertaken. Assumed habitat 3087-Mod-good 0.31 ha 3239-Mod-good 5.81 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Common Planigale	*Planigale maculata*	(All year) Camera traps	☒ Yes January	☐ No	Terrestrial camera traps: 20 Jan 25 – 12 Feb 25: 138 traps (6 cameras x 23 nights) 21 Jan 25 – 12 Feb 25: 396 traps (18 cameras x 22 nights)	Yes	Yes Recorded during the survey. Area of confirmed habitat is 16.00 ha, being: 3314-Poor 3.21 ha 3315-Thinned 4.26 ha 3431-Thinned 0.13 ha 3438-Mod-good 8.40 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Eastern Cave Bat	*Vespadelus troughtoni*	(Nov-Jan) Harp traps Anabat (Passive) Roost searches	☐ Yes	☒ No February	Opportunistic (Anabats): 12 Feb 24 – 16 Feb 24: 16 recorder nights (4 Anabats x 4 nights) 26 Feb 24 – 29 Feb 24: 6 recorder nights (2 Anabats x 3 nights)	Assumed present	Yes Recorded during the survey. Area of confirmed habitat is 56.83 ha, being: 3239-Mod-good 5.81 ha 3241-Mod-good 2.09 ha 3314-Thinned 0.13 ha 3315-Thinned 8.86 ha 3431-Plantation 0.18 ha 3431-Thinned 5.74 ha 3438-Mod-good 9.92 ha 3444-Mod-good 22.84 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**		
							4015-Thinned 0.70 ha 4039-Mod-good 0.56 ha
Reptiles							
Pink-tailed Legless Lizard	*Aprasia parapulchella*	(Sep-Nov) Habitat assessment Tile grids (5x10 tiles per grid)	☒ Yes October November December	☒ No February April May	Habitat assessment: 14-18 Oct 24: 2 people x 2 hrs Opportunistic (habitat assessment): 12-15 Feb 24: 2 people x 2 hrs 26-29 Feb 24: 2 people x 2 hrs 30 Apr 24: 2 people x 2 hrs 1-3 May 24: 2 people x 2 hrs Tile grids: 14-18 Oct 24: 50 tiles per grid 22-24 Oct 24: 50 tiles per grid 29-31 Oct 24: 50 tiles per grid 5-7 Nov 24: 50 tiles per grid 12 Nov 24: 50 tiles per grid 19-21 Nov 24: 50 tiles per grid 26 Nov 24: 50 tiles per grid 3 Dec 24: 50 tiles per grid	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Striped Legless Lizard	*Delma impar*	(Sep-Dec) Habitat assessment Tile grids (5x10 tiles per grid)	☒ Yes October November December	☒ No February April May	Habitat assessment: 14-18 Oct 24: 2 people x 2 hrs Opportunistic (habitat assessment): 12-15 Feb 24: 2 people x 2 hrs 26-29 Feb 24: 2 people x 2 hrs 30 Apr 24: 2 people x 2 hrs 1-3 May 24: 2 people x 2 hrs Tile grids: 14-18 Oct 24: 50 tiles per grid 22-24 Oct 24: 50 tiles per grid 29-31 Oct 24: 50 tiles per grid 5-7 Nov 24: 50 tiles per grid 12 Nov 24: 50 tiles per grid 19-21 Nov 24: 50 tiles per grid 26 Nov 24: 50 tiles per grid 3 Dec 24: 50 tiles per grid	No	No (species excluded through extensive and exhaustive surveys)

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Hunter Valley Delma	*Delma vescolineata*	(Sep-Dec) Habitat assessment Tile grids (5x10 tiles per grid)	☒ Yes October November December	☒ No February April May	Habitat assessment: 14-18 Oct 24: 2 people x 2 hrs Opportunistic (habitat assessment): 12-15 Feb 24: 2 people x 2 hrs 26-29 Feb 24: 2 people x 2 hrs 30 Apr 24: 2 people x 2 hrs 1-3 May 24: 2 people x 2 hrs Tile grids: 14-18 Oct 24: 50 tiles per grid 22-24 Oct 24: 50 tiles per grid 29-31 Oct 24: 50 tiles per grid 5-7 Nov 24: 50 tiles per grid 12 Nov 24: 50 tiles per grid 19-21 Nov 24: 50 tiles per grid 26 Nov 24: 50 tiles per grid 3 Dec 24: 50 tiles per grid	Yes	Yes Recorded during the survey. Area of confirmed habitat is 208.12 ha, being: 3314-Disturbed Grassland 20.02 ha 3314-Poor 19.40 ha 3314-Thinned 38.46 ha 3315-Derived 17.44 ha 3315-Thinned 8.84 ha 3431-Disturbed Grassland 35.34 ha 3431-Poor 5.20 ha 3431-Thinned 63.42 ha

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Stephens' Banded Snake	*Hoplocephalus stephensii*	(Oct-Mar) Road transects Spotlight	☒ Yes January February October November December	☒ No April May June July August September	Spotlighting: 6-7 Jan 25: 2 people x 2 hrs Opportunistic (spotlighting): 29-31 Aug 23: 2 people x 2 hrs 30 Apr 24: 2 people x 2 hrs 1-3 May 24: 2 people x 2 hrs 13-16 May 24: 2 people x 2 hrs 24-27 Jun 24: 2 people x 2 hrs 22-23 Jul 24: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys)

5.4 Justification for survey outside of specified timeframes

Some surveys for threatened species were undertaken outside of the specified timeframes outlined for the species in the TBDC. Justification for the surveys being done outside of the specified timeframes outlined for the species in the TBDC are provided in Table 5.19.

Table 5.19 Reasoning for undertaking threatened species surveys outside of the specified timeframes outlined in the TBDC

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Asperula asthenes	Trailing Woodruff	October – December	August September February April	The TBDC indicates to use fruiting material to identify, as its easily confused with *Galium* genera. Frost sensitive and may disappear above ground until both soil moisture (after about 25 mm of rain) and warmer weather return. It flowers predominantly Oct-Nov, although sometimes seen throughout the year (Mamott 2011). Any *Asperula* spp. or *Galium* spp. specimens that were recorded were collected for further analysis under a microscope. The main *Asperula* species encountered was *Asperula conferta*, which can be distinguished from *Asperula asthenes* by its leaves and leaf-like stipules all, or mostly, in whorls of 5 or more (NSW Flora Online 2025). The main *Galium* species recorded was *Galium leiocarpum* which can be which can be distinguished from *Asperula asthenes* by its leaves which have glandular cells on the lower surface whereas *Galium* species lack this feature (Thompson 2009). Weather conditions during field surveys are summarised in Table 2.17 and there were no overnight temperatures that fell below zero causing frost conditions to affect species detection within the forest habitats for this species.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Callistemon linearifolius	Netted Bottle Brush	October – January	June July August September February	The TBDC indicates to use flowers to identify this species from similar looking species within the genera. Survey period is October to January, however if not observed in flower, return to site for re-survey later in the survey period. It is recommended to check the nearest possible reference site (within 20 km) at similar altitude. The main *Callistemon spp.* encountered was *Callistemon linearis*, which was actively flowering during survey in September. This species differs from *C. linearifolius* by the width of its leaves and the visibility of its lateral veins (*C. linearis* 1–3 mm wide and lateral veins inconspicuous; *C. linearifolius* 5–7 mm wide and lateral veins distinct). Samples of *Callistemon linearis* were regularly collected during field surveys for further analysis under a microscope.
Dendrobium tetragonum var. melaleucaphilum	Spider Orchid	August – September	November	The TBDC indicates to use flowers to identify this species from similar looking species within the genera. Flowering occurs over 1 to 2 weeks during August and September. Its recommended to survey 3 times, at least 1 week apart, during August and September if not found in first survey(s). Its very difficult to distinguish from *D. tetragonum* when not in flower when in a juvenile state. Grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts. No specimens of *Dendrobium tetragonum* were identified during the targeted surveys in the associated PCT 3581 within the Wyong IBRA subregion. Within the subject land, no *Dendrobium* species were recorded within this PCT.
Dillwynia tenuifolia	–	August – October	February	The TBDC indicates to use its flowers to locate and differentiate from other *Dillwynia* species. However, it will flower sporadically at other times of the year in response to rain. The main *Dillwynia* species encountered was *Dillwynia retorta*, which is distinguished from *Dillwynia tenuifolia* by its distinctly spirally twisted leaves. This was regularly checked in the field using a 10x jewellers loupe hand lens.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Epacris purpurascens var. *purpurascens*	–	September – October	June August	The TBDC indicates to use flowers to identify this species, as its easily confused with *E. pulchella* and *E. wollsia*. Flowering pears around September to October, but flowers sporadically throughout the year. It requires a voucher specimen RBG. The main *Epacris* species encountered was *Epacris pulchella*, which is distinguished from *Epacris purpurascens var. purpurascens* by the width of the leaves (*E. pulchella* 1.4–4 mm wide; *E. purpurascens var. purpurascens* 4.4–9 mm wide). Samples of *Epacris pulchella* were regularly collected during field surveys for further analysis under a microscope.
Leionema lamprophyllum subsp. fractum	–	September – November	February	The TBDC indicates to use mature budding and/or full flowering to locate and identify. Any *Leionema* spp. specimens that were identified as potentially being *Leionema lamprophyllum subsp. fractum* within the associated PCTs were recorded and are to be re-assessed during the flowering survey period. No specimens of *Leionema* spp. were identified during the targeted surveys in the associated PCTs.
Ozothamnus tesselatus	–	September – October	November December January	The TBDC indicates to use flowers to locate and identify this species during September and October. According to the TBDC, the species can be identified by foliage year-round by a skilled botanist (NSW DCCEEW 2024a). The main *Ozothamnus* species encountered was *Ozothamnus diosmifolius*, which can be distinguished from *Ozothamnus tesselatus* by the leaves (*O. diosmifolius* leaves are linear, 10–15 mm long, 1–2 mm wide; *O. tesselatus* leaves are spreading, oblong, 4–5 mm long, <1 mm wide).

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Prostanthera cineolifera	Singleton Mint Bush	September – October	February	The TBDC indicates to use flowers to locate and identify this species during September and October. The main *Prostanthera* species encountered was *Prostanthera incisa*, which can be distinguished from *Prostanthera cineolifera* by the coarsely toothed margins on its leaves. No other similar *Prostanthera* species occur within the subject land and positive herbarium verification was sort for sample of this species that were recorded.
Rhizanthella slateri	Eastern Australian Underground Orchid	September – November	August February	The TBDC indicates to use buds, flowers and/or fruit to identify the species. This species is highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground between September to November. Therefore its usually located only when the soil is disturbed. To improve detection in less disturbed areas and/or outside of the flowering period, targeted surveys used hand rakes to search for specimens below the soil surface. See section 2.3 for further explanation of this survey methodology.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Syzygium paniculatum	Magenta Lilly Pilly	April – June	September	The TBDC indicates to use fruit to identify, as it can be easily confused with other species within the *Syzyguim* genus. Naturally occurring plants generally produce low numbers of fruit, while cultivated individuals and offspring generally produce high numbers of fruit. Samples need to be verified by RBG to detect hybridisation. Any *Syzygium* spp. specimens that were identified as potentially being *Syzygium paniculatum* within the associated PCTs were inspected with sample collected for further analysis under a microscope to look at oil dot arrangement and density along with other diagnostic features. The main *Syzygium* species encountered was *Syzygium australe*, which can be distinguished from *Syzygium paniculatum* by its 4-angled to shortly 4-winged branchlets. The dichotomous identification key in NSW PlantNet uses leafy twigs to determine *Syzygium australe* from other NSW *Syzygium* species. The NSW PlantNet dichotomous break between *Syzygium oleosum* and *Syzygium paniculata* is based on oil glands in the leaf. Fruit/seed is only used to differentiate between *Syzygium paniculatum* and *Syzygium crebrinerve*. *Syzygium crebrinerve* only occurs north of Comboyne on the NSW North Coast. The NSW PlantNet dichotomous identification key does therefore not require fruit/seed for *Syzygium paniculatum* identification in the Hunter region.
Tetratheca juncea	Black-eyed Susan	September – October	November	The TBDC indicates to use flowers to locate species. Its peak flowering period is between September and October, though will flower sporadically at other times throughout the year. Targeted surveys were undertaken during November while nearby known populations were still actively flowering. The main *Tetratheca* species encountered was *Tetratheca thymifolia*, which can be distinguished from *Tetratheca juncea* by its absence of wings on its stems.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Velleia perfoliata	–	September – November	February	The TBDC indicates to use flowers to locate and identify. The species can be identified by bracteole morphology year-round by a skilled botanist. Any *Velleia* spp. specimens that were identified as potentially being *Velleia perfoliata* within the associated PCTs would be sampled for further bracteole analysis under a microscope. Field surveys did not identify any *Velleia spp*. within the subject land.
Heleioporus australiacus	Giant Burrowing Frog	September – May	August	Targeted surveys were undertaken between September and May for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Litoria aurea	Green and Golden Bell Frog	November – March	April May September October	Targeted surveys were undertaken between November and March for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Litoria booroolongensis	Booroolong Frog	October – December	February September	Targeted surveys were undertaken between October and December for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Litoria brevipalmata	Green-thighed Frog	September – April	May August	Targeted surveys were undertaken between September and April for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Litoria littlejohni	Littlejohn's Tree Frog	July – November	January February	Targeted surveys were undertaken between July and November for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Mixophyes iteratus	Giant Barred Frog	October – March	September	Targeted surveys were undertaken between October and March for detecting presence and breeding habitat. Outside of this period, opportunistic searches were undertaken when potential habitat was identified during habitat assessments. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Callocephalon fimbriatum	Gang-gang Cockatoo (breeding)	October – January	February April May June August September	TBDC states assessors should look for signs of breeding on site as follows; (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. Surveys were undertaken within these specified months. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-cockatoo	April – August	February September October	Individual birds and signs of foraging have been recorded with the subject land outside of the nominated breeding habitat survey period. Surveys targeting signs of breeding were undertaken in within the April to August period. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Haliaeetus leucogaster	White-bellied Sea-Eagle	July – December	January February April May June	Surveys targeting signs of breeding were undertaken between July and December. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Hieraaetus morphnoides	Little Eagle	August – October	February April May June	Surveys targeting signs of breeding were undertaken between August and October. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Lophoictinia isura	Square-tailed Kite	September – January	February April May June July August	Surveys targeting signs of breeding were undertaken between September and January. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Pandion cristatus	Eastern Osprey	April – November	January February December	Surveys targeting signs of breeding were undertaken between April and November. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Cercartetus nanus	Eastern Pygmy-possum	October – March	April May June July August September	The TBDC indicates that the species is very difficult to detect, especially via spotlighting. Camera trapping was undertaken between October and March, with some cameras deployed at the end of September and collected within October.
Chalinolobus dwyeri	Large-eared Pied Bat	November – January	February March April May September	Surveys targeting signs of breeding were undertaken between November and January. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Myotis macropus	Southern Myotis	October – March	April May September	Surveys targeting signs of breeding were undertaken between October to March. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Phascogale tapoatafa	Brush-tailed Phascogale	December – June	July September October November	The TBDC indicates that due to low population densities, large home range size, annual male die-off and fluctuating local abundance make the species difficult to detect reliably. Surveys targeting the species were undertaken between December and June, when the species is most active due to juvenile dispersal and mating seasons. Surveys undertaken outside of this period were aimed at opportunistic detection of this species, while targeting other species through similar methods.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Pteropus poliocephalus	Grey-headed Flying-fox	October – December	February April May July August September	Surveys targeting signs of breeding were undertaken between October and December. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Vespadelus troughtoni	Eastern Cave Bat	November – January	February March April May September	Surveys targeting signs of breeding were undertaken between November and January. The specified months for survey contained within the TBDC are restricted to those months that maximise the likelihood of detecting a species or estimating the area that a species occupies. Survey outside of these months can still detect the species. Additional surveys were not undertaken to determine breeding habitat outside of the nominated survey period, but for detection of the species only.
Aprasia parapulchella	Pink-tailed Legless Lizard	September – November	February	Targeted surveys were undertaken between September and November once suitable habitat was identified. Habitat assessments, often followed by opportunistic searches for the species were undertaken outside of this period.
Delma impar	Striped Legless Lizard	September – December	February	Targeted surveys were undertaken between September and December once suitable habitat was identified. Habitat assessments, often followed by opportunistic searches for the species were undertaken outside of this period.
Delma vescolineata	Hunter Valley Delma	September – December	February	
Hoplocephalus bitorquatus	Pale-headed Snake	November – March	April May June July August September	Targeted surveys were undertaken with the TBDC recommended survey periods. Surveys undertaken outside of these survey periods were aimed at opportunistic detection of this species, while targeting other species through similar methods.
Hoplocephalus bungaroides	Broad-headed Snake	December – February, August – September	October	Targeted surveys were undertaken with the TBDC recommended survey periods. Surveys undertaken outside of these survey periods were aimed at opportunistic detection of this species, while targeting other species through similar methods.

Scientific name	Common name	Specified survey timing in TBDC	Survey undertaken outside of specified timeframes	Justification
Hoplocephalus stephensii	Stephens' Banded Snake	October – March	April May June July August September	Targeted surveys were undertaken with the TBDC recommended survey periods. Surveys undertaken outside of this period were aimed at opportunistic detection of this species, while targeting other species through similar methods.

5.5 Expert reports

Expert reports have not been used for this BDAR.

5.6 More appropriate local data (where relevant)

As outlined in BAM section 1.4.2(1), in some instances, the assessor may use more appropriate local data, rather than the information and datasets specified in subsection 1.4.1, to prepare a BDAR. The assessor must give the decision-maker the reasons these data better reflect local environmental conditions. The reasons these data better reflect local environmental conditions is provided in this BDAR.

Data from recent BDARs undertaken in the locality was also used as more appropriate local data. Several threatened species were recorded during Hunter Valley Operations Continuation Project – Biodiversity Development Assessment Report (Umwelt 2022) including the Hunter Valley Delma (*Delma vescolineata*). This data was used to guide field surveys and used to inform the assessment of likely presence of these species within the subject land.

As outlined in section 4.5.1, local vegetation integrity plot data was used to make up plot shortfalls. In lieu of using benchmark data for a PCT from the BioNet Vegetation Classification, existing plot data collected during the survey was duplicated in the BAM calculator or data from a better-quality vegetation zone was used. This provides a more accurate representation of on-ground local conditions (see section 4.5.1 for a description of data used).

As outlined in section 4.5.1, where no other data was available for a PCT or Vegetation Zone (i.e. due to limited property access preventing survey), benchmark data for a PCT from the BioNet Vegetation Classification was used in place of plot data collected on ground and entered into the BAM-C.

5.7 Area or count, and location of suitable habitat for a species credit species (a species polygon)

For species credit species either assumed to be present, or determined to be present, or likely to use suitable habitat on the subject land, species polygons were determined with reference to the various species survey guidelines published by the department (and the TBDC), including:

- *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020a).
- *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020b).
- *Threatened reptiles: Biodiversity Assessment Method survey guide* (DPE 2022c).
- Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide (DPE 2022d).
- *Species credit' threatened bats and their habitats: NSW guide for the Biodiversity Assessment Method* (DPIE 2021).

The species polygons for each species credit species are provided in Figure 14.13. This figure details the extent (area) of suitable habitat for the target species within the subject land. The species polygons were based on the following:

- For flora species assessed by a count of individuals, provide the estimated number of individuals present and their location (or the location of a group of individuals) on the subject land. Apply the 30 metre buffer. Include a description of the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken.
- For species assumed to be present, include a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species.
- For dual credit species with an important habitat map, include the entire area mapped on the important habitat map that occurs within the subject land.

Table 5.20 provides a summary of the species polygons for each recorded flora species and Table 5.21 provides a summary of the species polygons for each recorded fauna species credit species, with any additional species polygon rules. A description of habitat condition (vegetation zone) and vegetation integrity score is provided in detail in section 4.4 and 4.5.

Of these recorded or assumed threatened species, 38 were flora and 28 were fauna (5 frogs, 8 birds, 12 mammals, 3 reptiles). These include 15 species (8 flora & 7 fauna) listed as SAII entities and 39 species (24 flora & 15 fauna) listed under the EPBC Act.

Table 5.20 Results for present flora species separated by IBRA subregion

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Bynoe's Wattle	*Acacia bynoeana*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3315, 3617 & 4039.	n/a	Not recorded during field surveys. Assumed habitat of 9.77 ha for areas that contain survey gaps in PCT 3315 in the Hunter IBRA subregion. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Acacia pendula population in the Hunter catchment	*Acacia pendula* – endangered population	-	-	✓	Very High (3)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3314, 3315, 3431, 3438 & 4039.	n/a	Not recorded during field surveys. Assumed habitat of 16.92 ha for non-surveyed lands in PCT 3314, 3315, 3431 & 3438 in the Hunter IBRA subregion. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations applied to all disturbance areas. Threatened flora polygons comprised of assumed habitat (refer Figure 14.13): 3314-Poor – 2.06 ha 3314-Thinned – 1.64 ha 3315-Thinned – 0.84 ha 3431-Plantation – 3.73 ha 3431-Thinned – 8.14 ha 3431-Poor – 0.30 ha 3438-Mod-good – 0.21 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Charmhaven Apple	*Angophora inopina*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3244, 3250, 3315 & 3581.	n/a	Not recorded during field surveys. Assumed habitat of 0.90 ha for non-surveyed lands in PCT 3250 in the Wyong IBRA subregion and 0.84 ha for non-surveyed lands in PCT 3315 in the Hunter IBRA subregion. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): 3250-Mod-good – 0.90 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): 3315-Thinned – 0.84 ha	
Trailing Woodruff	*Asperula asthenes*	✓	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3086, 3087, 3241, 3242, 3244, 3250 & 3446.	n/a	Not recorded during field surveys. Assumed habitat of 2.29 ha for non-surveyed lands in PCT 3087 & 3242 & 3250 in all Wyong and Hunter IBRA subregions. Threatened flora polygons were created for the all IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13):	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter					Assumed habitat of 1.98 ha for non-surveyed lands in he Wyong IBRA subregion: 3424-Mod-good – 1.08 ha 3250-Mod-good – 0.90 ha Assumed habitat of 0.31 ha for non-surveyed lands in PCT 3087 in the Hunter IBRA subregion.	

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Brachyscome brownii*	-	✓	✓	-	-	None listed in the BAM-C. Currently not associated with any particular PCT, however recorded in PCTs 3605 & 3241.	n/a	Recorded during the survey. Recorded habitat of 25.42 ha in PCT 3239 & 3241 in the Yengo and Hunter IBRA subregions. Threatened flora polygons were created for the Yengo and Hunter IBRA subregion with impact calculations limited to Disturbance area A only (refer Figure 14.13). Yengo IBRA subregion 3239-Mod-good – 16.88 ha 3241-Mod-good – 7.67 ha Hunter IBRA subregion 3241-Mod-good – 0.87 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Netted Bottle Brush	*Callistemon linearifolius*	✓	-	✓	Moderate (1.5)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT PCTs 3230, 3444, 3581, 3617 & 3621.	Not recorded during field surveys. Assumed habitat of 4.09 ha for non-surveyed lands in PCT 3230 in the Wyong IBRA subregion and 4.82 ha for non-surveyed lands in PCT 3315 and 3444 in the Hunter IBRA subregion. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13):	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC. Within BAM-C the unit of measure for *Callistemon linearifolius* is a count of individuals. Given *Callistemon linearifolius* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3230-Mod-good – 3.79 ha or 190 (count) 3230-Plantation – 0.30 ha or 15 (count) Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13): 3315-Thinned – 0.84 ha or 42 (count) 3444-Mod-good – 3.55 ha or 178 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Red Helmet Orchid	*Corybas dowlingii*	✓	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3150, 3241, 3244, 3250, 3446 & 3581.	n/a	Not recorded during field surveys. Assumed habitat of 11.37 ha for non-surveyed lands in PCT 3150, 3241, 3244 and 3250 in the Wyong and Hunter IBRA subregion. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Wyong IBRA subregion 3150-Mod-good – 7.70 ha 3150-Plantation – 0.45 ha 3244-Mod-good - 0.23 ha 3250-Mod-good – 0.90 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Hunter IBRA subregion 3241-Mod-good – 2.09 ha	
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* – endangered population	-	-	✓	High (2)	No	Species is epiphytic to a range of eucalypts, acacia and angophora species. Can persist on cut stumps or logs on ground, if protected from grazing.	Recorded during the field surveys in the Hunter IBRA subregion. 1 individual recorded within the subject land in PCT 3444. An additional 4 species recorded outside the subject land (refer Figure 14.13).	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
							Geographic limitation of Hunter catchment as defined by Australia's River Basins (Geoscience Australia 1997) Vegetation zones within the subject land include PCT 3314, 3315, 3431, 3438, 3439 & 3636.	Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13): Assumed habitat: 3314-Poor – 2.06 ha or 2 (count) 3314-Thinned – 1.64 ha or 2 (count) 3315-Thinned – 0.84 ha or 1 (count) 3431-Plantation – 3.73 ha or 4 (count) 3431-Poor – 3.48 ha or 3 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
								3431-Thinned – 8.30 ha or 8 (count) 3438-Mod-good – 0.21 ha or 1 (count) 3636-Thinned – 1.18 ha or 1 (count)		
White-flowered Wax Plant	*Cynanchum elegans*	✓	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3086, 3087, 3151, 3152, 3237, 3239, 3244, 3250, 3489, 3617 & 3621	n/a	Not recorded during field surveys. Assumed habitat of 9.75 ha for non-surveyed lands in PCT 3029, 3087, 3152, 3239, 3489 and 3250. Threatened flora polygons were created for the Wyong, Yengo and Hunter IBRA subregions with impact calculations limited to Disturbance area A and B and comprised of assumed habitat (refer Figure 14.13):	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter					Assumed habitat within the Wyong IBRA subregion 3029-Mod-good – 0.92 ha 3250-Mod-good – 0.90 ha Assumed habitat within the Yengo IBRA subregion 3087-Mod-good – 0.59 ha 3152-Mod-good – 0.08 ha 3239-Mod-good – 3.59 ha 3489-Mod-good – 0.29 ha Assumed habitat within the Hunter IBRA subregion PCT 3239-Mod-good – 3.38 ha	

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Dillwynia tenuifolia*	-	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3605 & 3617.	n/a	Not recorded during field surveys. Assumed habitat of 1.46 ha for non-surveyed lands in PCT 3605 in the Yengo IBRA subregion. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Yengo IBRA subregion of PCT 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Pine Donkey Orchid	*Diuris tricolor*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3314, 3315 & 3431.	n/a	Recorded during field surveys but outside the subject land. Assumed habitat of 26.56 ha for non-surveyed lands in PCT 3314, 3315 & 3431.in the Hunter IBRA subregion. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat for non-surveyed lands 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha 3431-Thinned – 10.38 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Eucalyptus camaldulensis population in the Hunter catchment	*Eucalyptus camaldulensis* – endangered population	-	-	✓	High (2)	No	Habitat constraint of watercourses, including rivers, creeks, intermittent streams or billabongs. Geographic limitation of Hunter catchment as per the Final Determination. Vegetation zones within the subject land include PCT 4072 & 4089.	n/a	Recorded during the survey within 1.50 ha area of PCT 4089-Poor (refer Figure 14.13). Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13): Assumed habitat: 4089-Poor – 1.80 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Singleton Mallee	*Eucalyptus castrensis*	-	-	✓	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3438 & 3446.	n/a	Not recorded during field surveys. Assumed habitat of 0.21 ha for non-surveyed lands in PCT 3438 in the Hunter IBRA subregion. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations across all Disturbance areas and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Hunter IBRA subregion: 3438-Mod-good – 0.21 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Broken Back Ironbark	*Eucalyptus fracta*	-	✓	-	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3489 & 3605.	n/a	Recorded during the survey and assumed for non-surveyed lands. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations applied to all Disturbance areas and comprised of recorded and assumed habitat (refer Figure 14.13): The species has been recorded to occupy 4.53 ha of habitat within the Yengo IBRA subregion. Presence assumed within the Yengo IBRA subregion where survey not undertaken. Assumed habitat 3489-Mod-good – 0.73 ha 3605-Mod-good – 15.42 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Slaty Red Gum	*Eucalyptus glaucina*	-	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3152, 3239, 3241, 3314, 3315, 3431, 3438, 3446, 3605 & 3636.	Not recorded during field surveys. Assumed habitat of 5.77 ha for non-surveyed lands in PCT 3152, 3239 and 3605 in the Yengo IBRA subregion and 17.75 ha for non-surveyed lands in PCT 3239, 3314, 3315, 3431, 3438 and 3636 in the Hunter IBRA subregion. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations applied to all Disturbance areas	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				and comprised of assumed habitat (refer Figure 14.13): 3152-Mod-good – 0.08 ha or 4 (count) 3239-Mod-good – 3.59 ha or 179 (count) 3605-Mod-good – 2.10 ha or 105 (count) Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13):		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3239-Mod-good – 3.38 ha or 169 (count) 3314-Poor – 2.06 ha or 103 (count) 3314-Thinned – 1.64 ha or 82 (count) 3315-Thinned – 0.84 ha or 42 (count) 3431-Poor – 0.30 ha or 15 (count) 3431-Thinned – 8.14 ha or 407 (count) 3438-Mod-good – 0.21 ha or 11 (count) 3636-Thinned – 1.18 ha or 59 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Pokolbin Mallee	*Eucalyptus pumila*	-	✓	✓	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include 3152, 3239, 3314, 3315, 3444, 3446 & 3605.	n/a	Not recorded during field surveys. Threatened flora polygons were created for the Yengo and Hunter IBRA subregions with impact calculations limited to Disturbance area A and B and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Yengo IBRA subregion 3152-Mod-good – 0.08 ha 3239-Mod-good – 3.59 ha 3605-Mod-good – 2.10 ha Assumed habitat within the Hunter IBRA subregion 3239-Mod-good – 3.38 ha 3314-Poor – 2.06 ha 3314-Thinned – 1.64 ha 3315-Thinned – 0.84 ha 3444-Mod-good – 3.98 ha	No relevant species specific recommendations for species polygons are provided in the TBDC

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Narrow-leaf Finger Fern	*Grammitis stenophylla*	✓	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3150, 3239, 3242, 3617 and 3621.	n/a	Not recorded during field surveys. Assumed habitat of 5.76 ha for non-surveyed lands in PCT 3029, 3150, 3239 and 3239. Threatened flora polygons were created for the Wyong and Yengo IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion 3029-Mod-good – 0.37 ha 3150-Mod-good – 1.31 ha 3150-Plantation – 0.45 ha 3242-Mod-good – 1.08 ha	No relevant species specific recommendations for species polygons are provided in the TBDC

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Assumed habitat within the Yengo IBRA subregion 3239-Mod-good – 2.55 ha	
-	*Grevillea parviflora subsp. parviflora*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3244, 3444, 3446 & 3581.	n/a	Not recorded during field surveys. Presence assumed within Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3444-Thinned – 3.55 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Biconvex Paperbark	*Melaleuca biconvexa*	✓	-	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include 3029, 3150, 3241, 3242, 3244 & 3250.	n/a	Not recorded during field surveys. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations applied to all Disturbance areas and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion 3029-Mod-good – 0.92 ha 3150-Mod-good – 3.83 ha 3150-Plantation – 0.92 ha 3242-Mod-good – 3.68 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Grove's Paperbark	*Melaleuca groveana*	-	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include 3239, 3244, 3250 & 3605.	Recorded during the field surveys in the Yengo IBRA subregion. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations applied to all Disturbance areas and comprised of recorded habitat (refer Figure 14.13): PCT 3087 – 8 individuals PCT 3605 – 179 individuals. Presence assumed where survey not undertaken in the Yengo IBRA subregion.	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
								3239-Mod-good – 6.64 ha or 823 (count) 3605-Mod-good – 15.43 ha or 1913 (count) Presence assumed where survey not undertaken in the Hunter IBRA subregion. 3239-Mod-good – 3.38 ha or 419 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Olearia cordata*	-	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include 3151, 3152, 3238, 3239, 3605 & 3617.	n/a	Not recorded during field surveys. Presence assumed within Yengo IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3151-Mod-good – 0.01 ha 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Ozothamnus tesselatus*	-	-	✓	Moderate (1.5)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3315 & 3431.	n/a	Not recorded during field surveys. Presence assumed within the Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3315-Thinned – 0.84 ha 3431-Thinned – 4.73 ha 3431-Poor – 0.30 ha 3431-Plantation – 1.82 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Hairy Geebung	*Persoonia hirsuta*	-	✓	-	Vey High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3238, 3605 & 3617.	n/a	Not recorded during field surveys. Presence assumed within the Yengo IBRA subregion where survey not undertaken. Assumed habitat within Disturbance area A 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Scant Pomaderris	*Pomaderris queenslandica*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3242, 3244, 3431 & 3439.	n/a	Not recorded during field surveys. Presence assumed within the Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3431-Thinned – 4.73 ha 3431-Poor – 0.30 ha 3431-Plantation – 1.82 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Tarengo Leek Orchid	*Prasophyllum petilum*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3314, 3315, 3431, 3438 & 3444.	n/a	Not recorded during field surveys. Presence assumed within the Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha 3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 4.22 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Prasophyllum* sp. Wybong	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3314, 3315, 3431, 3438 & 3444.	n/a	Not recorded during field surveys. Presence assumed within the Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha 3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 4.22 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Singleton Mint Bush	*Prostanthera cineolifera*	-	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3239, 3315, 3438, 3444, 3446 & 3605.	n/a	Recorded during the survey within the Yengo and Hunter IBRA subregions. Threatened flora polygons were created for the Yengo and Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of recorded and assumed habitat (refer Figure 14.13): Recorded in the Yengo IBRA subregion during the survey. Area of occupancy is 23.74 ha, being: 3237-Mod-good – 0.64 ha 3239-Mod-good – 19.54 ha 3605-Mod-good – 3.56 ha Presence assumed where survey not undertaken.	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter					Assumed habitat within Disturbance area A 3239-Mod-good – 4.15 ha 3605-Mod-good – 11.57 ha Within the Hunter IBRA subregion the area of occupancy is 4.54 ha area of PCT 3438-Mod-good within Disturbance area A and 1.73 ha of PCT 3444-Mod-good within Disturbance area A (refer Figure 14.13). Assumed habitat within the Hunter IBRA subregion 3239-Mod-good – 5.81 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 5.13 ha	

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Pterostylis chaetophora*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3241, 3314, 3315, 3431, 3438, 3444 & 3446.	n/a	Not recorded during field surveys. Presence assumed within the Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3314-Poor – 1.81 ha 3314-Thinned – 2.20 ha 3315-Derived – 8.93 ha 3315-Thinned – 0.84 ha 3431-Plantation – 2.05 ha 3431-Poor – 0.35 ha 3431-Thinned – 10.38 ha 3438-Mod-good – 0.21 ha 3444-Mod-good – 4.22 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Illawarra Greenhood	*Pterostylis gibbosa*	-	-	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3438.	n/a	Recorded within the Hunter IBRA subregion during the survey within 1.97 ha area of PCT 3431-Thinned within Disturbance area A (refer Figure 14.13). Presence assumed where survey not undertaken. Threatened flora polygons were created for the Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3438-Mod-good – 0.21 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Eastern Australian Underground Orchid	*Rhizanthella slateri*	✓	✓	-	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3086, 3087, 3150, 3230, 3237, 3241, 3242, 3244, 3250, 3263, 3581, 3599, 3617 & 3621.	n/a	Not recorded during field surveys. Presence assumed within the Wyong and Yengo IBRA subregions where survey not undertaken. Threatened flora polygons were created for the Wyong and Yengo IBRA subregions with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat in the Wyong IBRA subregion 3029-Mod-good – 0.37 ha 3150-Mod-good – 1.31 ha 3150-Plantation – 0.45 ha 3230-Mod-good – 2.62 ha 3230-Plantation – 0.30 ha 3242-Mod-good – 1.08 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Assumed habitat in the Yengo IBRA subregion 3087-Mod-good – 0.35 ha 3237-Mod-good – 0.80 ha 3599-Mod-good – 0.64 ha	
Scrub Turpentine	*Rhodamnia rubescens*	✓	✓	✓	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3086, 3087, 3150, 3151, 3152, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3250, 3263, 3446 & 3617.	Recorded during the field surveys in the Wyong, Yengo and Hunter IBRA subregions. Threatened flora polygons were created for the Wyong, Yengo and Hunter IBRA subregion with impact calculations applied to all Disturbance areas and comprised of an impact to 1,164 recorded and 1,230 assumed	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				individuals (refer Figure 14.13): Wyong IBRA subregion impact is 646 individuals recorded from the following vegetation zones: 3029-Mod-good – 35 individuals 3150-Mod-good – 123 individuals 3150-Plantation – 9 individuals 3230-Mod-good – 109 individuals 3230-Plantation – 146 individuals 3239-Mod-good – 19 individuals 3242-Mod-good – 131 individuals		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3263-Mod-good – 74 individuals Wyong IBRA subregion impact is 708 individuals assumed from the following vegetation zones: 3029-Mod-good – 1.80 ha or 52 (count) 3150-Mod-good – 6.20 ha or 180 (count) 3150-Plantation – 0.92 ha or 27 (count) 3230-Mod-good – 3.99 ha or 116 (count) 3230-Plantation – 0.30 ha or 9 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3242-Mod-good – 7.86 ha or 228 (count) 3263-Mod-good – 3.32 ha or 96 (count) Yengo IBRA subregion impact is 508 individuals recorded from the following vegetation zones: 3086-Mod-good – 16 individuals 3087-Mod-good – 56 individuals 3151-Mod-good – 3 individuals 3230-Mod-good – 23 individuals 3237-Mod-good – 10 individual		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3239-Mod-good – 137 individuals 3241-Mod-good – 120 individuals 3242-Mod-good – 38 individuals 3605-Mod-good – 105 individuals Yengo IBRA subregion impact is 344 individuals assumed from the following vegetation zones: 3087-Mod-good – 0.59 ha or 21 (count) 3152-Mod-good – 0.47 ha or 16 (count) 3237-Mod-good – 2.13 ha or 75 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				3239-Mod-good – 6.64 ha or 232 (count) Hunter IBRA subregion impact is 10 individuals recorded from the following vegetation zone: 3241-Mod-good – 10 individuals Hunter IBRA subregion impact is 178 individuals assumed from the following vegetation zones: 3087-Mod-good – 0.31 ha or 9 (count) 3239-Mod-good – 5.81 ha or 169 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Native Guava	*Rhodomyrtus psidioides*	✓	✓	✓	Very High (3)	Yes	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3086, 3087, 3150, 3151, 3152, 3242, 3250 3621 & 4072.	n/a	Recorded within the Wyong IBRA subregion during the survey with 4 individuals within 1.69 ha identified within 3263-Mod-good (refer Figure 14.13). Assumed habitat in Wyong, Yengo and Hunter IBRA subregions for non-surveyed lands. Recorded during the field surveys in the Wyong IBRA subregion. Assumed present in the Yengo and Hunter IBRA subregions. Threatened flora polygons were created for the Wyong, Yengo and Hunter IBRA subregions with impact calculations applied to all Disturbance areas and comprised of recorded and assumed	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter					habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion: 3029-Mod-good – 1.80 ha 3150-Mod-good – 6.20 ha 3150-Plantation – 0.92 ha 3242-Mod-good – 7.86 ha Assumed habitat in Yengo IBRA subregion: 3087-Mod-good – 0.59 ha 3151-Mod-good – 0.15 ha 3152-Mod-good – 0.47 ha Assumed habitat in Hunter IBRA subregion: 3087-Mod-good – 0.31 ha	

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Heath Wrinklewort	*Rutidosis heterogama*	✓	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3244, 3250, 3315, 3444, 3446, 3581, 3605 & 4039.	n/a	Not recorded during field surveys. Presence assumed within the Wyong, Yengo and Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Wyong, Yengo and Hunter IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion: 3250-Mod-good – 0.90 ha Assumed habitat within the Yengo IBRA subregion: 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Assumed habitat within the Hunter IBRA subregion: 3315-Thinned – 0.84 ha 3315-Derived – 8.93 ha 3444-Mod-good – 3.55 ha	
Rainforest Cassia	*Senna acclinis*	✓	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3086, 3150 & 3242.	n/a	Recorded on Cedar Creek. The species is restricted to Cedar Creek and will be within a no clearing zone and not impacted (refer Figure 14.13). Presence assumed within the Wyong IBRA subregion where survey was not undertaken. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13):	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
									Assumed habitat within the Wyong IBRA subregion: 3029-Mod-good – 0.63 ha 3150-Mod-good – 2.12 ha 3150-Plantation – 0.45 ha 3242-Mod-good – 2.75 ha	
Magenta Lilly Pilly	*Syzygium paniculatum*	✓	✓	✓	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3029, 3087, 3150, 3241, 3242, 3244 & 3250.	Not recorded during field surveys. Presence assumed within the Wyong and Hunter IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Wyong and Hunter IBRA subregion with impact calculations applied to all Disturbance	n/a	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter				areas and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion: 3029-Mod-good 0 0.91 ha or 46 (count) 3150-Mod-good – 3.83 ha or 192 (count) 3150-Plantation – 0.92 ha or 46 (count) 3242-Mod-good – 3.68 ha or 184 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
								Assumed habitat within the Yengo IBRA subregion: 3087-Mod-good – 0.59 ha or 30 (count) Assumed habitat within the Hunter IBRA subregion: 3087-Mod-good – 0.31 ha or 15 (count)		

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
Black-eyed Susan	*Tetratheca juncea*	✓	-	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3241, 3242, 3244, 3250, 3581 & 3617.	n/a	Not recorded during field surveys. Presence assumed within the Wyong IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Wyong IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat within the Wyong IBRA subregion: 3242-Mod-good – 1.95 ha 3250-Mod-good – 0.90 ha	The TBDC recommends the following for species polygons for this species: When *Tetratheca juncea* is recorded within an assessment area, the species polygon does not necessarily need to extend over the whole zone for a given PCT where the species is detected. Suitable habitat may be modified to restrict the polygon to low nutrient, well drained soils on substrates that are generally sandy skeletal soil on sandstone or sandy-loam, or pH neutral clayey soil from conglomerates. The annual rainfall is between 1000–1200 mm.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Velleia perfoliata*	-	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3152, 3239, 3605 & 3617.	n/a	Not recorded during field surveys. Presence assumed within the Yengo IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		Wyong	Yengo	Hunter						
-	*Zieria involucrata*	-	✓	-	High (2)	No	None listed in the BAM-C. Vegetation zones within the subject land include PCT 3151, 3152, 3238, 3239, 3605 & 3617.	n/a	Not recorded during field surveys. Presence assumed within the Yengo IBRA subregion where survey not undertaken. Threatened flora polygons were created for the Yengo IBRA subregion with impact calculations limited to Disturbance area A only and comprised of assumed habitat (refer Figure 14.13): Assumed habitat 3151-Mod-good – 0.01 ha 3152-Mod-good – 0.01 ha 3239-Mod-good – 2.55 ha 3605-Mod-good – 1.46 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

Table 5.21 Results for present fauna species separated by IBRA subregion

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Frogs											
Giant Burrowing Frog	*Heleioporus australiacus*	✓	-	-	Moderate (1.5)	No	None listed in the BAM-C.	20.53 ha of recorded habitat. 6.22 ha of assumed habitat for non-surveyed lands within the Wyong IBRA subregion.	According to the BAM guidelines, the species polygon boundary should align with suitable aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 300 metres radius from the top of bank.	Confirmed Assumed	In the absence of detailed survey information of Top of bank, a conservative approach was adopted to create a 300 m species polygon created from nearest impacted mapped watercourse associated with the species record and extended downstream. Assumed polygons were applied to all impacted streams not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Littlejohn's Tree Frog	*Litoria littlejohni*	✓	-	-	High (2)	No	None listed in the BAM-C.	63.53 ha of recorded habitat.	According to the BAM guidelines, the species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 300 metres radius from the top of bank.	Confirmed	In the absence of detailed survey information of Top of bank, a conservative approach was adopted to create a 300 m species polygon from nearest impacted mapped watercourse associated with the species record and extended downstream.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Stuttering Frog	*Mixophyes balbus*	✓	-	-	Very High (3)	Yes	None listed in the BAM-C.	180.09 ha of recorded habitat.	According to the BAM guidelines, the species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 500 metres radius from the top of bank.	Confirmed	In the absence of detailed survey information of Top of bank, a conservative approach was adopted to create a 500 m species polygon created from nearest impacted mapped watercourse associated with the species record and extended downstream. Assumed polygons were applied to all impacted streams not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Giant Barred Frog	*Mixophyes iteratus*	✓	-	-	Moderate (1.5)	No	Habitat constraints being land within 50 m of semi-permanent and permanent drainages.	2.34 ha of recorded habitat within the Wyong IBRA subregion.	According to the BAM guidelines, the species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 50 metres radius from the top of bank.	Confirmed Assumed	In the absence of detailed survey information of Top of bank, a conservative approach was adopted to create a 50 m species polygon created from nearest impacted mapped watercourse associated with the species record and extended downstream. Assumed polygons were applied to all impacted streams not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Red-crowned Toadlet	*Pseudophryne australis*	✓	✓	-	Moderate (1.5)	No	None listed in the BAM-C.	39.39 ha of recorded habitat. 29.68 ha of recorded habitat within the Wyong IBRA subregion. 9.71 of recorded and 4.15 ha of assumed habitat within the Yengo IBRA subregion.	According to the BAM guidelines, the species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 100 metres radius from the top of bank.	Confirmed Assumed	Confirmed species polygon applied as per TBDC guidelines. Assumed polygons were applied to all aquatic habitats not subject to survey.
Birds											
Regent Honeyeater	*Anthochaera phrygia*	✓	✓	✓	Very High (3)	Yes	As per Important Habitat Map.	93.77 ha of important habitat mapped within the subject land.	The entire area mapped on the important habitat map that occurs within the subject land is included in the species polygon.	Confirmed	Nil

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Gang-gang Cockatoo	*Callocepha-lon fimbriatum*	✓	✓	✓	High (2)	No	Habitat constraints being hollow bearing trees and Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger.	2.96 ha of recorded habitat. 42.03 ha of assumed habitat within the Wyong IBRA subregion. 41.13 ha of assumed habitat within the Yengo IBRA subregion. 7.11 ha of assumed habitat within the Hunter IBRA subregion.	The TBDC recommends establishing species polygons with a radius of 200 m around trees that have been confirmed as nesting trees (i.e. trees that birds of the species are known to have used for nesting). The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, subject land under assessment is linear, and the nest tree is already located near the edge of the wooded area.	Confirmed Assumed	Species polygon for potential breeding habitat restricted to areas of associated PCTs within condition mod-good, thinned, poor or plantation associated with or in contiguous vegetation associated with recorded presence of the species. Derived Grasslands excluded from potential habitat for the species as no breeding habitats present. Potential breeding sites identified as all hollow trees >7 cm.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							In areas of recorded species habitats, surveys were undertaken for "SIGNS OF BREEDING", defined as: (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. To confirm if species polygon required, all surveys for signs of breeding, including (diurnal bird survey, habitat assessments and flora survey transects) undertaken between (October to January) in proximity

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							(<100 m) of nest trees. Potential breeding sites not subject to survey were assumed species polygons circular in shape and must include a buffer RADIUS of 200 m around each actual nest tree. In restricted access areas all habitat associated with the species is assumed breeding habitat. One recorded species polygon associated with observed breeding behaviour in a hollow tree.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
South-eastern Glossy Black-cockatoo	*Calyptor-hynchus lathami lathami*	✓	✓	✓	High (2)	No	Habitat constraint being living or dead tree with hollows greater than 15 cm diameter and higher than 8 m above ground.	16.18 ha of assumed habitat within the Wyong IBRA subregion. 46.40 ha of assumed habitat within the Yengo IBRA subregion. 6.92 ha of assumed habitat within the Hunter IBRA subregion.	The TBDC recommends establishing species polygons with a radius of 200 m around trees that have been confirmed as nesting trees (i.e. trees that birds of the species are known to have used for nesting). The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, subject land under assessment is linear, and the nest tree is already located near the edge of the wooded area.	Assumed	Species polygon for potential breeding habitat restricted to areas of associated PCTs within condition mod-good, thinned, poor or plantation associated with or in contiguous vegetation associated with recorded presence of the species. As species may need larger patches and more intact landscapes for breeding, Derived grasslands excluded. Potential breeding sites identified as all hollow trees >15 cm.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							In areas of recorded species habitats, surveys were undertaken for "SIGNS OF BREEDING", defined as: a) begging birds of any age or sex; or b) lone adult males identified during the breeding season (April to August); or c) an occupied nest. To confirm if species polygon required, all surveys for signs of breeding, including (diurnal bird survey, habitat assessments and flora survey transects) undertaken between (April to August) in

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							proximity (<100 m) of nest trees. Potential breeding sites not subject to survey were assumed species polygons circular in shape and must include a buffer RADIUS of 200 m around each actual nest tree. In restricted access areas all habitat associated with the species is assumed breeding habitat. No recorded species polygon associated with breeding behaviour.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Swift Parrot	*Lathamus discolor*	-	✓	✓	Very High (3)	Yes	As per Important Habitat Map.	42.76 ha of important habitat mapped within the subject land.	The entire area mapped on the important habitat map that occurs within the subject land is included in the species polygon.	Confirmed	Nil
Barking Owl	*Ninox connivens*	✓	✓	✓	High (2)	No	Habitat constraint of living or dead trees with hollows >20 cm diameter that occurs >2 metres above the ground.	29.30 ha of recorded habitat. 7.34 ha of assumed habitat in the Yengo IBRA subregion.	The TBDC recommends that the species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.	Confirmed Assumed	Species polygons created to include all vegetation in mod-good, thinned and poor condition within 800 m of an owl record, containing suitable hollow-bearing trees. DNG and plantation condition areas excluded due to lack of suitable habitat. Assumed species polygon created within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Powerful Owl	*Ninox strenua*	✓	✓	✓	High (2)	No	Habitat constraints being living or dead trees with hollows >20 cm diameter that occurs >4 meters above the ground.	103.73 ha of recorded habitat. 7.34 ha of assumed habitat in the Yengo IBRA subregion. 13.76 ha of assumed habitat in the Hunter IBRA subregion.	The TBDC recommends that the species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.	Confirmed Assumed	Species polygons created to include all vegetation in mod-good, thinned and poor condition within 800 m of an owl record, containing suitable hollow-bearing trees. DNG and plantation condition areas excluded due to lack of suitable habitat. Assumed species polygon created within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Masked Owl	*Tyto novaehollandiae*	✓	✓	✓	High (2)	No	Habitat constraints being a living or dead tree with a hollow >20 cm diameter that occurs >2 metres above the ground.	22.38 ha or recorded habitat. 7.34 ha of assumed habitat in the Yengo IBRA subregion. 12.36 ha of assumed habitat in the Hunter IBRA subregion.	The TBDC recommends that the species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground.	Confirmed Assumed	Species polygons created to include all vegetation in mod-good, thinned and poor condition within 800 m of an owl record, containing suitable hollow-bearing trees. DNG and plantation condition areas excluded due to lack of suitable habitat. Assumed species polygon created within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Sooty Owl	*Tyto tenebricosa*	✓	✓	✓	Very High (3)	Yes	Habitat constraints being caves, cliffs and escapements including clifflines/ledges. Hollow bearing trees, living or dead, with a hollow >20 cm diameter that occurs >2 metres above the ground.	195.05 ha of recorded habitat. 7.34 ha of assumed habitat in the Yengo IBRA subregion. 5.43 ha of assumed habitat in the Hunter IBRA subregion.	The TBDC recommends that the species polygon must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range of the sooty owl) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20 cm diameter that occurs >4 m above the ground, or caves, or cliffs, or escarpments, or clifflines/ledges.	Confirmed Assumed	Species polygons created to include all vegetation in mod-good, thinned and poor condition within 800 m of an owl record, containing suitable hollow-bearing trees. DNG and plantation condition areas excluded due to lack of suitable habitat. Assumed species polygon created within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Mammals											
Eastern Pygmy-possum	*Cercartetus nanus*	✓	-	-	High (2)	No	None listed in the TBDC.	155.55 ha of recorded habitat.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed	Species polygons created for all associated PCTs within moderate-good, thinned, poor or plantation condition with recorded presence or contiguous habitat. Areas of derived grasslands lacking the structural habitat required to support the species have been excluded. Areas of associated habitat and subject to survey without recorded presence excluded from confirmed species polygon if separated by topographical boundary,

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
											fragmentation or barrier (Watagan Creek).
Large-eared Pied Bat	*Chalinolobus dwyeri*	✓	✓	✓	Very High (3)	Yes	Habitat constraints being within 2 kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 kilometres of old mines or tunnels.	506.36 ha of recorded habitat.	Species polygon boundary should align with PCTs on the subject land to which the species is associated that are within 2 km of identified potential roost habitat features.	Confirmed Assumed-Breeding	Confirmed species polygon created as a 2 km buffer from potential roost and habitat features within associated PCTs on the subject land. Recorded breeding habitat polygon created as a 100 m buffer form all caves subject to survey and evidence of breeding. Assumed breeding polygon created as a 100 m buffer from all cave structures within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Southern Myotis	*Myotis macropus*	-	✓	✓	High (2)	No	Habitat constraints being waterbodies with permanent pools/stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site.	120.25 ha of recorded habitat.	Where a targeted survey confirms the species presence, a species polygon must be mapped to the extent of habitat, in accordance with section 6.4 of the BAM. Potential habitat includes the range of PCTs associated with the species (as per the TBDC) within 200 meters of any medium to large permanent creeks, rivers, lakes or other watercourses (i.e. with pools/stretches 3 m or wider).	Confirmed	All PCTs associated with the species (regardless of condition) within 200 m of the bank of any medium to large permanent creeks, rivers, lakes or other waterways (3 m or wider) on the subject land.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Parma Wallaby	*Notamacro-pus parma*	✓	✓	-	High (2)	No	None listed in the BAM-C.	304.98 ha of recorded habitat.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed	Species polygons created for all associated and contiguous PCTs within mod-good, thinned, poor or plantation condition with a recorded presence. Areas of derived grasslands lacking the structural habitat required to support the species have been excluded. Areas of associated habitat and subject to survey without recorded presence excluded from species polygon including areas of contiguous habitat but separated by topographical boundary, fragmentation or

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
											barrier (Congewai Creek)/Wollombi Road.
Southern Greater Glider	*Petauroides volans*	✓	✓	✓	High (2)	No	None listed in the BAM-C.	477.12 ha of recorded habitat.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed	Species polygons created off all associated PCTs within mod-good, thinned, poor or plantation condition, with recorded presence or contiguous habitat. Areas of derived grasslands lacking the canopy required to support the species have been excluded.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Squirrel Glider	*Petaurus norfolcensis*	✓	✓	✓	High (2)	No	None listed in the BAM-C.	647.62 ha of recorded habitat.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed	Species polygons created off all associated PCTs within mod-good, thinned, poor or plantation condition, with recorded presence or contiguous habitat (separated by <50 m). Areas of derived grasslands lacking the canopy required to support the species have been excluded.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Brush-tailed Rock-wallaby	*Petrogale penicillata*	✓	✓	✓	Very High (3)	Yes	Habitat constraints include land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines.	145.64 ha of recorded habitat. 10.38 ha of assumed habitat in the Yengo IBRA subregion.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed Assumed	Species polygons created off all associated PCTs within 1 km of cliff line/ cave habitats associated with recorded presence or contiguous habitat. Assumed species polygon created using the same rules for cliff lines/cave habitats that fell within restricted access properties not subject to survey.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Brush-tailed Phascogale	*Phascogale tapoatafa*	-	-	✓	High (2)	No	None listed in the BAM-C.	90.41 ha of recorded habitat.	The TBDC recommends that if detected or presence is assumed (impact site only) the species polygon is drawn around the outer-edge of the PCTs that the species is associated, as defined in the TBDC.	Confirmed	Species polygons created off all associated PCTs within mod-good, thinned, poor or plantation condition, with recorded presence (including HVOCP (Umwelt 2024)) or contiguous habitat. Areas of derived grasslands lacking the canopy required to support the species have been excluded. In consultation with species expert Rod Van der Ree (R. Van der Ree pers. comms. 2025) regarding survey effort, species was excluded from Wyong and Yengo bioregions based on

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
											absence from targeted survey and atlas records.
Koala	*Phascolarctos cinereus*	✓	✓	✓	High (2)	No	Habitat constraints being presence of koala use trees – refer to Survey Comments field in TBDC.	244.24 ha of recorded habitat. Assumed habitat 34.38 ha of assumed habitat in the Yengo IBRA subregion. 6.12 ha of assumed habitat in the Hunter IBRA subregion.	Where a targeted survey confirms koala presence, a species polygon must be mapped in accordance with BAM 2020 (subsection 5.2.5). Where koala presence is confirmed, begin by mapping the vegetation zone in which the species was detected as the species polygon. All vegetation zones that are continuous suitable habitat with this vegetation zone should be included. If areas of suitable habitat are discontinuous, koala presence must be confirmed in each by targeted survey, for	Confirmed Assumed	Species polygons created off all associated PCTs within mod-good, thinned, poor or plantation condition, with recorded presence or contiguous habitat. Areas of derived grasslands lacking the canopy required to support the species have been excluded. Areas of associated habitat and subject to survey without recorded presence excluded from species polygon if contiguous but separated by

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
									inclusion in the species polygon. Where koala presence is assumed, the full extent of all PCTs on the subject land determined to be suitable habitat (as per section 3.2 are mapped as the species polygon.		topographical boundary, fragmentation or barrier (road, higher order stream etc.). Assumed species polygon applied to associated PCTs within restricted access properties not subject to survey.
Common Planigale	*Planigale maculata*	-	-	✓	High (2)	No	None listed by the TBDC.	18.21 ha of recorded habitat.	The species polygon is drawn to 500 m either side of the PCT ecotonal boundary, or to the other PCT boundary, whichever is smaller.	Confirmed	The creation of a species polygon associated with recorded presence within in the SDA lands was created in accordance with the TBDC guidance and extended to 500 m either side of the PCT ecotonal boundary it was recorded in.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							For the two records of the species within the Hunter IBRA in in AGL lands, the associated PCTs did not form an ecotonal boundary between Wet and Dry sclerophyll habitats. In this location a 500 m buffer was applied to the edge of the boundary of the PCT vegetation zone associated with the species record. The applied species buffer is suitably conservative in that it significantly exceeds the typical known range for the species and similar small terrestrial mammals (ref) of ~10 ha.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Long-nosed Potoroo	*Potorous tridactylus*	✓	-	-	High (2)	Yes	Habitat constraints being dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest)	133.10 ha of recorded habitat.	No relevant species specific recommendations for species polygons are provided in the TBDC.	Confirmed	Species polygons created for all associated and contiguous PCTs within mod-good, thinned, poor or plantation condition with a recorded presence. Areas of derived grasslands lacking the structural habitat required to support the species have been excluded. Areas of associated habitat and subject to survey without recorded presence excluded from species polygon including areas of contiguous habitat but separated by topographical boundary, (Watagan Creek).

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Eastern Cave Bat	*Vespadelus troughtoni*	✓	✓	✓	Very High (3)	Yes	Habitat constraints being within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, cervices or boulder piles, or within 2 km of old mines, tunnels, old buildings or sheds.	383.77 ha of recorded habitat. Whilst the species was recorded during field surveys no breeding habitat is within the subject land and as such this species is only considered as a species credit species and not a SAII entity based on impact being restricted to foraging habitat within 2 kilometres from roost sites.	Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat. All breeding habitat on or within 100 m of the subject land and the area immediately surrounding the feature must be mapped. Artificial structures should be inspected and included on the map if the species is using these features for breeding. All habitat for this species should also be mapped if present. Species mapping polygon for breeding habitat must use high resolution aerial imagery and topographic maps to identify features on the subject land (caves, scarps, cliffs etc).	Confirmed	Species polygon applied as per TBDC guidelines. No assumed breeding species polygons required as no indication of breeding activity detected during surveys.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
									Polygon must be at least 100 m wide (or 100 m radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid (see Threatened Bat Survey Guide).		
Reptiles											
Hunter Valley Delma	*Delma vescolineata*	-	-	✓	Moderate (1.5)	No	None listed in the BAM-C.	233.04 ha of recorded habitat.	Due to this species being recently described, TBDC requires this species to be assessed as *Delma impar* for NSW planning matters until a formal assessment is made for the species. TBDC recommends to map the species polygon to the full extent of all suitable habitat on the subject land. Suitable habitat is all PCTs on the subject land associated with the species in the TBDC.	Confirmed	The species habitat preferences are for areas of grasslands and open woodlands, defined as all condition classes, with the exception of mod-good condition PCTs with intact canopy.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
											Species polygon created for all associated PCTs with recorded presence or contiguous vegetation with recorded presence inclusive of adjoining records of the species from HVOCP (Umwelt 2024).
Pale-headed Snake	*Hoploce-phalus bitorquatus*	✓	-	-	High (2)	No	None listed in the BAM-C.	2.02 ha of assumed habitat in the Wyong IBRA subregion.	BAM guidelines require the species polygon to be the full extent of all suitable habitat on the subject land.	Assumed	Assumed polygon applied to areas of unsurveyed associated habitat.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
Stephens' Banded Snake	*Hoploce-phalus stephensii*	✓	-	-	High (2)	No	Habitat constraints being within 500 m of fallen/standing dead timber including logs; within 500 m of hollow bearing trees; within 500 m of arboreal vine tangles.	141.86 ha of recorded habitat. 3.85 ha of assumed habitat in the Wyong IBRA subregion.	BAM guidelines require the species polygon to be the full extent of all suitable habitat on the subject land.	Confirmed Assumed	Due to species habitat preferences for Old growth and structured habitats only areas of associated PCTs in moderate good condition were included in species polygon. Species polygon includes all areas of associated PCTs and contiguous vegetation with confirmed species records.

Common name	Scientific name	Subregion			Biodiversity risk weighting (BAM-C & TBDC*)	SAII entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Polygon type	Additional species polygon rules
		Wyong	Yengo	Hunter							
											Area of associated PCTs without records from nocturnal surveys works and separated by distinct boundary (Watagan Creek, Cliff lines etc.) were excluded from contiguous habitat and species polygon. Assumed species polygon in restricted access areas of associated PCTs in moderate good condition.

5.8 Listed aquatic threatened species, populations or ecological communities

The project is located within the Hunter-Central Rivers catchment and Hunter River sub-catchment and will cross 20 named watercourses as well as many unnamed watercourses (90% being Strahler Order <2). Desktop assessments undertaken in Appendix L (Aquatic biodiversity impact assessment) identified that 16 named watercourses and 48 unnamed watercourses were mapped as key fish habitat (KFH). Of these, four were determined to contain mapped habitat for Southern Purple Spotted Gudgeon (*Mogurnda adspersa*), which is listed as endangered under the FM Act. Slightly upstream of the subject land is the lowest extent of mapped habitat for the FM Act listed endangered Hunter River population of Darling River Hardyhead (*Craterocephalus amniculus*). Despite being outside of its known distribution this species is considered further on a precautionary basis.

A field assessment was conducted over a three-day period, between 10–12 September 2024. 7 key aquatic locations were selected since they were either determined to contain mapped aquatic habitat for Southern Purple Spotted Gudgeon or determined to be potentially impacted because of construction activities (i.e. tree pruning, sedimentation because of vegetation removal, steep banks etc.):

- Hunter River (2 locations)
- Wollombi Brook
- Loder Creek
- Monkey Place Creek
- Congewai Creek
- Watagan Creek.

All these watercourses are mapped as KFH, with Wollombi Brook and Congewai Creek containing mapped Southern Purple Spotted Gudgeon habitat. While Monkey Place Creek does contain mapped Southern Purple Spotted Gudgeon habitat, it is mapped slightly downstream of the subject land. While some of these assessed watercourses are outside of the mapped habitat for Southern Purple Spotted Gudgeon and Darling River Hardyhead, they were all identified as containing potential habitat for both species.

Minor road upgrades along Wollombi Road consist of an existing crossing over Black Creek, which is mapped as both KFH and Southern Purple Spotted Gudgeon habitat. However, this section of creek wasn't assessed in the field due to it being identified as an active stormwater drain with no significant habitat features.

The likelihood of occurrence assessment completed for threatened fish species under the FM Act determined that the Southern Purple Spotted Gudgeon had a 'high' likelihood of occurrence, while the Darling River Hardyhead had a 'moderate' likelihood of occurrence (see Appendix L (Aquatic biodiversity impact assessment)). To assess what impacts the project will have on these 2 species, a test of significance for the Southern Purple Spotted Gudgeon and the Darling River Hardyhead was conducted and the outcome is available in Appendix L (Aquatic biodiversity impact assessment).

It is anticipated that the likelihood of impacts to these species will be minimised through restriction of direct impacts to the watercourses which contain mapped species habitat. The proposed mitigation and management measures outlined in Appendix L (Aquatic biodiversity impact assessment) to manage impacts to fish habitat are likely to prevent any direct or indirect impacts to these watercourses and their habitats. It is considered unlikely that temporary impacts associated with the construction of the project would result in any long-term degradation of mapped key fish habitat areas. The projects preference will be to utilise existing watercourse crossings for construction and operation, and in the event additional watercourse crossings are required by the project, they will be designed in accordance with the relative guidelines.

The extent of impact to waterbodies, water quality, and hydrological processes from the project is expected to be minor, with appropriate management measures to be implemented. As a result, the risk of impacts on aquatic threatened species is considered minor and there is no need for targeted threatened aquatic species surveys or standalone assessment as part of the EIS.

6 Identifying prescribed impacts

Prescribed impacts are those that may affect biodiversity values in addition to, or instead of, impacts from clearing vegetation. These impacts may be difficult to quantify or offset as they often affect biodiversity values that are irreplaceable. Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as per clause 6.1 of the NSW Biodiversity Conservation Regulation 2017 (BC Regulation). The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme as follows:

(a) impacts of development on the habitat of threatened species or ecological communities associated with:

(i) karst, caves, crevices, cliffs and other geological features of significance, or

(ii) rocks, or

(iii) human made structures, or

(iv) non-native vegetation

(b) impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

(c) impacts of development on movement of threatened species that maintains their life cycle

(d) impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)

(e) impacts of wind turbine strikes on protected animals

(f) impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

A summary of the relevant prescribed impacts associated with the project is provided in Table 6.1.

The list of threatened entities likely to use the habitats and feature/s identified as a prescribed impact was generated by considering the list of threatened species auto-generated by the BAM-C for the subject land, BioNet records within the vicinity of the subject land, information on threatened species and TECs occurrence from previous surveys (e.g. from existing BDARs) and data layers, and the results of field surveys.

Wind farm impacts are not applicable. The impacts of wind turbine strikes on protected animals is only applicable for wind farm developments. The project does not include development of wind turbines so an assessment of wind turbine strike is not required.

Potential impacts from vehicle strike are addressed with regard to identifying a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the project.

The impacts and mitigation for prescribed impacts are discussed in section 8.2.2 and section 8.4.

Table 6.1 Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☒Yes / ☐No	Caves used for roosting and potentially for breeding by threatened species: — Brush-tailed Rock Wallaby — Little Bent-winged Bat — Large Bent-winged Bat — Large-eared Pied Bat — Eastern Cave Bat and — Sooty Owl. Rocky areas potentially used by: — Hunter Valley delma — Broad-headed Snake and — Pink-tailed Legless Lizard. These features are a key part of the breeding habitat for these species.	Brush-tailed Rock-wallaby (*Petrogale penicillata*) – rests and basks in rugged rocky areas, including rock faces and outcrops, with a preference for north-facing fissures, caves and ledges as refuge habitat (Short, 1982; Waldegrave-Knight 2002; Murray *et al.* 2008) and may potentially occur in the assessment area. Little Bent-winged Bat – known to roost and breed in caves (Dwyer, 1965; Hall & Richards, 2003) and be present in the assessment area. Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – known to roost and breed in caves (Dwyer, 1965; Hall & Richards, 2003) and be present in the assessment area. Large-eared Pied Bat (*Chalinolobus dwyeri*) – known to roost and breed in sandstone cliff faces without large caverns (Williams & Thomson, 2019) and caves (Pennay, 2008; Hall & Richards, 2003) and be present in the assessment area. Eastern Cave Bat (*Vespadelus troughtoni*) – known to roost in caves (see Law *et al,* 2005; Hall & Richards, 2003) and be present in the assessment area. Sooty Owl (*Tyto tenebricosa*) – known to roost in caves, cliff ledges or crevices, rock or bank overhangs in some territories and be present in the assessment area. Hunter Valley delma – known to shelter under surface rocks (see Mahony *et al* 2022, Cogger *et al*., 2003; Coulson 1995; Turner, 2014) and may potentially occur in the assessment area. Broad-headed Snake (*Hoplocephalus bungaroides*) – known to shelter in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500 m of escarpments in summer. Known to be present in the assessment area. Pink-tailed Legless Lizard (*Aprasia parapulchella*) – known to have a strong association with landscapes that are characterised by outcroppings of lightly-embedded surface rocks (Wong *et al.,* 2011) and may potentially occur in the assessment area.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC
Human-made structures	☐Yes / ☒No	No substantial human-made structures (such as old farm buildings, mine infrastructure etc) are present in the subject land.	N/A
Non-native vegetation	☒Yes / ☐No	See detailed description of non-native vegetation in section 4.1.2. Potentially used by some threatened species for movement or foraging. Unlikely to be a limiting feature of the habitat for these species in the locality due to the extensive areas of agricultural paddocks.	Masked Owl (*Tyto novaehollandiae*) – An opportunistic generalist with a varied diet (birds, insects with a preference for terrestrial mammals) (Debus, 1993) likely to forage in and use non-native vegetation (i.e. paddocks next to forested areas) as habitat (see Kavanagh & Murray, 1996). This species will go to ground in paddocks at the edge of forested habitat (see McNabb *et al.,* 2003). Known to occur in the assessment area. Koala (*Phascolarctos cinereus*) – Koalas do utilise agricultural land and will cross fences and cleared paddocks (see Kavanagh & Stanton, 2012) and there are documented interactions of Koalas and cattle (see Hill *et al.,* 2019). Use of scattered trees in paddocks is also documented (see Barth *et al.,* 2019). May potentially occur in the assessment area.
Habitat connectivity	☒Yes / ☐No	The HTP corridor crosses areas of habitat connectivity (see section 3.2.4). These habitat corridors are likely to be important components of the habitat and facilitate species movement and genetic exchange.	These habitat corridors will link habitat for the threatened species (see section 3.2.4). The project may impact the movement aerial species such as birds and bats due to the placement of powerlines and proposed transmission line towers. Movement corridors between nature reserves may be affected, potentially impacting threatened species such as the Large Bent-wing Bat, Eastern Cave Bat, Large-eared Pied Bat and threatened woodland birds. However, the project will be highly permeable and is unlikely to result in substantial impacts to local or regional connectivity. Remnant linear roadside reserves are important habitats for species such as the Squirrel Glider, and their long-term viability is likely to remain post-construction.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	The HTP corridor crosses or is near several watercourses (see section 3.2.3). Substantial impacts to water quality to these water bodies are not expected to occur, with all permanent disturbance areas located outside core riparian zone areas. All construction and operation impacts will be managed to make sure that ground disturbance is minimised and managed and direct impacts to the waterbodies themselves and related hydrological processes are not expected to occur. All waterway crossing will be designed in accordance with *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003) and *Policy and Guidelines for Fish Habitat Conservation and Management (2013 update)* (DPI 2013).	Amphibians, terrestrial species, and aerial species identified in section 5.1 and threatened fish species. However, as substantial impacts to these water bodies are not expected to occur (all permanent disturbance areas located outside core riparian zone) species that use these habitat features would not be detrimentally impacted.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	The project is not a wind farm development	N/A

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC
Vehicle strikes	☒Yes / ☐No	The HTP corridor is located adjoining to or crosses roads such as Martinsville Road, Wollombi Road, Cessnock Road, Broke Road, Putty Road and Lemington Road (and other smaller local and forestry roads). The project is likely to generate additional vehicular movements along these roads, mostly during construction but also during operation.	Threatened species at some increased risk of vehicle strike include (but are not limited to) Squirrel Glider, Barking Owl, Masked Owl, Powerful Owl, Sooty Owl, Little Eagle, White-bellied Sea-eagle, Glossy Black-Cockatoo, Gang-Gang Cockatoo, Grey-crowned Babbler, Spotted-tailed Quoll, Black Falcon and Little Lorikeet. The TECs that are likely to have some level of increased vehicle strike are: — Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions — Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions — Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast bioregions — Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions — Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions — River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions — Warkworth Sands Woodland in the Sydney Basin Bioregion. Protected fauna species that are part of these TECs that are most at increased risk from vehicle strike based on observations of roadkill made in the locality and database records are: — Mammals including Eastern Grey Kangaroo, Red-necked Wallaby, Common Wallaroo, Swamp Wallaby, Common Wombat, Short-beaked Echidna, Common Brushtail Possum, Common Ringtail Possum, Sugar Glider, Squirrel Glider, Koala. — Reptiles including Common Bearded Dragon, Jacky Lizard, Nobbi Dragon, Red-bellied Black Snake, Eastern Brown Snake, Eastern Bluetongue, Shingleback Lizard, Lace Monitor, Snake-necked Turtle.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC
			— Amphibians including Ornate Burrowing Frog, Common Froglet, Brown Toadlet, Striped Marsh Frog, Spotted Grass Frog, Eastern Banjo Frog, Peron's Tree Frog, Broad-palmed Frog, Green Tree Frog, Tyler's Tree Frog, Eastern Dwarf Tree Frog. — Birds including Wedge-tailed Eagle, Little Eagle, Whistling Kite, Australian Wood Duck, Pacific Black Duck, Masked Lapwing, Australian Magpie, Pied Currawong, White-winged Chough, Apostlebird, Australian Raven, Red-browed Finch, Double-barred Finch, Diamond Firetail, Zebra Finch, Superb Fairy-wren, Variegated Fairy-wren, Noisy Miner, Australian Pipit, Grey-crowned Babbler, Willie Wagtail, Grey Fantail, Sulphur-crested Cockatoo, Little Corella, Gang-gang Cockatoo, Glossy Black-cockatoo, Galah, Cockatiel, Yellow-tailed Black-cockatoo, Australian King-parrot, Red-winged Parrot, Musk Lorikeet, Swift Parrot, Budgerigar, Turquoise Parrot, Bluebonnet, Little Lorikeet, Eastern Rosella, Crimson Rosella, Red-rumped Parrot, Scaly-breasted Lorikeet, Rainbow Lorikeet, Southern Boobook, Barking Owl, Powerful Owl, Barn Owl, Masked Owl, Emu.

The following photos provide some examples of aspects related to prescribed impact considerations.



Photo 6.1 Caves were examined for the presence of roosting threatened bat species



Photo 6.2 The interior of caves within the subject land were examined for evidence of use by threatened fauna



Photo 6.3 Sandstone rock outcrops and caves provide potential habitat for threatened bats and Brush-tailed Rock-wallaby



Photo 6.4 Rocky cliff lines provide suitable habitat for the threatened Brush-tailed Rock-wallaby



Photo 6.5 Existing electrical transmission easement within Olney State Forest



Photo 6.6 Existing electrical transmission easement where *Genoplesium insigne* (Variable Midge Orchid) was observed growing



Photo 6.7 Small dams provide potential habitat for threatened and non-threatened aquatic species

Stage 2: Impact assessment (biodiversity values and prescribed impacts)

7 Avoid and minimise impacts

The following provides information on avoiding and minimising impacts on biodiversity values through the planning and design phase of the project. This information is provided to directly address section 7 of the NSW Biodiversity Assessment Method 2020 (BAM).

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Background

The Hunter Transmission Project (HTP, the project) is critical for energy security in NSW. The criticality of HTP is recognised by declaring it as an actionable project in the Integrated System Plan (ISP) released in 2022 by the Australian Energy Market Operator (AEMO). In the ISP, HTP forms part of the group of actionable ISP projects referred to as 'Sydney Ring' (Reinforcing Sydney, Newcastle and Wollongong Supply).

Australian Energy Market Operator (AEMO) advised that new transmission development that increase intra-regional transfer limits into the Sydney-Newcastle-Wollongong area would help alleviate major transmission constraints and reduce energy security deficits in the next decade.

The HTP is currently proposed to provide an estimated additional 5,000 MW of transfer capacity, enabling new generation in the New England Renewable Energy Zone (REZ) and Central West Orana REZ to reach Sydney, Newcastle and Wollongong load centres.

The NSW Minister for Energy appointed EnergyCo as Infrastructure Planner for the HTP in a letter dated 17 June 2022. At this time, EnergyCo assumed responsibility for planning and design of the transmission corridor and began engaging local communities and stakeholders to inform the development of new transmission network.

7.1.2 Approach to HTP corridor development

Since EnergyCo's appointment as the Infrastructure Planner, the project development process included the following steps:

- established the strategic objectives and supporting evaluation criteria (see Table 7.1) to inform the corridor development assessment process
- identified opportunities and constraints, with key features identified and classified into categories to guide the development of corridor and alignment options. These corridor and alignment options were then assessed against the strategic objectives and evaluation criteria
- undertook spatial modelling, where data sets were collated with weightings assigned consistent with strategic objectives to process though a geographical information system (GIS) spatial model. The spatial model developed mapped corridor options for evaluation and iterative reruns of the modelling were undertaken upon review by the project team
- undertook ground-truthing activities to further assess the viability of the corridors and alignments
- reviewed and evaluated the refined corridors and alignments against the strategic objectives and evaluation criteria
- selected the preferred corridor and subsequent preferred alignment.

Table 7.1 HTP strategic objectives

Strategic objectives
Maximise use of mines, suitable public land and electricity easements
Minimise significant land use conflicts and impacts on people and the environment
Minimise hazards and risks
Build community support
Deliver the project on time and at reasonable cost to consumers

To guide the preferred corridor and subsequent preferred alignment process the guiding principles for environmental factors was to minimise impacts on unique or sensitive biodiversity and cultural values and offset unavoidable biodiversity impacts.

This included a tiered approach to avoiding areas with significant biodiversity values by initially prioritising avoidance of national parks, nature reserves, protected areas, existing offset areas, and wetlands, and minimising impacts to high conservation woodland remnants and scarce valley floor vegetation such as the critically endangered, Central Hunter Valley eucalypt forest and Warkworth Sands Woodland.

7.1.3 Summary of option assessment

By applying the strategic objectives identified in Table 7.1 and guiding principles, the initial options development process focussed on the identification of several alternative alignments located between Bayswater and Eraring power stations. The alignments were grouped into 3 broad corridors known as the:

- Northern corridor
- Central corridor
- Southern corridor.

An overview of these 3 corridors is provided in section 7.1.3.1 to section 7.1.3.3.

7.1.3.1 Northern corridor

The Northern corridor contains the most geographically diverse alignments of the alternatives considered, and are the longest corridor alignment options considered, taking an indirect path that travels north and east from Bayswater Power Station before turning south towards Eraring Power Station. This alignment allows the routes to connect to the Richmond Vale substation option and avoid ecologically sensitive areas. However, due to its overall length, these options pass a greater number of visual receivers than other options considered and are not able to utilise mining, public or Crown owned land to the same extent as the other options.

7.1.3.2 Central corridor

The most direct of the corridors considered, the 6 alignments within the Central corridor extend south from Bayswater before turning southeast, and ultimately approaching Eraring from the north. Like the Northern corridor options, the Central corridor includes an option to travel via a potential substation location at Richmond Vale. Despite being the shortest of the options considered, these alignments within the Central corridor are characterised by moderate to high impacts on ecologically sensitive areas and nearby residents. The town of Kurri Kurri and Sugarloaf State Conservation Area have potential to be impacted by the Central corridor.

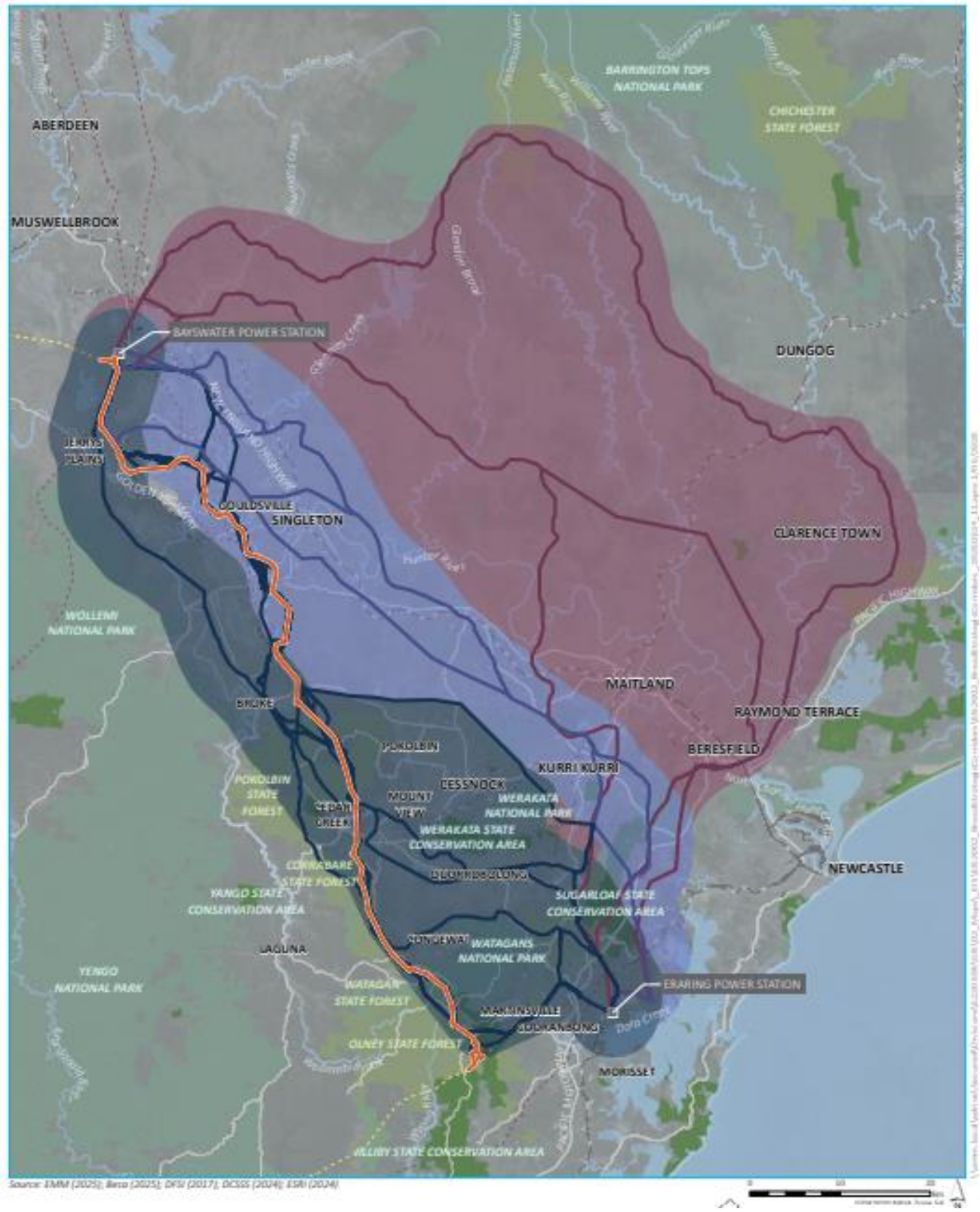


Figure 7.1 Project corridor options with red being the northern corridor, light blue being the central corridor and dark blue being the southern corridor (source: EMM 2025)

7.1.3.3 Southern corridor

The Southern corridor presents the most variety in terms of alignments, with 8 different options considered. The options extend directly south from Bayswater Power Station and have the potential to utilise larger amounts of public land than the other corridors, due to the presence of State Forests to the south. Another opportunity available in the Southern Corridor is large areas of potentially inactive mining land for alignments with lower adverse environmental and social impacts than would otherwise be possible.

7.1.4 Selection and refinement of the preferred corridor for biodiversity

7.1.4.1 Preferred corridor

Whilst all corridors assessed present benefits and challenges for a new transmission line, on balance the Southern corridor was preferred to progress to consider for further assessment and project development due to the overall best potential to meet the strategic objectives. The key advantages of this corridor are as follows:

- has the potential for co-location with existing transmission infrastructure
- maximises use of already disturbed areas whilst minimising interaction with the community
- maximises use of available mining and industrial lands
- intersects and utilises large amounts of public land
- minimises the potential visual amenity impacts by avoiding the populated and heavily touristed areas through the Central Hunter Valley
- avoids impacts to key local industries including viticulture, tourism and equine industries.

Further influencing the selection of the Southern corridor as preferred, were some of the insurmountable challenges associated with both the Northern and Central corridors. In particular, both the Northern and Central corridors have high potential for significant land use conflicts, significant impacts to people and potential for significant delays to obtaining the required community support and approvals which would jeopardise delivery of the project on time and at reasonable costs for consumers.

The HTP corridor transects 2 generally distinct environmental landforms in the Hunter valley floor and forested plateau and ranges, each with unique biodiversity values and ecosystems. Avoiding significant biodiversity values within both of these landscapes has been key to informing the selection of the adopted HTP corridor (see section 7.1.2).

South from the township of Bulga the HTP corridor specifically avoids further impacts to these threatened valley floor landscapes, notably large areas of threatened ecological communities (TECs) and important habitat for the Regent Honeyeater and Swift Parrots, by transecting the forest ecosystems of the plateau and ranges. These ranges are dominated by a mixture of remnant moist wet sclerophyll vegetation within the sheltered valleys and dry sclerophyll forests on the ridgelines and upper slopes. Both of these ecosystems are well represented within the National Park Estate and are not considered to be over cleared landscapes.

7.1.4.2 Refinement of preferred corridor

The HTP has incorporated the following into the alignment refinements and project assessment:

- **co-location:** placing sections of the transmission line alongside existing infrastructure or in disturbed areas, such as mining sites, forestry operations or cleared lands, where native vegetation and habitat quality are low
- **relocation:** adjusting the corridor route to avoid impacts on listed communities and species following fields surveys, particularly avoiding known populations of threatened species, such as significant serious and irreversible impact (SAII) species of Brush-tailed Rock-wallaby, microbats and threatened flora habitats

- **spanning and retention of forested gullies:** within the subject land there is further scope to reduce the extent of clearing in the State forests by spanning steep ravines and avoiding clearing vegetation in the valleys and by partially clearing the easement in other areas, similar to the clearing for the existing 500kV Eraring-Kemps Creek transmission line in Olney State Forest. By maximising the spanning of gullies within the forest by locating alignment and proposed transmission line tower spacing the project has reduced clearing by ~20% within the forest
- **partial clearing:** implementing controlled vegetation clearing within and adjacent to the transmission line easement, focusing only on vegetation taller than 2 metres
- **project design and alterations:**
  - **Sites A and B – Hunter Valley:** minimising impacts on high-quality remnant Central Hunter Valley eucalypt forest and Warkworth Sands Woodland by prioritising location of the project on derived and disturbed grassland and low-quality vegetation areas. Project design within the Hunter Valley also included aligning most of the transmission line along valley floors dominated by active coal mines and existing transmission easements, thereby avoiding the national park estates
  - **Site C – Singleton Military Area:** avoiding further fragmentation of large, intact areas of important Regent Honeyeater and Swift Parrot habitat within the Singleton Military Area through collocation with existing transmission lines
  - **Sites D and E – Pokolbin State Forest:** realignment within Pokolbin State Forest to avoid the significant Brush-tailed Rock-wallaby, Microbat and threatened flora populations
  - **Sites F and G – Corrabare State Forest:** realignment within Corrabare State Forest to avoid the SAII Sooty Owl breeding location and realignment to maximise no clearing zones and valley spanning
  - **Site H – Watagan State Forest:** realignment within Watagan State Forest (to avoid significant Brush-tailed Rock-wallaby and Threatened frog breeding habitats), Warrawolong Flora reserve (old growth stands of vegetation and rainforest), and maximise alignment within existing disturbances areas of the State Forest hardwood plantation areas without impacting harvest operations
  - **Site I – Olney switching station to TG 5A1/5A2 tie-ins:** realignment within Olney State Forest to minimise extent of native vegetation clearing
  - **Site J – Olney 500 kV switching station:** relocating the eastern switching station from Eraring to Olney State Forest to minimise vegetation clearing through Olney State Forest, Martinsville and Eraring
- **access:** using existing access tracks where possible to minimise additional vegetation clearing and minimising construction of new access tracks
- **site selection:** strategically placing substations and ancillary infrastructure to largely avoid impacts on listed communities and species, including potential SAII entities
- **micro-siting:** mechanisms to adjust project features during the detailed design phase to avoid areas with high biodiversity value when on the ground works commence.

7.1.4.3 Sites A and B – Hunter Valley refinements

Several design changes occurred that allowed for avoidance of high biodiversity values (see Figure 14.23 and Figure 14.24). Easement realignments and refinements focused on co-location of electrical assets to minimise biodiversity impacts along with targeting the utilisation of existing access tracks and maximising disturbed coal operation land and Category 1 – excluded land (agricultural).

Impact to Warkworth Sands Woodland was achievable through co-location with existing electrical infrastructure easements and access tracks.

Design refinements to the proposed Bayswater Switching Station that moved the footprint away from native vegetation patches enabled avoidance to a population of *Diuris tricolor* and minimise impacts to the TEC Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions and EC Central Hunter Valley eucalypt forest and woodland.

7.1.4.4 Site C – Singleton Military Area refinements

As part of the project design phase, EnergyCo explored 3 options through the Singleton Military Area, being:

- Western option
- Eastern option
- Central option.

The 3 options share a common alignment to the north of Cessnock Road. The 3 options are shown in Figure 14.23 and Figure 14.24.

The biodiversity constraints assessment of the 3 HTP route options within the Singleton Military Area study area identifies the western option as the preferred option from a biodiversity perspective given that a large proportion of this option crosses through the highly disturbed agricultural land of the valley floor and lower slopes that has been cleared of native vegetation. This option has the lowest overall potential impact to native PCTs (avoidance of about 15 hectares of native vegetation) and TECs (avoidance of about 10 hectares of EPBC Act and BC Act). The western option would also have the least impact to mapped important habitat for Regent Honeyeater and Swift Parrot (with avoidance more than 10 hectares of important habitat).

7.1.4.5 Sites D and E – Pokolbin State Forest refinements

Several alignment changes were made through the Pokolbin State Forest to avoid significant biodiversity values (see Figure 14.23 and Figure 14.24).

Design changes included shifting the easement slightly to the north of Campbell Springs Trail to utilise ridgetop proposed transmission line tower locations to allow non-clearing gully spans through this section of the alignment. The earlier design was more closely aligned to the broader flat ridge that Campbell Springs Trail runs along that would have resulted in a large native vegetation clearing footprint with less opportunity for non-clearing gully spans.

Design changes to the west of Broken Back Road saw the easement originally exiting Pokolbin State Forest off old logging trails associated with Bees Nest Ridge Road. The exit proposed transmission line tower location under this option was positioned in an area that has a large population of *Eucalyptus fracta* (an SAII entity), *Prostanthera cineolifera* and the Brush-tailed Rock-wallaby. The design change in this area has avoided impacts to this high biodiversity value area and shifted the alignment to the north where it follows an old logging trail. The design change does not completely avoid impact to *Eucalyptus fracta* or Brush-tailed Rock-wallaby however is considered to avoid large scale impact associated with the Bees Nest Ridge Road.

A central option between the Bees Nest Ridge Road and current alignment was also considered but this option was identified to have less opportunity to co-locate with existing disturbed forestry trails and was identified to have a large population of *Prostanthera cineolifera*. This option was abandoned and impact avoided.

7.1.4.6 Sites F and G – Corrabare State Forest refinements

Within Corrabare State Forest a number of design refinements have allowed native vegetation clearing and impacts to threatened species to be minimised and avoided (see Figure 14.23 and Figure 14.24).

A major easement realignment occurred in Corrabare State Forest between Flick Road and Crawfords Road where the alignment was shifted to the south following Becketts Road to allow greater non-clearing spans of gullies through this area. The option to the north followed a lower ridge system that limited non-clearing spans and as such vegetation clearing has been minimised in this area.

Design refinements also occurred in the vicinity of a rock cave where Sooty Owls were observed within. Alignment adjustment in this area has avoided any potential impacts (direct and indirect) to this likely Sooty Owl breeding rock cave.

7.1.4.7 Site H – Watagan State Forest refinements

Several alignment changes were made through the Watagan State Forest between Langans Road and Wollombi Forest Road to avoid significant biodiversity values (see Figure 14.23 and Figure 14.24).

Under this option the alignment was positioned further south and followed the valley floor along the paper road of Watagan Shelf Road. This option had the alignment impacting old growth wet sclerophyll and rainforest within Warrawolong Flora Reserve. Old growth Mountain Blue Gum (*Eucalyptus deanii*) and Turpentine (*Syncarpia glomulifera*) species were recorded with many trees exhibiting diameter at breast height of greater than 150 centimetres. This option was abandoned and impacts on this high biodiversity value area was avoided.

A further design option considered was aligning the transmission line with Wave Rock Road. This option had a proposed transmission line tower pad located on a rock pagoda when high numbers of brush-tailed rock wallaby records occur. Given the brush-tailed rock wallaby is an SAII entity this option was also abandoned and impact to this species at Wave Rock Road was avoided.

Other design options impacted state forest operation and as such a balance between avoiding biodiversity values and locating the easement within disturbed forestry lands was achieved through the latest design. This design co-locates with New Road and Watagan Creek Road with non-clearing areas spanning most gullies. This option also allows for a large non-clearing span between the north of Watagans Creek Road to the south of Langans Road, further avoiding high biodiversity values of wet sclerophyll and rainforest vegetation.

7.1.4.8 Site I – Olney switching station to TG 5A1/5A2 tie-ins

As part of the initial project design phase, EnergyCo explored 3 options for transmission line tie-in to the Transgrid 5A1/5A2 easement from the proposed new Olney switching station through Olney State Forest (see Figure 14.23 and Figure 14.24). The 3 options are:

- Western option (accessed from Watagan Forest Road)
- Central option (accessed from Stump and Tree Point Road)
- Eastern option (accessed from Douglas Point Road).

Of the 3 options considered the eastern option is considered to have the least impact on biodiversity. This option is about 2.75 kilometres in length and as with the other 2 options it projects south from the Olney Switching Station. The initial route option follows the same path as the 2 other options before projecting southeast from Jiffy Pot Road to Watagan Forest Road where it follows a broad ridge area that has been subject to historic forestry practices and is heavily vegetated with forestry revegetation mapped as PCT 3263 – Watagan Range Turpentine – Mahogany Grassy Forest.

This option then follows Douglas Point Road where blackbutt dominated forest occurs in the form of PCT 3230 – Central Coast Escarpment Moist Forest. Under this option the easement width is sufficient for the co-location of 2 power transmission lines to the end of Douglas Point Road before the ridge spur terminates and a deep gully system associated with Jilliby Jilliby Creek occurs. The narrowing nature of the ridge spur to southeast means that the 2 transmission lines need to separate at this point to avoid excessive clearing of the Jilliby Jilliby Creek gully system with 1 line projecting southeast to the TG 5A1/5A2 where it connects with the ridge spur associated with Tin Dog Point Road and the other projecting southwest to the Stump and Tree Point Road ridge.

The southeast projection of this eastern option is bisected by a deep incised gully associated with a tributary of Jilliby Jilliby creek that is fringed by rainforest vegetation in the form of PCT 3029 – Lower North Wet Gully Palm Rainforest. Whilst this vegetation does not form part of and threatened ecological community rainforest listing it does provide suitable habitat for a range of threatened species including the SAII listed stuttering frog.

It is understood that the proposed transmission line tower pad locations will be sited on elevated ridges that will allow spanning of the 2 main creek gullies associated with Jilliby Jilliby Creek. The eastern option is considered to avoid about 10 hectares of native vegetation clearing when compared with the central option and up to about 50 hectares when compared with the western option.

7.1.4.9 Site J – Olney 500 kV switching station

During the initial design phase for the project options were explored in locating an eastern switching station that allows for the connection of HTP into the existing transmission line 5A1 and 5A2: Eraring – Kemps Creek 500 kV. Initial designs had the switching station located near the existing Eraring substation and was referred to as the Eraring West switching station. As the project developed, avoid and minimise criteria considered 4 options for the switching station location (see Figure 14.23 and Figure 14.24). These options were:

- Eraring West
- Martinsville
- Olney State Forest option 1 – Watagan Forest Road
- Olney State Forest option 2 – Ridgeline via easement.

Of the 4 options analysed, the preferred adopted option was Olney State Forest option 1 – Watagan Forest Road. Under this option the truncation of the transmission line in Olney State Forest allowed an avoidance in vegetation clearing of about 100 hectares compared to the Eraring West option. The Olney State Forest option 1 – Watagan Forest Road option allowed avoidance of between 20 to 100 hectares of native vegetation clearing when assessed against all other option. Under this option impacts were also avoided to about 5.7 ha of Swamp Sclerophyll Forest on Coastal Floodplain that is threatened ecological community under both the BC Act and EPBC Act.

7.1.5 Project design

Section 7.1.2 of the BAM deals with designing the project to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat. The BDAR must document the reasonable measures taken by the proponent to avoid or minimise clearing of native vegetation and threatened species habitat during project's design development, including placement of temporary and permanent ancillary construction and maintenance facilities.

It is important to note when considering project design that the disturbance areas presented and assessed in this BDAR are conceptual. The disturbance areas are identified based on realistic project component locations and areas however it is indicative. There would be a detailed design process and the final impact area would be confirmed during finalisation of design and construction methodology.

The design and refinement process undertaken for this project was similar to that undertaken for transmission line projects including Central-West Orana REZ - Transmission Connection, HumeLink, Snowy 2.0 – Transmission Connection, Project EnergyConnect (NSW – Eastern Section), Project EnergyConnect (NSW – Western Section), and Wollar – Wellington Transmission Line.

In accordance with section 7.1 of the BAM, efforts to avoid and minimise direct impact on native vegetation and habitat through design of the project are addressed in Table 7.2.

Table 7.2 Efforts to avoid and minimise impacts on native vegetation and habitat during project design

Principles	Proposal consistency
Designing a project to avoid and minimise impact on native vegetation, threatened species, threatened ecological communities and their habitat (section 7.1.2.1 of BAM)	
(a) Reducing the proposal's clearing footprint by minimising the number and type of facilities	The project design features various disturbance areas with different impact intensities, avoiding complete vegetation and habitat removal in any single area. This approach is outlined in detail in section 8.1. Briefly, the design incorporates 3 levels of disturbance scaled to the minimum necessary for each project component. Impacts vary from complete removal in areas of proposed transmission line towers, stringing sites, new/upgraded access tracks, construction support sites (including worker accommodation), to partial removal and retention of vegetation and habitat along the transmission line alignment between proposed transmission line towers considering vegetation clearance heights required for operational and safety requirements, including bushfire risk management. In locating ancillary facilities key factors applied to the identification of potential main construction support sites (including worker accommodation) and laydown areas included: — being in areas which have previously been disturbed, or would already require disturbance as part of the construction of the proposal — no impacts to threatened species (or their habitats) or threatened ecological communities (within the meaning of the BC Act or the EPBC Act) — being located on sites of identified lower ecological and heritage value — being located an appropriate distance from watercourses (i.e. locations greater than 200 metres away).
(b) Locating ancillary facilities in areas where there are no biodiversity values	
(c) Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	
(d) Locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC or is an entity at risk of a serious and irreversible impact (SAII)	
(e) actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	Mitigation measures have been developed to address the direct and indirect impacts of the project, including restoration and rehabilitation, and is outlined in section 8.4. Vegetation maintenance protocols would be developed for the project. All commitments etc. will be captured in an OEMP or managed as part of the Network Operators accredited EMS.

7.2 Micro-siting process

The project was assessed using a concept design, which includes sufficient detail to determine land and infrastructure requirements including the location and size of project features, and to inform constructability components. The BDAR uses the concept design to develop an indicative yet realistic disturbance model, with actual disturbance areas to be confirmed during detailed design.

On the basis the project is approved, the Network Operator would prepare a detailed design based on additional site investigations, technical specifications, topographical and access constraints, compliance with any planning approval requirements, and micro-siting of project features to avoid or further minimise impacts to biodiversity values.

It is noted that in developing a detailed design that seeks to avoid or further minimise impacts to biodiversity values, the Network Operator is also required to avoid or further minimise impacts to other environmental values such as Aboriginal and historic heritage items. In this regard, it is not always possible to avoid biodiversity values beyond the impacts assessed in the BDAR.

The general approach to locating project features within the assessed footprint is set out here. The Network Operator would review the spatial data from the BDAR and other EIS studies to identify key constraints and opportunities when developing the detailed design. The proposed transmission line towers are designed as part of a coordinated transmission network, meaning the placement of 1 proposed transmission line tower influences the placement of the next proposed transmission line tower, and so forth. The Network Operator, which comprises a multi-disciplinary team, must take all this information into account, including biodiversity values and constraints, when making decisions on design including micro-siting of project features.

Confirmation of proposed transmission line tower siting locations is important as it sets the clearing extent of the permanent easement (disturbance areas A and B) and the adjacent hazard tree zone. This provides the opportunity for the avoidance of Hunter Floodplain Red Gum Woodland and Warkworth Sands Woodland or other TECs if present on or outside of the current disturbance, but remaining within the biodiversity study area.

The Network Operator will review the location of final project features to monitor and track it does not result in increased impacts (compared to the BDAR), and look for opportunities to reduce impact, consistent with project commitments.

In carrying out vegetation clearing, the Network Operator would confirm the location and extent of vegetation to be cleared through pre-clearing surveys, and demarcation of clearing extents onsite, and post-clearing survey. The Network Operator would typically only clear the minimum amount of vegetation necessary to facilitate construction and meet operational requirements.

The HTP is committed to ensuring that the clearing limits are not exceeded and will monitor and track the total predicted clearing value against the limits. In the unlikely event that an exceedance is predicted, the project will discuss the matter with the NSW Department of Planning, Housing and Infrastructure and will seek the Planning Secretary's agreement, as required.

7.3 Avoid and minimise prescribed impacts

7.3.1 Project location

Section 7.2.1 of the BAM deals with locating the project to avoid or minimise prescribed biodiversity impacts. EnergyCo identified and evaluated a range of transmission line corridor options as outlined in section 7.1 and in Chapter 3 (Alternatives and options) of the EIS.

Table 7.3 outlines how the project has been located to avoid and minimise impact on prescribed biodiversity impacts.

Table 7.3 Efforts to avoid and minimise impacts on prescribed biodiversity during project planning

Prescribed biodiversity impacts	Project planning
Locate the project to avoid and minimise impact on prescribed biodiversity (section 7.2.2.1 of BAM)	
(a) locating surface works to avoid direct impacts on the habitat features identified in Chapter 6	The approach outlined in section 7.1 has enabled: — impacts to caves have been avoided or minimised — impacts to rocky habitats have been avoided or minimised — impacts to habitat connectivity and species movement have been avoided and minimised — impacts to water-related values have been avoided and minimised — impacts of vehicle strikes have been avoided and minimised.
(b) locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features identified in Chapter 6. For example, locating longwall panels away from geological features of significance, groundwater-dependent plant communities and their supporting aquifers	The approach outlined in section 7.1 has enabled: — impacts to caves have been avoided or minimised — impacts to rocky habitats have been avoided and minimised — impacts to habitat connectivity and species movement have been avoided and minimised — impacts to water-related values have been avoided and minimised — impacts of vehicle strikes have been avoided and minimised. Subsurface works are expected to be minor.
(c) locate the project to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways	The approach outlined in section 7.1 has enabled: — impacts to caves have been avoided or minimised — impacts to rocky habitats have been avoided and minimised — impacts to habitat connectivity and species movement have been avoided and minimised — impacts to water-related values have been avoided and minimised — impacts of vehicle strikes have been avoided and minimised. Connectivity may be impacted to some degree, particularly for aerial species, however such impacts are not expected to be significant. It is not possible to avoid some impact on connectivity given that the project needs to be located in the general location and in a manner that is functional.
(d) optimising project layout to minimise interactions with threatened entities	The approach outlined in section 7.1 has enabled: — impacts to caves have been avoided — impacts to rocky habitats have been avoided and minimised — impacts to habitat connectivity and species movement have been avoided and minimised — impacts to water-related values have been avoided and minimised — impacts of vehicle strikes have been avoided and minimised. The EIS outlines the approach to the identification and refinement of the proposal corridor. A hierarchy of constraints and opportunities was used to define and refine the preliminary and preferred alignment corridors.
(e) locate the project to avoid impacts on water bodies or hydrological processes.	No waterbodies will be directly impacted. The approach outlined in section 7.1 has enabled impacts to water-related values to be avoided and minimised.

7.3.2 Project design

Section 7.2.2 of the BAM deals with designing the project to avoid or minimise prescribed biodiversity impacts. EnergyCo identified and evaluated a range of transmission line corridor options as outlined in section 7.1 and in Chapter 3 (Alternatives and options) of the EIS.

Section 7.1 of this BDAR and Chapter 3 (Alternatives and options) of the EIS outline the design of the project. There are no feasible alternatives to the project and the project has been designed in a holistic manner which considers multiple constraints and opportunities. There are no alternative modes or technologies, alternative routes, alternative locations, or alternative sites that would reduce prescribed biodiversity impacts.

7.4 Other measures considered

The following strategic alternatives have been considered against their ability to deliver on the strategic project objectives:

- Strategic option 1: Base case ('do nothing')
- Strategic option 2: Battery storage
- Strategic option 3: Network solutions.

7.4.1 Strategic option 1: Base case ('do nothing')

This alternative is to do nothing to the existing transmission network that forms part of the 'Sydney Ring' and supplies the Sydney, Newcastle and Wollongong (SNW) load centres. The alternative would rely on the existing transfer capacity of the network and other augmentations by Transgrid to meet future load demands and accommodate the energisation of the REZs as part of the wider network.

Power flowing into the SNW load centre is measured by a cut-set limit, adding together all the transfer capacity of the transmission lines bringing power from regional NSW to the SNW load centres. The current Central NSW (CNSW) – SNW cut-set limit is 7525 megawatts. As coal fired power stations close, this limit will decrease to 6,125 megawatts.

Further, Transgrid's 2022 Transmission Annual Planning Report has identified high line utilisations for the existing 330 kV transmission lines between Liddell and Tomago / Newcastle for both N and N-1 utilisation, where N utilisation refers to the condition with all network elements in service and N-1 utilisation refers to the most critical credible contingency. Modelling results show that these loadings will increase to beyond 100% post Eraring Power Station retirement.

As such, the do nothing alternative has been rejected as unacceptable because it will not address the overall energy system needs and will hamper delivery of the NSW Electricity Infrastructure Roadmap.

The do nothing alternative would adversely impact on:

- the ability to provide NSW consumers with affordable, clean and reliable power
- NSW's transition to renewable power generation, by impacting the implementation of REZs across NSW, in particular in the Central West Orana, New England and Hunter Central Coast regions as alternatives to the current coal fired power stations
- future opportunities for economic growth, particularly with regard to a further use of electrically powered transport, plant, equipment and devices.

7.4.2 Strategic option 2: Battery storage

In late 2021/early 2022, the Australian Energy Market Operator (AEMO) conducted consultation on non-network options for reinforcing supply to Sydney, Newcastle and Wollongong ('Sydney Ring'). Submissions received generally comprised battery storage, battery storage with automated control schemes and power flow controllers. These projects were assessed as to whether each solution met or is reasonably likely to deliver net market benefits for consumers by increasing capability to supply the SNW load centres, following coalfired power station closures in the Newcastle area.

AEMO's assessment findings indicate that the large scale of the SNW area means that non-network options such as battery storage and System Integration Protection Schemes (SIPS) on their own cannot fully provide the required capacity increase and instead could form part of a hybrid solution. As such, a long-term network solution that can provide the required improvement of transfer capacity is required.

Acknowledging that the proposed early closure of Eraring Power Station is unlikely to allow sufficient time to deliver a long-term network solution prior to closure, EnergyCo in its capacity as Infrastructure Planner under the EII Act is delivering the Waratah Super Battery (WSB) project to make sure that the SNW region continues to have a reliable energy supply following the closure of the Eraring Power Station until a longer term network solution is delivered.

7.4.3 Strategic option 3: Network solutions

EnergyCo engaged Transgrid to conduct a transfer limit study to assess the electricity transfer limit based on thermal and voltage constraints between the CNSW sub-region and the SNW sub-region post Eraring Power Station and Vales Point Power Station retirement. The study assessed a series of Hunter to Sydney transmission augmentation options including:

- uprate the existing 330 kV lines from Bayswater – Sydney West via Regentville and Liddell – Tomago/Newcastle to high temperature conductor
- uprate the existing 330 kV line from Bannaby – Sydney West to a higher operating temperature
- 500 kV double circuit from Bayswater to Eraring and substation upgrades as needed
- 500 kV double circuit from Bayswater to Kemps Creek
- install power flow controller on 330 kV line from Liddell – Newcastle/Tomago
- battery option with SIPS that operate as a Virtual Transmission Line.

Transgrid's transfer limit study results showed that minor augmentations such as transmission line uprating, the installation of power flow controllers and the battery SIPS option can increase the CNSW – SNW transfer level by about 200–1000 megawatts, while major augmentations such as a 500 kV double circuit transmission line from Bayswater to Eraring or Bayswater to Kemps Creek can increase the CNSW – SNW transfer level by 3000–4000 megawatts.

7.4.4 Preferred strategic alternative

Based on assessments conducted by AEMO and Transgrid, a 500 kV double circuit transmission line will be required to support the future load demands as a long-term solution. In addition, when considering the preferred connection for a new transmission line, a new connection between Bayswater and Eraring is preferred to the connection between Bayswater and Kemps Creek, due to the higher transfer level achieved and the overall shorter transmission line distance.

7.5 Summary of measures to avoid and minimise impacts

Table 7.4 documents the measures to avoid and minimise direct, indirect and prescribed impacts.

Table 7.4 Avoidance and minimisation measures for direct, indirect and prescribed impacts

Action	Outcome	Timing	Responsibility
Identified and evaluated a range of transmission line corridor options	The project has sought to maximise avoidance and minimisation of biodiversity impacts. Impacts to TECs have been avoided and minimised through the corridor refinement and selection process. While efforts have been made to avoid biodiversity impacts, some impacts cannot be avoided.	Design phase	EnergyCo
Locating the project to avoid high biodiversity values	The project has successfully avoided locations of threatened plant species that were identified during field surveys. Surveys undertaken in 2023/2024 located threatened plant species in the preliminary alignment options including: — Olney 500 kV switching station: relocating the eastern switching station from Eraring to Olney State Forests to minimise vegetation clearing through Olney State Forest, Martinsville and Eraring. — Olney switching station to TG 5A1/5A2 tie-ins: realignment within Olney State Forest to minimise extent of native vegetation clearing. — Watagan State Forest: realignment within Watagan State Forest to avoid significant Brush-tailed rock wallaby and threatened frog breeding habitats, Warrawolong Flora Reserve, “Old growth” stands of vegetation and rainforest maximise alignment disturbance within existing disturbances areas of the State forest hardwood plantation areas without impacting harvest operations. — Corrabare State Forest: realignment within Corrabare State Forest to avoid the SAII Sooty Owl breeding cave location. — Pokolbin State Forest: realignment within Pokolbin State Forest to avoid the significant Brush-tailed rock wallaby, Microbat and threatened flora populations. — Singleton Military Area: avoiding further fragmentation through collocation with existing transmission lines of large, intact areas of important Regent Honeyeater and Swift Parrot habitat within the Singleton Military Area.	Design phase	EnergyCo

Action	Outcome	Timing	Responsibility
	— Hunter Valley: minimising impacts on high-quality remnant Central Hunter Valley eucalypt forest and Warkworth Sands Woodland by directing the project towards derived and disturbed grassland and low-quality vegetation areas. Project design within the Hunter Valley also comprised of aligning most of the transmission line along valley floors dominated by active coal mines and existing transmission easements, thereby avoiding national park estates. Opportunities exist in the detailed design phase to micro-site project features away from areas of high biodiversity values.		
Locating ancillary facilities to avoid high biodiversity values	The key factors applied to the identification of potential main construction compounds and accommodation camps included: — being in areas which have previously been disturbed, or would already require disturbance as part of the construction of the project — limiting impacts to threatened species (or their habitats) or threatened ecological communities (within the meaning of the BC Act or the EPBC Act) — being located on sites of identified lower ecological and heritage value — being located an appropriate distance from watercourses (i.e. locations greater than 200 metres away).	Design phase	EnergyCo
Vegetation and habitat removal minimised through implementation of a varied disturbance regime	The design of the project incorporates a variety of disturbance areas of varying impact intensity as opposed to a single disturbance area where complete vegetation and habitat removal would occur. This approach is outlined in detail in Chapter 8 (Impact assessment). Opportunities exist in the detailed design phase to micro-site project features away from areas of high biodiversity values. The maintenance zone underneath the transmission line will be managed through the removal of vegetation with specific growth height levels in accordance with vegetation clearing requirements (i.e. down to a growth height of 2 metres) leaving the midstorey and ground layers intact within disturbance areas B and HZ. These areas don't include disturbance area A, which is where vegetation would be completely removed in the subject land, including sub-surface disturbance from construction activities such as grading, excavation, and full tree removal.	Design phase Operational phase	EnergyCo

Action	Outcome	Timing	Responsibility
Avoiding and minimising prescribed impacts	The approach outlined in section 7.1 has enabled: — impacts to caves to be avoided — impacts to rocky habitats to be avoided or minimised — impacts to habitat connectivity and species movement to be avoided or minimised — impacts to water-related values to be avoided and minimised — impacts of vehicle strikes to be avoided and minimised. Opportunities exist in the detailed design phase to micro-site project features away from prescribed impact matters such as caves.	Design phase	EnergyCo

7.6 Biodiversity Offsets Scheme requirements

EnergyCo intends to enter into a Strategic Offset Delivery Agreement (SODA) with the Secretary of the NSW Department of Climate Change, Energy, Environment and Water (NSW DCCEEW) for the project. Under this agreement, responsibility for delivering biodiversity offsets will be transferred to the Department with commensurate funding.

Offset selection will be guided by a conservation investment strategy for the region. The strategy will outline priority areas and actions to protect and restore biodiversity values, improve habitat connectivity, support species resilience to climate change and provide permanent conservation outcomes while also benefitting landholders. The Department is preparing a strategy which will be published on the NSW DCCEEW website prior to entry into the SODA.

Biodiversity offsets secured under the SODA will constitute either the retirement of like-for-like credits or conservation actions that are targeted at impacted entities. The Department will engage with credit owners, landholders and other potential partners in offset delivery through a range of programs including Credit Supply Fund auction processes, sponsored biodiversity stewardship agreements under the Stewardship Support Program, acquisition of new public land to create credits and tailored Savings our Species projects.

8 Impact assessment

Assessment of direct impacts unable to be avoided has been carried out in accordance with section 8 of the NSW Biodiversity Assessment Method 2020 (BAM). To assess the construction impacts from each stage, a subject land (as defined in Table 8.1) has been used. For this report, the subject land has the same meaning as 'development site' as defined in the BAM.

It should be noted that the final design for the project has not been completed and as a result the subject land is based on a concept design (realistic project component locations and areas however it is indicative at this stage). It has been applied to this assessment to enable assessment of the likely quantum and type of impacts of the project. These would be confirmed following the completion of the final design.

Table 8.1 Subject land definitions for biodiversity construction impact assessment purposes

Term	Definition
Subject land	This is a subset of the project impact area and used primarily to assess potential impacts on biodiversity values in the biodiversity development assessment report (BDAR). Includes the following categories: — disturbance area A — disturbance area A (centreline) — disturbance area B — disturbance area HZ. Also termed the subject land for consistency with the BAM.
Disturbance area A	The area where vegetation would be completely removed. It includes areas at and around proposed transmission line towers (including tower pads and batters), stringing sites, laydown areas, switching stations, substations upgrades, construction support sites, new and upgraded access tracks and road upgrades. Impacts within this area would include sub-surface disturbance from construction activities such as grading, excavation, and full tree removal. With the exception of areas that only require temporary disturbance (i.e. temporary access tracks and stringing sites), this area would also be subject to ongoing maintenance during operation (including vegetation removal to ground level) for operational and safety requirements (including bushfire).
Disturbance area A (centreline)	A 20 m wide centreline area between proposed transmission line towers where all vegetation would be removed to ground level during construction. This area would also be subject to ongoing maintenance during operation (i.e. removal to maintain vegetation clearance requirements) for operational and safety requirements (including bushfire).
Disturbance area B	The area within the transmission line easement, excluding disturbance area A and disturbance area A (centreline), where partial clearing would be undertaken. Removal of vegetation (including trees) would be required if there is a risk of vegetation exceeding the designated clearance heights. These heights are set for operational and safety requirements, including bushfire risk management (indicatively 13.5 m below the conductors at maximum operating temperature). This area would be subject to ongoing maintenance during operation.

Term	Definition
Disturbance area HZ	A 10 m wide area located either side of the transmission line easement known as a hazard tree zone. Hazard trees are those that have the potential to pose a risk to safe operation of the transmission line by falling into the easement and contacting the conductors. The hazard tree zone would be inspected for trees in the height range of >20 m, which is in the high-risk category. Those that meet the height category are subsequently considered for structural stability. A structurally sound tree with no obvious risk of falling is left standing. Trees with obvious defects that pose a risk would be removed.

8.1 Direct impacts

8.1.1 Residual direct impacts to plant community types

The overall direct impacts to PCTs and habitat for the various threatened species is estimated at approximately 761.98 ha (see Table 8.2). Within this area of direct impact:

- 208.44 hectares is within the Wyong IBRA subregion, with 140.26 hectares in disturbance area A
- 227.31 hectares is within the Yengo IBRA subregion, with 169.56 hectares in disturbance area A
- 326.23 hectares is within the Hunter IBRA subregion, with 236.27 hectares in disturbance area A.

Table 8.3 to Table 8.5 document the impacts likely to occur in the subject land after steps taken to avoid and minimise impacts. The final impacts likely to occur on the subject land are illustrated in Figure 14.14.

For disturbed grassland and derived vegetation conditions the impacts are limited to disturbance area A where there would be complete vegetation removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal. The impacts from disturbance area B and disturbance area HZ are not applicable to vegetation conditions as these areas would not contain vegetation over 2 metres in height.

Table 8.2 Summary of residual direct impacts to PCTs identified within the subject land

PCT ID number and name	Disturbance area A impact (ha)	Disturbance area B impact (ha)	Disturbance area HZ impact (ha)	Total impact (ha)
3029 - Lower North Wet Gully Palm Rainforest	1.61	3.20	0.00	4.81
3086 - Lower North Hinterland Riparian Dry Rainforest	4.84	1.12	0.00	5.96
3087 - Lower North Ranges Riparian Turpentine Forest	1.64	1.49	0.00	3.13
3150 - Hunter Coast Ranges Turpentine Wet Forest	17.48	17.99	0.56	36.03
3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	0.87	0.98	0.00	1.85
3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest	0.25	0.67	0.00	0.92
3230 - Central Coast Escarpment Moist Forest	52.60	17.77	0.09	70.46
3237 - Hunter Range Blue Gum Gully Forest	2.43	3.03	0.00	5.46
3238 - Hunter Range Colluvial Apple-Gum Forest	0.01	0.04	0.00	0.05
3239 - Hunter Range Sheltered Grey Gum Forest	85.86	23.98	0.13	109.97
3241 - Lower North White Mahogany-Spotted Gum Moist Forest	12.30	0.00	0.00	12.30
3242 - Lower North Ranges Turpentine Moist Forest	17.67	18.63	0.20	36.50

PCT ID number and name	Disturbance area A impact (ha)	Disturbance area B impact (ha)	Disturbance area HZ impact (ha)	Total impact (ha)
3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	1.31	0.31	0.00	1.62
3250 - Northern Foothills Blackbutt Grassy Forest	2.02	0.00	0.00	2.02
3263 - Watagan Range Turpentine-Mahogany Grassy Forest	29.72	9.14	0.24	39.10
3314 - Central Hunter Slopes Grey Box Forest	64.01	13.87	0.00	77.88
3315 - Central Hunter Ironbark-Spotted Gum Forest	22.20	4.10	0.00	26.30
3328 - Lower Hunter Red Gum-Paperbark Riverflat Forest	0.34	0.11	0.00	0.45
3431 - Central Hunter Ironbark Grassy Woodland	77.98	40.88	0.00	118.86
3438 - Hunter Escarpment Footslopes Ironbark Forest	6.28	5.9	0.01	12.19
3439 - Hunter Escarpment Grey Gum Sheltered Forest	0.40	1.01	0.21	1.62
3444 - Lower Hunter Spotted Gum-Ironbark Forest	21.15	16.72	0.00	37.87
3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	0.48	0.89	0.00	1.37
3489 - Hunter Escarpment Grey Box Forest	4.45	1.21	0.01	5.67
3581 - Hunter Coast Foothills Apple Forest	0.67	0.00	0.00	0.67
3599 - Blue Mountains Peppermint Shrub Forest	7.23	0.01	0.00	7.24
3605 - Hunter Range Ironbark Forest	43.47	13.45	0.18	57.10
3617 - Sydney Hinterland Peppermint-Apple Forest	29.83	5.52	0.21	35.56
3621 - Sydney Hinterland Turpentine-Apple Gully Forest	2.02	2.84	0.00	4.86
3636 - Warkworth Sands Woodland	18.97	3.11	0.00	22.08
4015 - Central Hunter Swamp Oak Riparian Forest	7.09	2.73	0.00	9.82
4039 - Hunter Range Creekflat Apple-Red Gum Forest	0.60	0.31	0.00	0.91
4072 - Hunter River Oak Mesic Forest	0.21	0.00	0.00	0.21
4089 - Namoi-Upper Hunter River Red Gum Forest	8.10	3.04	0.00	11.14
Totals	**546.09**	**214.05**	**1.84**	**761.98**

Disturbance type:

- A = disturbance area A. Includes vegetation (including tree) removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal.
- B = disturbance area B. Refers to an area between proposed transmission line towers in which it is assumed vegetation removal would be required to meet the vegetation clearance heights of 2 metres. Trees within this area that would or have the potential to exceed growth heights greater than 2 metres would be removed.
- HZ = refers to an area adjacent to disturbance area B which is known as a hazard tree zone (hazard high risk trees). The hazard tree zone is inspected for trees within the risk category height range 20–30 metres. Then those that meet the height category are considered for structural stability. A structurally sound tree with no obvious risk of falling is left standing. Trees with obvious defects that pose a risk of falling are removed.

Table 8.3 Summary of residual direct impacts for the Wyong IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Disturbance area A	Disturbance area B	Disturbance area HZ	Total
11	3029_Mod-good	3029 - Lower North Wet Gully Palm Rainforest	Mod-good	1.61	3.20	0.00	4.81
1	3150_Mod-good	3150 - Hunter Coast Ranges Turpentine Wet Forest	Mod-good	16.56	16.87	0.55	33.98
8	3150_Plantation	3150 - Hunter Coast Ranges Turpentine Wet Forest	Plantation	0.92	1.12	0.01	2.05
2	3230_Mod-good	3230 - Central Coast Escarpment Moist Forest	Mod-good	31.61	11.89	0.03	43.53
9	3230_Plantation	3230 - Central Coast Escarpment Moist Forest	Plantation	9.79	1.83	0.01	11.63
3	3239_Mod-good	3239 - Hunter Range Sheltered Grey Gum Forest	Mod-good	3.93	0.96	0.01	4.90
4	3242_Mod-good	3242 - Lower North Ranges Turpentine Moist Forest	Mod-good	12.31	13.44	0.18	25.93
13	3244_Mod-good	3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Mod-good	1.18	0.13	0.00	1.31
10	3250_Mod-good	3250 - Northern Foothills Blackbutt Grassy Forest	Mod-good	2.02	0.00	0.00	2.02
5	3263_Mod-good	3263 - Watagan Range Turpentine-Mahogany Grassy Forest	Mod-good	29.72	9.14	0.24	39.10
12	3581_Mod-good	3581 - Hunter Coast Foothills Apple Forest	Mod-good	0.67	0.00	0.00	0.67
6	3617_Mod-good	3617 - Sydney Hinterland Peppermint-Apple Forest	Mod-good	27.92	5.52	0.21	33.65
7	3621_Mod-good	3621 - Sydney Hinterland Turpentine-Apple Gully Forest	Mod-good	2.02	2.84	0.00	4.86
Totals				**140.26**	**66.94**	**1.24**	**208.44**

Disturbance type:

- A = disturbance area A. Includes vegetation (including tree) removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal.
- B = disturbance area B. Refers to an area between proposed transmission line towers in which it is assumed vegetation removal would be required to meet the vegetation clearance heights of 2 metres. Trees within this area that would or have the potential to exceed growth heights greater than 2 metres would be removed.
- HZ = refers to an area adjacent to disturbance area B which is known as a hazard tree zone (hazard high risk trees). The hazard tree zone is inspected for trees within the risk category height range 20–30 metres. Then those that meet the height category are considered for structural stability. A structurally sound tree with no obvious risk of falling is left standing. Trees with obvious defects that pose a risk of falling are removed.

Table 8.4 Summary of residual direct impacts for the Yengo IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Disturbance area A	Disturbance area B	Disturbance area HZ	Total
24	3086_ Mod-good	3086 - Lower North Hinterland Riparian Dry Rainforest	Mod-good	0.78	1.12	0.00	1.90
1	3087_Mod-good	3087 - Lower North Ranges Riparian Turpentine Forest	Mod-good	1.33	1.49	0.00	2.82
18	3151_ Mod-good	3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	Mod-good	0.87	0.98	0.00	1.85
2	3152_ Mod-good	3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest	Mod-good	0.25	0.67	0.00	0.92
3	3230_Mod-good	3230 - Central Coast Escarpment Moist Forest	Mod-good	11.20	4.05	0.05	15.30
4	3237_ Mod-good	3237 - Hunter Range Blue Gum Gully Forest	Mod-good	2.43	3.03	0.00	5.46
14	3238_ Mod-good	3238 - Hunter Range Colluvial Apple-Gum Forest	Mod-good	0.01	0.04	0.00	0.05
5	3239-Mod-good	3239 - Hunter Range Sheltered Grey Gum Forest	Mod-good	73.36	22.95	0.12	96.43
22	3239_Plantation	3239 - Hunter Range Sheltered Grey Gum Forest	Plantation	2.76	0.07	0.00	2.83
19	3241_Mod-good	3241 - Lower North White Mahogany-Spotted Gum Moist Forest	Mod-good	10.21	0.00	0.00	10.21
6	3242_Mod-good	3242 - Lower North Ranges Turpentine Moist Forest	Mod-good	5.36	5.19	0.02	10.57
7	3244_Mood-good	3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Mod-good	0.13	0.18	0.00	0.31
15	3328_ Mod-good	3328 - Lower Hunter Red Gum-Paperbark Riverflat Forest	Mod-good	0.34	0.11	0.00	0.45
8	3438_Mod-good	3438 - Hunter Escarpment Footslopes Ironbark Forest	Mod-good	1.42	0.54	0.01	1.97
9	3439_Mod-good	3439 - Hunter Escarpment Grey Gum Sheltered Forest	Mod-good	0.40	1.01	0.21	1.62
16	3444_Mod-good	3444 - Lower Hunter Spotted Gum-Ironbark Forest	Mod-good	0.76	0.16	0.00	0.92
23	3444_Derived	3444 - Lower Hunter Spotted Gum-Ironbark Forest	Derived	0.29	0.00	0.00	0.29
17	3446_Mod-good	3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	Mod-good	0.46	0.89	0.00	1.35
10	3489_Mod-good	3489 - Hunter Escarpment Grey Gum Sheltered Forest	Mod-good	4.45	1.21	0.01	5.67

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Disturbance area A	Disturbance area B	Disturbance area HZ	Total
11	3599_Mod-good	3599 - Blue Mountains Peppermint Shrub Forest	Mod-good	7.23	0.01	0.00	7.24
12	3605_Mod-good	3605 - Hunter Range Ironbark Forest	Mod-good	43.47	13.45	0.18	57.10
13	3617_Mod-good	3617 - Sydney Hinterland Peppermint-Apple Forest	Mod-good	1.91	0.00	0.00	1.91
20	4039_Mod-good	4039 - Hunter Range Creekflat Apple-Red Gum Forest	Mod-good	0.07	0.00	0.00	0.07
21	4072_ Mod-good	4072 - Hunter River Oak Mesic Forest	Mod-good	0.07	0.00	0.00	0.07
Totals				**169.56**	**57.15**	**0.60**	**227.31**

Disturbance type:

- A = disturbance area A. Includes vegetation (including tree) removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal.
- B = disturbance area B. Refers to an area between proposed transmission line towers in which it is assumed vegetation removal would be required to meet the vegetation clearance heights of 2 metres. Trees within this area that would or have the potential to exceed growth heights greater than 2 metres would be removed.
- HZ = refers to an area adjacent to disturbance area B which is known as a hazard tree zone (hazard high risk trees). The hazard tree zone is inspected for trees within the risk category height range 20–30 metres. Then those that meet the height category are considered for structural stability. A structurally sound tree with no obvious risk of falling is left standing. Trees with obvious defects that pose a risk of falling are removed.

Table 8.5 Summary of residual direct impacts for the Hunter IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Disturbance area A	Disturbance area B	Disturbance area HZ	Total
20	3086_ Mod-good	3086 - Lower North Hinterland Riparian Dry Rainforest	Mod-good	4.06	0.00	0.00	4.06
21	3087_ Mod-good	3087 - Lower North Ranges Riparian Turpentine Forest	Mod-good	0.31	0.00	0.00	0.31
22	3239-Mod-good	3239 - Hunter Range Sheltered Grey Gum Forest	Mod-good	5.81	0.00	0.00	5.81
23	3241_Mod-good	3241 - Lower North White Mahogany-Spotted Gum Moist Forest	Mod-good	2.09	0.00	0.00	2.09
1	3314_Thinned	3314 - Central Hunter Slopes Grey Box Forest	Thinned	26.42	12.04	0.00	38.46
2	3314_Poor	3314 - Central Hunter Slopes Grey Box Forest	Poor	17.57	1.83	0.00	19.40
3	3314_Disturbed grassland	3314 - Central Hunter Slopes Grey Box Forest	Disturbed grassland	20.02	0.00	0.00	20.02
4	3315_Thinned	3315 - Central Hunter Ironbark-Spotted Gum Forest	Thinned	4.76	4.10	0.00	8.86
5	3315_Derived	3315 - Central Hunter Ironbark-Spotted Gum Forest	Derived	17.44	0.00	0.00	17.44
6	3431_Thinned	3431 - Central Hunter Ironbark Grassy Woodland	Thinned	33.09	30.33	0.00	63.42
9	3431_Poor	3431 - Central Hunter Ironbark Grassy Woodland	Poor	2.15	3.05	0.00	5.20
15	3431_Disturbed_Grassland	3431 - Central Hunter Ironbark Grassy Woodland	Disturbed Grassland	35.34	0.00	0.00	35.34
7	3431_Plantation	3431 - Central Hunter Ironbark Grassy Woodland	Plantation	7.40	7.50	0.00	14.90
8	3438_Mod-good	3438 - Hunter Escarpment Footslopes Ironbark Forest	Mod-good	4.86	5.36	0.00	10.22
10	3444_Mod-good	3444 - Lower Hunter Spotted Gum-Ironbark Forest	Mod-good	20.08	16.56	0.00	36.64
24	3444_Derived	3444 - Lower Hunter Spotted Gum-Ironbark Forest	Derived	0.02	0.00	0.00	0.02
18	3446_Mod-good	3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	Mod-good	0.02	0.00	0.00	0.02
11	3636_Thinned	3636 - Warkworth Sands Woodland	Thinned	4.40	3.11	0.00	7.51
12	3636_Disturbed_Grassland	3636 - Warkworth Sands Woodland	Disturbed Grassland	14.57	0.00	0.00	14.57

BAM-C #	BAM-C – Vegetation zone name	PCT ID number and name	Condition/other defining feature	Disturbance area A	Disturbance area B	Disturbance area HZ	Total
13	4015_Thinned	4015 - Central Hunter Riparian Forest	Thinned	4.88	2.73	0.00	7.61
14	4015_Derived	4015 - Central Hunter Riparian Forest	Derived	2.21	0.00	0.00	2.21
16	4039_Mod-good	4039 - Hunter Range Creekflat Apple-Red Gum Forest	Mod-good	0.53	0.31	0.00	0.84
17	4072_Mod-good	4072 - Hunter River Oak Mesic Forest	Mod-good	0.14	0.00	0.00	0.14
19	4089_Poor	4089 - Namoi-Upper Hunter River Red Gum Forest	Poor	1.18	3.04	0.00	4.22
25	4089_Derived	4089 - Namoi-Upper Hunter River Red Gum Forest	Derived	6.92	0.00	0.00	6.92
Totals				**236.27**	**89.96**	**0**	**326.23**

Disturbance type:

- A = disturbance area A. Includes vegetation (including tree) removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal.
- B = disturbance area B. Refers to an area between proposed transmission line towers in which it is assumed vegetation removal would be required to meet the vegetation clearance heights of 2 metres. Trees within this area that would or have the potential to exceed growth heights greater than 2 metres would be removed.
- HZ = refers to an area adjacent to disturbance area B which is known as a hazard tree zone (hazard high risk trees). The hazard tree zone is inspected for trees within the risk category height range 20–30 metres. Then those that meet the height category are considered for structural stability. A structurally sound tree with no obvious risk of falling is left standing. Trees with obvious defects that pose a risk of falling are removed.

8.1.2 Change in vegetation integrity score

The BAM has been established under the guiding principle of avoiding and minimising impacts to biodiversity values. For impacts that cannot be totally avoided, impacts must be minimised to enable better outcomes for biodiversity values.

Transmission line easement management traditionally focuses on the complete removal of vegetation using short rotation times with the aim to reduce the perceived fire hazard associated with transmission line easement vegetation. The project has taken a different approach where the maintenance zone underneath the transmission line will be managed through the removal of vegetation with specific growth height levels in accordance with vegetation clearing requirements (i.e. down to a growth height of 2 metres) leaving the midstorey and ground layers intact within disturbance areas B and HZ. These areas don't include disturbance area A, which is where vegetation would be completely removed in the subject land, including sub-surface disturbance from construction activities such as grading, excavation, and full tree removal.

This partial clearing of the transmission line easement forms part of the measures taken to minimise impacts to biodiversity values. Maintaining a shrub layer will help avoid total loss of species richness, encourage native species and limit colonisation opportunities of introduced species (see Clarke and White 2008). To facilitate these partial vegetation clearing scenarios the BAM allows for circumstances where partial clearing of vegetation is proposed, and remaining vegetation will be maintained (i.e. not degraded further over time). The future value of the relevant vegetation integrity attributes can be determined as greater than zero in these circumstances.

In assessing direct impacts on native vegetation, future vegetation integrity scores were calculated in the BAM-C for each disturbance area subset and associated vegetation zone as follows:

- for disturbance area A (management zone A in the BAM-C), the future vegetation integrity score was calculated as zero (assuming total loss of all biodiversity values)
- for disturbance area B (partial clearing of the transmission line easement) and HZ (hazard high risk trees) (management zones B and HZ in the BAM-C) future vegetation integrity scores have been calculated through assuming total loss of tree related values and calculating changes to mean average scores in attributes associated with composition condition, structure condition, and function condition.

For the calculations of impact, this assessment outlines that there will be no impact to derived and disturbed grassland vegetation zones within disturbance area B and HZ as vegetation within these zones occurs below 2 metres in height.

Table 8.6 outlines how the future vegetation integrity scores for disturbance area B and HZ were calculated based on data collected from existing powerlines in the locality. Differences were found between dry sclerophyll forest and grassy woodlands so the means have been adjusted for PCTs in these formations. Appendix M provides evidence to support and the justify the quantum of partial loss applied to disturbance area B and HZ based on field data collected from existing powerline easements in the locality.

Transmission line clearings develop into novel habitats over time (see Eldridge, Eyitayo et al. 2017) and species and functional composition have been shown to be different between sites with control and thinned canopy treatments with proportionally more individuals of grasses and forbs in thinned plots (see Tsai et al. 2018). Where structural elements such as the canopy tree layer is removed from existing powerline easements across NSW, shrubby mid storey layer, or derived shrub land vegetation structure may develop.

Canopy opening disturbance has immediate and substantive effects on understory microclimate and therefore the establishment and growth of understory plants (Tsai et al., 2018). Where shrub and ground stratum cover increases it has been documented that composition or species richness may decrease through species being out competed by more dominant species. Studies show a general shift to early successional shade intolerant species and those species that reproduce through clonal growth (see Luken, et al. 1992; Eldridge, Eyitayo et al. 2017; Walker and Koen 1995).

Table 8.6 Future vegetation integrity score adjustment based on vegetation formation for disturbance area B and HZ

BAM-C attribute	Vegetation layer		Vegetation formation					
		DSF (shrub/grass)	DSF (shrubby)	Forested wetlands	Grassy woodland	Rainforests	WSF (grassy)	WSF (shrubby)
Composition	Tree	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal
	Shrub	10% reduction	10% reduction	No reduction	10% reduction	No reduction	No reduction	No reduction
	Grass/grasslike	No reduction	10% reduction	No reduction	10% reduction	30% reduction	No reduction	30% reduction
	Forb/fern/other	20% reduction	No reduction	20% reduction	No reduction	20% reduction	20% reduction	20% reduction
Structure	Tree	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal
	Shrub	30% reduction	20% reduction	No reduction	No reduction	30% reduction	No reduction	30% reduction
	Grass/grasslike	30% reduction	No reduction	No reduction	No reduction	30% reduction	No reduction	30% reduction
	Forb/fern/other	30% reduction	No reduction	20% reduction	20% reduction	30% reduction	20% reduction	30% reduction
Function	Tree	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal	Complete removal
	Understory	30% reduction in leaf litter and fallen timber						

Table 8.7 Impacts to vegetation integrity for the Wyong IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
11	3029_Mod-good	Area A	1.61	88.7	98.2	93.5	93.4	0	0	0	0	-93.4
		Area B	3.20	88.7	98.2	93.5	93.4	0	0	0	0	-93.4
1	3150_Mod-good	Area A	16.56	75.2	83.3	68	75.3	0	0	0	0	-75.3
		Area B	16.87	75.2	83.3	68	75.3	51.1	41.5	34.4	41.8	-33.5
		Area HZ	0.55	75.2	83.3	68	75.3	51.1	41.5	34.4	41.8	-33.5
8	3150_Plantation	Area A	0.92	72.5	74.7	63.2	69.9	0	0	0	0	-69.9
		Area B	1.12	72.5	74.7	63.2	69.9	51.9	36.9	34.1	40.3	-29.7
		Area HZ	0.01	72.5	74.7	63.2	69.9	51.9	36.9	34.1	40.3	-29.7
2	3230_Mod-good	Area A	31.61	80.2	74.7	84.1	79.6	0	0	0	0	-79.6
		Area B	11.89	80.2	74.7	84.1	79.6	62.6	32.9	27.7	38.5	-41.1
		Area HZ	0.03	80.2	74.7	84.1	79.6	62.6	32.9	27.7	38.5	-41.1
9	3230_Plantation	Area A	9.79	68.9	74.1	60.2	67.5	0	0	0	0	-67.5
		Area B	1.83	68.9	74.1	60.2	67.5	53.1	40.2	25.8	38	-29.4
		Area HZ	0.01	68.9	74.1	60.2	67.5	53.1	40.2	25.8	38	-29.4
3	3239_Mod-good	Area A	3.93	64.2	72.6	47	60.3	0	0	0	0	-60.3
		Area B	0.96	64.2	72.6	47	60.3	45.5	34.2	15.6	28.9	-31.3
		Area HZ	0.01	64.2	72.6	47	60.3	45.5	34.2	15.6	28.9	-31.3

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
4	3242_Mod-good	Area A	12.31	95.6	77.2	90.1	87.3	0	0	0	0	-87.3
		Area B	13.44	95.6	77.2	90.1	87.3	78.7	39.6	27.3	44	-43.3
		Area HZ	0.18	95.6	77.2	90.1	87.3	78.7	39.6	27.3	44	-43.3
13	3244_Mod-good	Area A	1.18	85.4	77	48.7	68.4	0	0	0	0	-68.4
		Area B	0.13	85.4	77	48.7	68.4	67.3	39.7	13.3	32.9	-35.5
10	3250_Mod-good	Area A	2.02	100	100	100	100	0	0	0	0	-100
5	3263_Mod-good	Area A	29.72	83.6	86	63.8	77.1	0	0	0	0	-77.1
		Area B	9.14	83.6	86	63.8	77.1	64.6	43.5	24.3	40.9	-36.2
		Area HZ	0.24	83.6	86	63.8	77.1	64.6	43.5	24.3	40.9	-36.2
12	3581_Mod-good	Area A	0.67	100	100	100	100	0	0	0	0	-100
6	3617_Mod-good	Area A	27.92	70.4	67.3	93	76.1	0	0	0	0	-76.1
		Area B	5.52	70.4	67.3	93	76.1	54.7	23.3	20.7	29.8	-46.4
		Area HZ	0.21	70.4	67.3	93	76.1	54.7	23.3	20.7	29.8	-46.4
7	3621_Mod-good	Area A	2.02	70.8	72.4	94.5	78.5	0	0	0	0	-78.5
		Area B	2.84	70.8	72.4	94.5	78.5	54.4	25.9	34.2	36.4	-42.1
		Area HZ	0.00	70.8	72.4	94.5	78.5	54.4	25.9	34.2	36.4	-42.1

Table 8.8 Impacts to vegetation integrity for the Yengo IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
24	3086_Mod-good	Area A	0.78	96	84.5	69.6	82.7	0	0	0	0	-82.7
		Area B	1.12	96	84.5	69.6	82.7	74.2	38.1	29.5	43.7	-38.9
1	3087_Mod-good	Area A	1.33	90.4	90.3	74.2	84.6	0	0	0	0	-84.6
		Area B	1.49	90.4	90.3	74.2	84.6	67.3	45	31.8	45.9	-46.8
18	3151_Mod-good	Area A	0.87	88	53.3	49	61.3	0	0	0	0	-61.3
		Area B	0.98	88	53.3	49	61.3	75	11.6	14.8	23.4	-37.8
2	3152_Mod-good	Area A	0.25	100	100	100	100	0	0	0	0	-100
		Area B	0.67	100	100	100	100	84.8	57.7	30.7	53.2	-46.8
3	3230_Mod-good	Area A	11.20	81.7	91.4	63.8	78.1	0	0	0	0	-78.1
		Area B	4.05	81.7	91.4	63.8	78.1	64.3	49.1	17.5	38.1	-40
		Area HZ	0.05	81.7	91.4	63.8	78.1	64.3	49.1	17.5	38.1	-40
4	3237_Mod-good	Area A	2.43	96	79.1	69.4	80.8	0	0	0	0	-80.8
		Area B	3.03	96	79.1	69.4	80.8	80.2	44.3	23	43.4	-37.4
14	3238_Mod-good	Area A	0.01	100	100	100	100	0	0	0	0	-100
		Area B	0.04	100	100	100	100	84.8	57.7	30.7	53.2	-46.8
5	3239-Mod-good	Area A	73.36	83.9	86.8	56.6	74.4	0	0	0	0	-74.4
		Area B	22.95	83.9	86.8	56.6	74.4	63.2	44.8	19.3	37.9	-36.5
		Area HZ	0.12	83.9	86.8	56.6	74.4	63.2	44.8	19.3	37.9	-36.5

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
22	3239_Plantation	Area A	2.67	78.3	68.1	20.9	48.1	0	0	0	0	-48.1
		Area B	0.07	78.3	68.1	20.9	48.1	59	33.7	1.1	13	-35.1
19	3241_Mod-good	Area A	10.21	94.2	92.4	64.6	82.6	0	0	0	0	-82.6
6	3242_Mod-good	Area A	5.36	86.5	73.5	55.6	70.7	0	0	0	0	-70.7
		Area B	5.19	86.5	73.5	55.6	70.7	68.1	34.9	18.4	35.2	-35.5
		Area HZ	0.02	86.5	73.5	55.6	70.7	68.1	34.9	18.4	35.2	-35.5
7	3244_Mod-good	Area A	0.15	92.3	97.6	79	89.3	0	0	0	0	-89.3
		Area B	0.19	92.3	97.6	79	89.3	79.3	55.2	18.8	43.5	-45.8
15	3328_Mod-good	Area A	0.34	25	73.6	18.9	32.6	0	0	0	0	-32.6
		Area B	0.11	25	73.6	18.9	32.6	21.3	36.5	0.1	9.2	-23.4
8	3438_Mod-good	Area A	1.42	80.4	86.4	69.4	78.4	0	0	0	0	-78.4
		Area B	0.54	80.4	86.4	69.4	78.4	61.7	40.2	15.2	33.6	-44.9
		Area HZ	0.01	80.4	86.4	69.4	78.4	61.7	40.2	15.2	33.6	-44.9
9	3439_Mod-good	Area A	0.40	100	100	100	100	0	0	0	0	-100
		Area B	1.01	100	100	100	100	87.1	59	30.7	54	-46
		Area HZ	0.21	100	100	100	100	87.1	59	30.7	54	-46
16	3444_Mod-good	Area A	0.76	100	100	100	100	0	0	0	0	-100
		Area B	0.16	100	100	100	100	87.1	59	30.7	54	-46
23	3444_Derived	Area A	0.29	100	100	100	100	0	0	0	0	-100

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
17	3446_Mod-good	Area A	0.46	93.7	87	44.2	71.2	0	0	0	0	-71.2
		Area B	0.89	93.7	87	44.2	71.2	79.5	41.4	14.1	35.9	-47.5
10	3489_Mod-good	Area A	4.45	99.5	96.6	73	88.9	0	0	0	0	-88.9
		Area B	1.21	99.5	96.6	73	88.9	85.4	41.8	26.5	45.6	-43.3
		Area HZ	0.01	99.5	96.6	73	88.9	85.4	41.8	26.5	45.6	-43.3
11	3599_Mod-good	Area A	7.05	50	67.4	93.6	68.1	0	0	0	0	-68.1
		Area B	0.01	50	67.4	93.6	68.1	34.9	20.6	26.7	26.8	-41.3
12	3605_Mod-good	Area A	43.47	68.1	87.6	53.6	68.4	0	0	0	0	-68.4
		Area B	13.45	68.1	87.6	53.6	68.4	52.8	49.7	15.5	34.4	-34
		Area HZ	0.18	68.1	87.6	53.6	68.4	52.8	49.7	15.5	34.4	-34
13	3617_Mod-good	Area A	1.91	79.1	59.2	74	70.2	0	0	0	0	-70.2
20	4039_Mod-good	Area A	0.07	100	100	100	100	0	0	0	0	-100
21	4072_Mod-good	Area A	0.07	100	100	100	100	0	0	0	0	-100

Table 8.9 Impacts to vegetation integrity for the Hunter IBRA subregion

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
20	3086_ Benchmark	Area A	4.06	100	100	100	100	0	0	0	0	-100
21	3087_Benchmark	Area A	0.31	100	100	100	100	0	0	0	0	-100
22	3239-Mod-good	Area A	5.81	100	100	100	100	0	0	0	0	-100
23	3241_Mod-good	Area A	2.09	82.7	75.3	56.4	70.5	0	0	0	0	-70.5
1	3314_Thinned	Area A	26.42	83.7	73.6	65.4	73.9	0	0	0	0	-73.9
		Area B	12.04	83.7	73.6	65.4	73.9	73	38.3	34.3	45.8	-28.1
2	3314_Poor	Area A	17.57	62.6	17.7	43.5	36.4	0	0	0	0	-36.4
		Area B	1.83	62.6	17.7	43.5	36.4	52.1	12.6	10.9	19.3	-17.1
3	3314_Disturbed grassland	Area A	20.02	25.6	33.9	0.6	9.5	0	0	0	0	-9.5
4	3315_Thinned	Area A	4.76	93.4	92.1	48.1	74.5	0	0	0	0	-74.5
		Area B	4.10	93.4	92.1	48.1	74.5	82.3	60.5	15.7	42.8	-31.7
5	3315_Derived	Area A	17.44	32.9	42.9	4.2	18.1	0	0	0	0	-18.1
6	3431_Thinned	Area A	29.40	79.1	71.2	60.9	70	0	0	0	0	-70
		Area B	26.78	79.1	71.2	60.9	70	65.5	27	5.9	21.8	-48.2
9	3431_Poor	Area A	2.15	61.2	55.5	33.5	48.5	0	0	0	0	-48.5
		Area B	3.05	61.2	55.5	33.5	48.5	49.3	19.6	1.6	11.6	-36.9
15	3431_Disturbed_Grassland	Area A	35.34	32.4	39.5	0	10.9	0	0	0	0	-10.9

BAM-C #	BAM-C – Vegetation zone name	BAM-C – Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
7	3431_Plantation	Area A	7.40	60.7	44.1	33.8	44.9	0	0	0	0	-44.9
		Area B	7.50	60.7	44.1	33.8	44.9	47.3	18.4	2	11.9	-33
8	3438_Mod-good	Area A	4.86	99.9	96.3	99.3	98.5	0	0	0	0	-98.5
		Area B	5.36	99.9	96.3	99.3	98.5	87.1	51.1	30.8	51.6	-46.9
10	3444_Mod-good	Area A	20.08	96.8	95.6	47.4	76	0	0	0	0	-76
		Area B	16.56	96.8	95.6	47.4	76	80.4	58.6	11.6	38	-38
24	3444_Derived	Area A	0.02	57.7	57.5	18.1	39.2	0	0	0	0	-39.2
18	3446_Mod-good	Area B	0.02	100	100	100	100	87.1	59	30.7	54	-46
11	3636_Thinned	Area A	4.40	60.4	47.7	64.2	57	0	0	0	0	-57
		Area B	3.11	60.4	47.7	64.2	57	51.2	31.3	18.3	30.7	-26.2
12	3636_Disturbed_Grassland	Area A	14.57	20	32.9	0	8.7	0	0	0	0	-8.9
13	4015_Thinned	Area A	4.88	60.9	69.7	94.3	73.7	0	0	0	0	-73.7
		Area B	2.73	60.9	69.7	94.3	73.7	45.4	51	30.6	41.1	-32.3
14	4015_Derived	Area A	2.21	47.9	60.9	8.9	29.6	0	0	0	0	-29.6
16	4039_Mod-good	Area A	0.53	93.2	87.6	90.4	90.4	0	0	0	0	-90.4
		Area B	0.31	93.2	87.6	90.4	90.4	81.8	69.2	14.4	43.3	-47
17	4072_Mod-good	Area A	0.14	49.7	56.1	100	65.3	0	0	0	0	-65.3
19	4089_Poor	Area A	1.18	6.4	12	78.6	18.2	0	0	0	0	-18.2
		Area B	3.04	6.4	12	78.6	18.2	1.8	0.1	17.3	3.1	-15.1
25	4089_Derived	Area A	6.92	21.9	39.4	15.6	23.8	0	0	0	0	-23.8

8.1.3 Residual direct impacts to TECs

The residual direct impact to BC Act listed threatened ecological communities (TECs) is outlined in Table 8.10. The direct impact across these 7 TECs is expected to impact 207.43 hectares within the subject land, with 124.40 hectares within disturbance area A.

Table 8.10 Residual direct impact to BC Act listed TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status[1]	Associated PCT and vegetation zones within the subject land	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Impact within subject land (ha)
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	20126	E	3314_Thinned (38.46 ha) 3314_Poor (19.40 ha) 3431_Thinned (63.42 ha) 3431_Poor (5.20 ha) 3431_Plantation (14.90 ha)	86.63	54.75	0.00	141.38
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	20127	E	3315_Thinned (8.86 ha)	4.76	4.10	0.00	8.86
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	20141	E	4089_Poor (4.22 ha)	1.18	3.04	0.00	4.22
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	10416	E	3446_Mod-good (1.37 ha)	0.48	0.89	0.00	1.37
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	10942	E	3444_Mod-good (37.56 ha) 3444_Derived (0.31 ha)	21.15	16.72	0.00	37.87
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	10787	E	3328_Mod-good (0.45 ha) 4039_Mod-good (0.91 ha)	0.94	0.42	0.00	1.36
Warkworth Sands Woodland in the Sydney Basin Bioregion	10833	E	3636_Thinned (7.51 ha) 3636_Disturbed Grassland (4.86 ha)	9.26	3.11	0.00	12.37
Totals				**124.40**	**83.03**	**0.00**	**207.43**

(1) E = Endangered under the BC Act

8.1.4 Residual direct impacts to ECs

The residual direct impact to EPBC Act listed ecological communities (ECs) is outlined in Table 8.11. The direct impact across these 3 ECs is expected to impact 158.13 hectares within the subject land, with 90.78 hectares within disturbance area A.

Table 8.11 Summary of impact to EPBC Act listed ECs within the subject land

EC name	EPBC Act status[1]	Associated PCT and vegetation zones within the subject land	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (Ha)	Impact within subject land (ha)
Central Hunter Valley eucalypt forest and woodland	CE	3314_Thinned (38.46 ha) 3315_Thinned (8.86 ha) 3431_Thinned (63.42 ha) 3431_Poor (5.20 ha) 3431_Plantation (14.90 ha) 3438_Mod-good (12.19 ha) 3446 Mod-good (1.37 ha)	80.58	63.81	0.01	144.40
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	CE	3328_Mod-good (0.27 ha) 4039_Mod-good (0.91 ha)	0.94	0.42	0.00	1.36
Warkworth Sands Woodland of the Hunter Valley	CE	3636_Thinned (7.51 ha) 3636_Disturbed Grassland (4.86 ha)	9.26	3.11	0.00	12.37
Total			**90.78**	**67.34**	**0.01**	**158.13**

(1) CE = Critically Endangered under the EPBC Act

8.1.5 Residual direct impacts to species credit species

The residual direct impacts to species credit species are outlined in Table 8.12 to Table 8.16 and provide a breakdown of the impacts to species credit species per IBRA subregion and construction stage.

The residual direct impacts to species credit species consider the differing impacts that would occur in disturbance area A compared to disturbance areas B and HZ. The impacts to disturbance area B and HZ are limited to tree removal. Shrub and ground layer plant species are considered unlikely to be impacted in disturbance areas B and HZ. Likewise, fauna species that are not reliant on trees as the only source of habitat are considered unlikely to be impacted in disturbance area B and HZ. Species reliant on trees will be impacted.

Partial impacts to species credit species are accounted for in the adjusted future means of management zones within each vegetation zone as outlined in section 8.1.1:

- for disturbance area A (management zone A in the BAM-C), the future vegetation integrity score was calculated as zero (assuming total loss of all biodiversity values)
- for disturbance area B (partial clearing of the transmission line easement) and HZ (hazard high risk trees) (management zones B and HZ in the BAM-C) future vegetation integrity scores have been calculated through assuming total loss of tree related values and calculating changes to mean average scores in attributes associated with composition condition, structure condition, and function condition.

Importantly, the partial impact calculation accounts for full impact to the values that tree dependent species rely upon for habitat. The biodiversity values associated with tree composition, structure, and function attributes have been taken to zero in the management zones in all 3 disturbance areas (A, B and HZ) to account for total loss of these features. Removing the tree values from the management zone accounts for the tree loss and therefore accounts for total loss of the habitat feature for tree dependent species.

The scoring of partial loss used in this BDAR is considered to be an accurate representation of the proposed clearing scenario and is a key component of meeting the guiding principle of the BAM which is avoiding and minimising impacts to biodiversity values.

For species assessed by area of suitable habitat, the BAM-C determines the habitat condition within the species polygon using the VI score. Calculations of the number and type of biodiversity credits required to offset direct impacts are based on change in VI score, from current to estimated future value. This BDAR aims to present a realistic account of change or loss in VI score due to tree loss only in disturbance areas B and HZ. As such, partial impact has been calculated for areas that will have the tree layer removed. The removal of the tree layer results in an important habitat resource in the form of trees being removed, but tree removal does not take the VI score for the habitat to zero. The habitat value for threatened species would be reduced but there will not be total loss of habitat in disturbance areas B or HZ. The change or loss in VI score presented for each vegetation zone in each disturbance area within the BDAR accounts for the expected habitat degradation. The future value of the attributes in each impacted vegetation zone within the species polygon for these species have been amended to reflect the impacts from partially clearing a vegetation zone in accordance with BAM section 8.1.1.

However, where a species is dependent on trees for breeding (and as such is a species credit species for breeding habitat) tree removal may be considered as a complete impact to the specific habitat feature required for breeding. In this instance for species including Glossy Black-Cockatoo, Masked Owl, Powerful Owl and Sooty Owl a full impact to all disturbance areas (A, B and HZ) has been calculated separately and presented for consideration alongside the calculated partial impact. Tables outlining the credit generation derived from this scenario are provided in Chapter 11 (Biodiversity credit report). This approach is not strictly in accordance with the BAM and the BAM-C is not set up to allow for full and partial impact calculations for different species within a single vegetation zone.

The project has been assessed to have a residual direct impact on a total of 66 threatened species of which 35 have been confirmed to have habitat present with the remaining 31 being assumed present due to survey deficiencies. Of the 66 threatened species identified to be potentially impacted by the project 38 are listed threatened flora species and 28 are threatened fauna species. In terms of impacts within the disturbance area, impacts for disturbance area A will have a complete impact (fully cleared) on all 66 species, whilst the impacts for disturbance area B will be restricted to a complete impact on 26 species, partial impact on 15 species, and no impact on 25 species. Within disturbance area HZ a complete impact has been assessed on 14 species with a partial impact on 12 species, and no impact on 40 species.

Table 8.12 and Table 8.13 provides a summary of residual direct impacts to threatened flora and fauna species credit species within the subject land. Table 8.14 to Table 8.16 outline the known impacts to species recorded during the survey compared to areas of assumed habitat impact for species from each disturbance area within each IBRA subregion.

Table 8.12 Summary of residual direct impacts to threatened flora species credit species within the subject land

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Acacia bynoeana	Bynoe's Wattle	E	V	No	-	-	✓	0.00	9.77	9.77
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	EP	-	Yes	-	-	✓	0.00	16.92	16.92
Angophora inopina	Charmhaven Apple	V	V	No	✓	-	✓	0.00	1.74	1.74
Asperula asthenes	Trailing Woodruff	V	V	No	✓	-	✓	0.00	2.29	2.29
Brachyscome brownii	-	-	CE	No	-	✓	✓	25.42	0.00	25.42
Callistemon linearifolius	Netted Bottle Brush	V	-	No	✓	-	✓	0.00	446 individuals	446 individuals
Corybas dowlingii	Red Helmet Orchid	E	-	No	✓	-	✓	0.00	11.37	11.37
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* population in the Hunter Catchment	EP	-	No	-	-	✓	1 individual	22 individuals	23 individuals
Cynanchum elegans	White-flowered Wax Plant	E	E	No	✓	✓	✓	0.00	9.75	9.75
Dillwynia tenuifolia	-	V	-	No	-	✓	-	0.00	1.46	1.46
Diuris tricolor	Pine Donkey Orchid	V	-	No	-	-	✓	0.00	26.56	26.56
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis population in the Hunter catchment	EP	-	No	-	-	✓	1.50	1.80	3.30
Eucalyptus castrensis	Singleton Mallee	E	-	Yes	-	-	✓	0.00	0.21	0.21
Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	-	✓	-	4.53	16.15	20.68
Eucalyptus glaucina[3]	Slaty Red Gum	V	V	No	-	✓	✓	0.00	1,176 individuals	1,176 individuals

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	-	✓	✓	0.00	17.68	17.68
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	✓	✓	-	0.00	5.76	5.76
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	V	No	-	-	✓	0.00	3.55	3.55
Melaleuca biconvexa	Biconvex Paperbark	V	V	No	✓	-	-	0.00	9.35	9.35
Melaleuca groveana	Grove's Paperbark	V	-	No	-	✓	✓	187 individuals	3,155 individuals	3,342 individuals
Olearia cordata	-	V	V	No	-	✓	-	0.00	4.03	4.03
Ozothamnus tesselatus	-	V	V	No	-	-	✓	0.00	7.69	7.69
Persoonia hirsuta	Hairy Geebung	E	E	Yes	-	✓	-	0.00	1.46	1.46
Pomaderris queenslandica	Scant Pomaderris	E	-	No	-	-	✓	0.00	6.85	6.85
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	-	-	✓	0.00	30.99	30.99
Prasophyllum sp. Wybong	-	-	CE	No	-	-	✓	0.00	30.99	30.99
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	-	✓	✓	30.01	27.71	57.72
Pterostylis chaetophora	-	V	-	No	-	-	✓	0.00	30.99	30.99
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	-	-	✓	1.97	0.21	2.18
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	✓	✓	-	0.00	9.45	9.45
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	✓	✓	✓	1,164 individuals	1,230 individuals	2,394 individuals
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	✓	✓	✓	1.69	18.3	19.99

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Rutidosis heterogama	Heath Wrinklewort	V	V	No	✓	✓	✓	0.00	15.68	15.68
Senna acclinis	Rainforest Cassia	E	-	No	✓	-	-	0.00	5.95	5.95
Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	✓	✓	✓	0.00	513 individuals	513 individuals
Tetratheca juncea	Black-eyed Susan	V	V	No	✓	-	-	0.00	2.85	2.85
Velleia perfoliata	-	V	V	No	-	✓	-	0.00	4.02	4.02
Zieria involucrata	-	E	V	No	-	✓	-	0.00	4.03	4.03

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.13 Summary of residual direct impacts to threatened fauna species credit species within the subject land

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	✓	✓	✓	93.77	0.00	93.77
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	✓	✓	✓	2.96	90.27	93.23
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	✓	✓	✓	0.00	69.50	69.50
Cercartetus nanus	Eastern Pygmy-possum	V	-	No	✓	-	-	155.55	0.00	155.55
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	✓	✓	✓	506.36	0.00	506.36
Delma vescolineata	Hunter Valley Delma	E	E	No	-	-	✓	233.04	0.00	233.04
Heleioporus australiacus	Giant Burrowing Frog	V	E	No	✓	-	-	20.53	6.22	26.75
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	No	✓	-	-	0.00	2.02	2.02
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	✓	-	-	141.86	3.85	145.71
Lathamus discolor	Swift Parrot	E	CE	Yes	-	✓	✓	42.76	0.00	42.76
Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	✓	-	-	63.53	0.00	63.53
Mixophyes balbus	Stuttering Frog	E	V	Yes	✓	-	-	180.09	0.00	180.09
Mixophyes iteratus	Giant Barred Frog	V	V	No	✓	-	-	2.34	1.47	3.81
Myotis macropus	Southern Myotis	V	-	No	-	✓	✓	120.25	0.00	120.25
Ninox connivens	Barking Owl	V	-	No	✓	✓	✓	29.30	7.34	36.64
Ninox strenua	Powerful Owl	V	-	No	✓	✓	✓	103.73	21.10	124.83
Notamacropus parma	Parma Wallaby	V	V	No	✓	✓	-	304.98	0.00	304.98
Petauroides volans	Southern Greater Glider	E	E	No	✓	✓	✓	477.12	0.00	477.12

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Potential SAII	Wyong IBRA subregion	Yengo IBRA subregion	Hunter IBRA subregion	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Petaurus norfolkensis	Squirrel Glider	V	-	No	✓	✓	✓	647.62	0.00	647.62
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	✓	✓	✓	145.64	10.38	156.02
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	No	-	-	✓	90.41	0.00	90.41
Phascolarctos cinereus	Koala	E	E	No	✓	✓	✓	244.24	40.50	284.74
Planigale maculata	Common Planigale	V	-	No	-	-	✓	18.21	0.00	18.21
Potorous tridactylus	Long-nosed Potoroo	V	V	No	✓	-	-	135.10	0.00	135.10
Pseudophryne australis	Red-crowned Toadlet	V	-	No	✓	✓	-	39.39	4.15	43.54
Tyto novaehollandiae	Masked Owl	V	-	No	✓	✓	✓	22.38	19.70	42.08
Tyto tenebricosa	Sooty Owl	V	-	Yes	✓	✓	✓	195.05	12.77	207.82
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	✓	✓	✓	383.77	0.00	383.77

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.14 Residual direct impacts to species credit species within the Wyong IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Angophora inopina	Charmhaven Apple	V	V	0.90 - complete	0.00	0.00	0.00	0.90	0.90
Anthochaera phrygia	Regent Honeyeater	CE	CE	0.51 - complete	0.00	0.00	0.51	0.00	0.51
Asperula asthenes	Trailing Woodruff	V	V	1.98 - complete	0.00	0.00	0.00	1.98	1.98
Callistemon linearifolius[3]	Netted Bottle Brush	V	-	146 individuals - complete	59 individuals - complete	0.00	0.00	205 individuals	205 individuals
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	25.95 - complete	18.67 - complete	0.37 - complete	2.96	42.03	44.99
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	6.86 - complete	9.18 - complete	0.14 - complete	0.00	16.18	16.18
Cercartetus nanus	Eastern Pygmy-possum	V	-	105.42 - complete	49.03 - partial	1.08 – partial	155.55	0.00	155.55
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	138.64 - complete	63.75 - partial	1.24 – partial	203.63	0.00	203.63
Corybas dowlingii	Red Helmet Orchid	E	-	9.28 - complete	0.00	0.00	0.00	9.28	9.28
Cynanchum elegans	White-flowered Wax Plant	E	E	1.27 - complete	0.55 - complete	0.00	0.00	1.82	1.82
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	3.21 - complete	0.00	0.00	0.00	3.21	3.21
Heleioporus australiacus	Giant Burrowing Frog	V	E	15.98 - complete	10.73 - partial	0.04 - partial	20.53	6.22	26.75
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	2.02 - complete	0.00	0.00	0.00	2.02	2.02
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	97.16 - complete	47.49 - partial	1.06 - partial	141.86	3.85	145.71
Litoria littlejohni	Littlejohn's Tree Frog	E	E	46.55 - complete	16.60 - partial	0.38 - partial	63.53	0.00	63.53
Melaleuca biconvexa	Biconvex Paperbark	V	V	3.21 - complete	6.11 - complete	0.03 - complete	0.00	9.35	9.35

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Mixophyes balbus	Stuttering Frog	E	V	118.72 - complete	60.21 - partial	1.16 - partial	180.09	0.00	180.09
Mixophyes iteratus	Giant Barred Frog	V	V	0.95 complete	2.85 - partial	0.01 - partial	2.34	1.47	3.81
Ninox connivens	Barking Owl	V	-	9.30 - complete	6.20 - complete	0.05 - complete	15.55	0.00	15.55
Ninox strenua	Powerful Owl	V	-	17.77 - complete	12.02 - complete	0.15- complete	29.94	0.00	29.94
Notamacropus parma	Parma Wallaby	V	V	140.25 - complete	66.94 - partial	1.25 - partial	208.44	0.00	208.44
Petauroides volans	Southern Greater Glider	E	E	140.25 - complete	66.94 - complete	1.25 - complete	208.44	0.00	208.44
Petaurus norfolkensis	Squirrel Glider	V	-	140.25 - complete	66.94 - complete	1.25 - complete	208.44	0.00	208.44
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	47.82 - complete	22.76 - partial	0.33 - partial	70.91	0.00	70.91
Phascolarctos cinereus	Koala	E	E	34.82 - complete	19.91 - complete	0.17 - complete	52.90	0.00	52.90
Potorous tridactylus	Long-nosed Potoroo	V	V	95.06 - complete	39.15 - partial	0.89 - partial	135.10	0.00	135.10
Pseudophryne australis	Red-crowned Toadlet	V	-	18.18 - complete	11.45 - partial	0.05 - partial	29.68	0.00	29.68
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	7.66 - complete	0.00	0.00	0.00	7.66	7.66
Rhodamnia rubescens[4]	Scrub Turpentine	CE	CE	732 individuals - complete	618 individuals - complete	4 individual - complete	646 individuals	708 individuals	1,354 individuals
Rhodomyrtus psidioides	Native Guava	CE	CE	6.60 - complete	11.69 - complete	0.18 - complete	1.69	16.78	18.47
Rutidosis heterogama	Heath Wrinklewort	V	V	0.90 - complete	0.00	0.00	0.00	0.90	0.90
Senna acclinis	Rainforest Cassia	E	-	5.95 - complete	0.00	0.00	0.00	5.95	5.95

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Syzygium paniculatum[5]	Magenta Lilly Pilly	V	V	161 individuals - complete	306 individuals - complete	1 individual - complete	0.00	468 individuals	468 individuals
Tetratheca juncea	Black-eyed Susan	V	V	2.85 - complete	0.00	0.00	0.00	2.85	2.85
Tyto novaehollandiae	Masked Owl	V	-	3.62 - complete	1.13 - complete	0.00 - complete	4.75	0.00	4.75
Tyto tenebricosa	Sooty Owl	V	-	46.77 - complete	28.17 - complete	0.52 - complete	75.46	0.00	75.46
Vespadelus troughtoni	Eastern Cave Bat	V	-	67.93 - complete	40.88 - partial	0.97 - partial	109.78	0.00	109.78

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Callistemon linearifolius* is a count of individuals. Given *Callistemon linearifolius* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied for the Wyong IBRA subregion.

(5) Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

Table 8.15 Residual direct impacts to species credit species within the Yengo IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Anthochaera phrygia	Regent Honeyeater	CE	CE	33.98 - complete	8.50 - complete	0.07 - complete	42.55	0.00	42.55
Brachyscome brownii	-	-	CE	24.55 - complete	0.00	0.00	24.55	0.00	24.55
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	27.29 - complete	13.59 - complete	0.15 - complete	0.00	41.13	41.13
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	30.36 – complete	15.87 - complete	0.17 - complete	0.00	46.40	46.40
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	168.11 - complete	55.66 - partial	0.58 - partial	224.35	0.00	224.35
Cynanchum elegans	White-flowered Wax Plant	E	E	3.15 - complete	1.40 - complete	0.00	0.00	4.55	4.55
Dillwynia tenuifolia	-	V	-	1.46 - complete	0.00	0.00	0.00	1.46	1.46
Eucalyptus fracta	Broken Back Ironbark	E	-	15.49 - complete	5.19 - complete	0.00	4.53	16.15	20.68
Eucalyptus glaucina[3]	Slaty Red Gum	V	V	201 individuals - complete	87 individuals - complete	0.00	0.00	288 individuals	288 individuals
Eucalyptus pumila	Pokolbin Mallee	V	V	4.02 – complete	1.75 – complete	0.00	0.00	5.77	5.77
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	2.55 - complete	0.00	0.00	0.00	2.55	2.55
Lathamus discolor	Swift Parrot	E	CE	1.67 - complete	0.00	0.00	1.67	0.00	1.67
Melaleuca groveana[4]	Grove's Paperbark	V	-	2137 individuals - complete	786 individuals - complete	0.00	187 individuals	2736 individuals	2923 individuals
Myotis macropus	Southern Myotis	V	-	2.17 - complete	0.39 - partial	0.00	2.56	0.00	2.56
Ninox connivens	Barking Owl	V	-	5.58 – complete	1.76 – complete	0.00	0.00	7.34	7.34

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Ninox strenua	Powerful Owl	V	-	47.57 - complete	20.97 - complete	0.29- complete	61.49	7.34	68.83
Notamacropus parma	Parma Wallaby	V	V	69.11 - complete	27.14 - partial	0.29- partial	96.54	0.00	96.54
Olearia cordata	-	V	V	4.03 - complete	0.00	0.00	0.00	4.03	4.03
Persoonia hirsuta	Hairy Geebung	E	E	1.46 - complete	0.00	0.00	0.00	1.46	1.46
Petauroides volans	Southern Greater Glider	E	E	169.28 - complete	57.13 - complete	0.59 - complete	227.02	0.00	227.02
Petaurus norfolkensis	Squirrel Glider	V	-	164.81 - complete	55.91- complete	0.58 - complete	221.30	0.00	221.30
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	50.54 - complete	21.65 - partial	0.32 - partial	62.13	10.38	72.51
Phascolarctos cinereus	Koala	E	E	167.25 - complete	55.77 - complete	0.59- complete	189.23	34.38	223.61
Prostanthera cineolifera	Singleton Mint Bush	V	V	39.46 - complete	0.00	0.00	23.74	15.72	39.46
Pseudophryne australis	Red-crowned Toadlet	V	-	7.10 - complete	6.75 - partial	0.01 - partial	9.71	4.15	13.86
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	1.79 - complete	0.00	0.00	0.00	1.79	1.79
Rhodamnia rubescens[5]	Scrub Turpentine	CE	CE	525 individuals - complete	327 individuals - complete	0.00	508 individuals	344 individuals	852 individuals
Rhodomyrtus psidioides	Native Guava	CE	CE	0.48 - complete	0.73 - complete	0.00	0.00	1.21	1.21
Rutidosis heterogama	Heath Wrinklewort	V	V	1.46 - complete	0.00	0.00	0.00	1.46	1.46
Syzygium paniculatum[6]	Magenta Lilly Pilly	V	V	18 individuals - complete	12 individuals - complete	0.00	0.00	30 individuals	30 individuals
Tyto novaehollandiae	Masked Owl	V	-	16.78 - complete	7.98 - complete	0.21 - complete	17.63	7.34	24.97

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Tyto tenebricosa	Sooty Owl	V	-	91.87 - complete	34.79 - complete	0.28 - complete	119.59	7.34	126.93
Velleia perfoliata	-	V	V	4.02 - complete	0.00	0.00	0.00	4.02	4.02
Vespadelus troughtoni	Eastern Cave Bat	V	-	150.28 - complete	47.47 - partial	0.53 - partial	198.27	0.00	198.27
Zieria involucrata	-	E	V	4.03 - complete	0.00	0.00	0.00	4.03	4.03

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Eucalyptus glaucina* is a count of individuals. Given *Eucalyptus glaucina* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Melaleuca groveana* is a count of individuals. For assumed habitat an average of recorded counts of 124 plants per hectare has been applied.

(5) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied for the Yengo IBRA subregion.

(6) Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

Table 8.16 Residual direct impacts to species credit species within the Hunter IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Acacia bynoeana	Bynoe's Wattle	E	V	9.77 - complete	0.00	0.00	0.00	9.77	9.77
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	EP	-	11.22 - complete	5.70 - complete	0.00	0.00	16.92	16.92
Angophora inopina	Charmhaven Apple	V	V	0.84 - complete	0.00	0.00	0.00	0.84	0.84
Anthochaera phrygia	Regent Honeyeater	CE	CE	29.00 - complete	21.71 - complete	0.00	50.71	0.00	50.71
Asperula asthenes	Trailing Woodruff	V	V	0.31 - complete	0.00	0.00	0.00	0.31	0.31
Brachyscome brownii	-	-	CE	0.87 - complete	0.00	0.00	0.87	0.00	0.87
Callistemon linearifolius[3]	Netted Bottle Brush	V	-	219 individuals - complete	22 individuals - complete	0.00	0.00	241 individuals	241 individuals
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	5.78 - complete	1.33 - complete	0.00	0.00	7.11	7.11
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	5.59 - complete	1.33 - complete	0.00	0.00	6.92	6.92
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	54.80 - complete	23.58 - partial	0.00	78.38	0.00	78.38
Corybas dowlingii	Red Helmet Orchid	E	-	2.09 - complete	0.00	0.00	0.00	2.09	2.09
Cymbidium canaliculatum – endangered population[4]	*Cymbidium canaliculatum* population in the Hunter Catchment	EP	-	15 individuals - complete	8 individuals - complete	0.00	1 individual	22 individuals	23 individuals
Cynanchum elegans	White-flowered Wax Plant	E	E	3.38 - complete	0.00	0.00	0.00	3.38	3.38

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Delma vescolineata	Hunter Valley Delma	E	E	164.19 - complete	58.85 - partial	0.00	223.04	0	223.04
Diuris tricolor	Pine Donkey Orchid	V	-	26.56 - complete	0.00	0.00	0.00	26.56	26.56
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis population in the Hunter catchment	EP	-	0.90 - complete	2.40 - complete	0.00	1.50	1.80	3.30
Eucalyptus castrensis	Singleton Mallee	E	-	0.21 - complete	0.00	0.00	0.00	0.21	0.21
Eucalyptus glaucina[5]	Slaty Red Gum	V	V	681 individuals - complete	207 individuals - complete	0.00	0.00	888 individuals	888 individuals
Eucalyptus pumila	Pokolbin Mallee	V	V	11.08 - complete	0.83 - complete	0.00	0.00	11.91	11.91
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	V	3.55 - complete	0.00	0.00	0.00	3.55	3.55
Lathamus discolor	Swift Parrot	E	CE	19.78 - complete	21.31 - complete	0.00	41.09	0.00	41.09
Melaleuca groveana[6]	Grove's Paperbark	V	-	419 individuals	0.00	0.00	0.00	419 individuals	419 individuals
Myotis macropus	Southern Myotis	V	-	85.18 - complete	32.51 - partial	0.00	117.69	0.00	117.69
Ninox connivens	Barking Owl	V	-	11.46 - complete	2.29 - complete	0.00	13.75	0.00	13.75
Ninox strenua	Powerful Owl	V	-	17.26 - complete	8.80- complete	0.00	12.30	13.76	26.06
Ozothamnus tesselatus	-	V	V	7.69 - complete	0.00	0.00	0.00	7.69	7.69

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Petauroides volans	Southern Greater Glider	E	E	29.55 - complete	12.11 - complete	0.00	41.66	0.00	41.66
Petaurus norfolkensis	Squirrel Glider	V	-	133.66 - complete	84.22 - complete	0.00	217.88	0.00	217.88
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	6.47 - complete	6.13 - partial	0.00	12.60	0.00	12.60
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	61.60 - complete	28.81 - partial	0.00	90.41	0.00	90.41
Phascolarctos cinereus	Koala	E	E	8.21 - complete	0.02	0.00	2.11	6.12	8.23
Planigale maculata	Common Planigale	V	-	14.53 - complete	3.68 - complete	0.00	18.21	0.00	18.21
Pomaderris queenslandica	Scant Pomaderris	E	-	6.85 - complete	0.00	0.00	0.00	6.85	6.85
Prasophyllum petilum	Tarengo Leek Orchid	E	E	30.99 - complete	0.00	0.00	0.00	30.99	30.99
Prasophyllum sp. Wybong	-	-	CE	30.99 - complete	0.00	0.00	0.00	30.99	30.99
Prostanthera cineolifera	Singleton Mint Bush	V	V	18.26 - complete	0.00	0.00	6.27	11.99	18.26
Pterostylis chaetophora	-	V	-	30.99 - complete	0.00	0.00	0.00	30.99	30.99
Pterostylis gibbosa	Illawarra Greenhood	E	E	2.18 - complete	0.00	0.00	1.97	0.21	2.18
Rhodamnia rubescens[7]	Scrub Turpentine	CE	CE	10 individuals - complete	178 individuals - complete	0.00	10 individuals	178 individuals	188 individuals
Rhodomyrtus psidioides	Native Guava	CE	CE	0.31 - complete	0.00	0.00	0.00	0.31	0.31
Rutidosis heterogama	Heath Wrinklewort	V	V	13.32 - complete	0.00	0.00	0.00	13.32	13.32
Syzygium paniculatum[8]	Magenta Lilly Pilly	V	V	15 individuals - complete	0.00	0.00	0.00	15 individuals	15 individuals

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
				Disturbance area A	Disturbance area B	Disturbance area HZ			
Tyto novaehollandiae	Masked Owl	V	-	10.38 - complete	1.98 - complete	0.00	0.00	12.36	12.36
Tyto tenebricosa	Sooty Owl	V	-	5.43 - complete	0.00	0.00	0.00	5.43	5.43
Vespadelus troughtoni	Eastern Cave Bat	V	-	51.53 - complete	24.19 - partial	0.00	75.72	0.00	75.72

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Callistemon linearifolius* is a count of individuals. Given *Callistemon linearifolius* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Cymbidium canaliculatum* – endangered population is a count of individuals. For assumed habitat an average of recorded counts of 1 plant per hectare has been applied.

(5) Within BAM-C the unit of measure for *Eucalyptus glaucina* is a count of individuals. Given *Eucalyptus glaucina* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(6) Within BAM-C the unit of measure for *Melaleuca groveana* is a count of individuals. For assumed habitat an average of recorded counts of 124 plants per hectare has been applied.

(7) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied based on recorded densities in the adjacent Yengo IBRA subregion.

(8) Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

8.1.6 Residual direct impacts to scattered trees

A total of 25 scattered trees were recorded within the subject land with 4 occurring within the Yengo IBRA subregion and 21 occurring within the Hunter IBRA subregion. The residual direct impacts to scattered trees for each the Yengo and Hunter IBRA subregions is presented in Table 8.17 and Table 8.18.

Table 8.17 Summary of residual direct impacts to scattered trees in the Yengo IBRA subregion

Class	Species	DBH category	Contain hollows	Number of trees
3489 – Hunter Escarpment Grey Box Forest				
2	*Eucalyptus sparsifolia*	≥20 cm and <50 cm DBH	No (visual assessment)	4
Total				**4**

Table 8.18 Summary of residual direct impacts to scattered trees in the Hunter IBRA subregion

Class	Species	DBH category	Contain hollows	Number of trees
3314 – Central Hunter Slopes Grey Box Forest				
1	*Eucalyptus moluccana*	<20 cm DBH	No (visual assessment)	1
3	*Eucalyptus moluccana*	>50 cm DBH	Yes (visual assessment)	1
3431 – Central Hunter Ironbark Grassy Woodland				
3	*Eucalyptus crebra*	>50 cm DBH	Yes (estimated)	6
3	*Eucalyptus moluccana*	>50 cm DBH	Yes (estimated)	6
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	3
4015 – Central Hunter Riparian Forest				
2	*Eucalyptus tereticornis*	≥20 cm and <50 cm DBH	Yes (visual assessment)	1
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	1
4089 – Namoi-Upper Hunter River Red Gum Forest				
3	*Eucalyptus tereticornis*	>50 cm DBH	Yes (estimated)	2
Total				**21**

8.2 Indirect impacts

8.2.1 Assessment of indirect impacts

Indirect impacts, as defined in the BAM, are impacts that occur when the project affects native vegetation and threatened species habitat beyond the subject land or within retained areas. This includes impacts from activities related to the construction or operational phase of the project.

Indirect impacts associated with the project include (but are not limited to):

- inadvertent impacts on adjacent habitat or vegetation including:
  - impact to habitat surrounding caves that are known or potential breeding habitat for threatened microbat species and Sooty Owl
  - impact to habitat surrounding known locations of Brush-tailed Rock Wallaby populations
  - impact to habitat surrounding known aquatic or gully locations of threatened frog species
  - impact to habitat near known locations of Hunter Valley delma
- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat due to noise, dust or light spill
- transport of weeds, pests and pathogens from the subject land to adjacent vegetation
- increased risk of starvation, exposure and loss of shade or shelter
- loss of breeding habitats
- trampling of threatened flora species
- increased risk of fire during construction
- increased risk of collision with lines and electrical and magnetic fields (EMF) impacts from new infrastructure.

Table 8.19 documents the residual indirect impacts (likely to occur on native vegetation, threatened entities and their habitat beyond the subject land). Figure 14.12 illustrates the final impacts likely to occur on the subject land including consideration of indirect impacts.

As outlined in section 8.1, partial clearing of the transmission line easement forms part of the measures taken to minimise impacts to biodiversity values. A hard edge with abrupt transition between totally cleared easement and forest or woodland would not be created. Instead, there would be gradual transition from cleared easement to lower shrubland into forest or woodland.

Substantial efforts have also been invested into no clearing zones by avoiding gully impacts within the State forests and nature reserve by stringing the transmission lines across such features and avoiding clearing in specific locations where this is achievable.

The partial vegetation clearing scenarios allow for a calculation of partial impacts adjacent to areas of complete vegetation and habitat removal. This incorporates any potential edge effects into the calculation as follows:

- disturbance area A is the area of most impact likely to generate indirect impacts to adjacent retained vegetation and this is assessed in section 8.1.
- disturbance area B (partial clearing of the transmission line easement) located directly adjacent to disturbance area A would be subject to the most indirect impact. Indirect impacts are incorporated into the direct impact calculation in section 8.1 for this disturbance area.
- disturbance area HZ (hazard high risk trees) is an area adjacent to disturbance area B (where required) and the direct impact calculation for this disturbance area in section 8.1 incorporates the indirect impacts that may occur adjacent to disturbance area B.

The mapping of disturbance area B and HZ are distinct management zones adjacent to the area of full direct impact (disturbance area A) and the impacts calculated for these areas incorporate the indirect impacts in terms of partial loss in vegetation integrity score. Importantly, while this is a linear infrastructure project it will not have the same level of predicted indirect impacts as other linear infrastructure projects such as major roads and the extent of indirect impacts adjacent to the subject land will be considerably less. The project would not result in any ‘sterilisation’ of remaining vegetation.

Table 8.19 Summary of residual indirect impacts

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Inadvertent impacts on adjacent habitat or vegetation	All PCTs Threatened species (e.g. Brush-tailed Rock-wallaby, Large-eared Pied Bat, Eastern Cave Bat, Large Bent-winged Bat, Sooty Owl) Threatened ecological communities Aquatic habitat	All PCTs Caves and cliff lines with potential and known bat and Sooty Owl habitat (adjacent to the subject land) Aquatic habitats associated with creeks and rivers.	Frequent during the length of the construction phase where it is near the feature.	Short-term	Construction	**Moderate.** The subject land is within a 100 m wide buffer of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments that are and may be breeding habitat for threatened micro bat species and Soot Owl. Breeding success may be influenced by construction during the breeding season. Inadvertent impacts on adjacent vegetation can include a range of indirect impacts including soil disturbance, erosion, sedimentation, enriched run-off and water quality. Construction of the project has the potential to result in sedimentation and erosion and mobilisation of contaminants within the disturbance area and into adjoining native vegetation and aquatic habitats, through soil disturbance and construction activities. Sediment laden runoff and spills affect water quality and adversely affect aquatic life particularly during construction near rivers, creek lines and Key Fish Habitats. These impacts have the potential to reduce the viability of habitat for aquatic and semi aquatic species (including frogs) temporarily.	The direct impacts to cave dwelling bats are well known (see Furey and Racey 2016). Land cover changes in the catchments of caves can affect their environments in several ways but empirical data is lacking. Abiotic changes in habitats surrounding the habitat features may include altered hydrological cycles and altered cave microclimates (Furey and Racey 2016). Removal of vegetation at cave entrances may also alter airflows and temperatures within a cave to such an extent that its habitable portions are reduced or eliminated (Sheffield et al. 1992). The purpose of the 100 m wide buffer around rocky areas containing caves, or overhangs or crevices, cliffs or escarpments is to minimise disturbance/avoid clearing within the area essential for microbat breeding. Several of the measures outlined in section 8.4.4 aim to prevent or mitigate impacts on adjacent habitat or vegetation including the avoidance of sensitive areas in the design process, micro-siting of construction infrastructure, minimising indirect impacts from light spill, and specific plans regarding biodiversity management, operational guidelines and pre-clearing survey procedures.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Reduced viability of adjacent habitat due to edge effects	Native vegetation	All PCTs	Ongoing. Impacts are likely to be higher during construction. The level of impacts is likely to decrease over time with the increase resilience of managed vegetation and habitats.	Long-term	Construction/ operational	**Negligible.** Indirect impacts on adjacent native vegetation and habitats are considered unlikely due to the observed quality of woodland and forest habitats adjacent to existing power line easements in the subject land and assessment area. Vegetation integrity scores are considered unlikely to decline in adjacent retained vegetation. The data from survey plots adjacent to existing easements suggests that the vegetation and habitat adjacent to existing easements remains in moderate to good condition (high native species richness and cover, low exotic species cover, low high threat weed cover). New edges will be created but the impacts may not necessarily be deleterious to retained vegetation adjacent to the power line easement based on evidence collected form the subject land.	The new environmental conditions along habitat edges can promote the growth of different vegetation types (including weeds), promote invasion by pest animals specialising in edge habitats, or change the behaviour of resident animals (Moenting and Morris 2006). The species composition, structure and ecological processes of a patch of habitat at the line of contact with another patch of habitat may be changed (Murcia 1995). The intensity of edge effects (abiotic, biological and indirect biological effects) is generally measured by distance from the edge. The distance of edge effect influence can vary, with the extent of edge effects having been recorded greater than 1 km from an edge (Forman et al. 2000) and stopping as little as 50 m from an edge (Bali 2005). The new edges created by the easement as it crosses through vegetation will cause changes in microclimates (a gradient of temperature, light intensity, and moisture will be formed running perpendicular to the edge) (Murcia 1995). The increase in light at the edge may result in increased plant growth (Murcia 1995) which may favour certain species. Increased wind speed at edges can result in detrimental impacts to taller tree growth forms due to impacts from wind throw (Murcia 1995) as the trees on the new edge

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							will be poorly adapted to increased wind speeds as they have grown in the confines of the interior of the vegetation patch buffered from direct wind gusts. There will be changed dynamics of species interactions at the newly created edge and cascading effects may occur. Increased leaf growth can be expected which may result in attraction of more herbivorous insects that in turn may attract more insectivorous birds, which may attract more nest predators and brood parasites (Murcia 1995). The newly created edges will create a new habitat type but the impact may not be negative based on evidence collected from the subject land.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Reduced viability of adjacent habitat due to noise, dust or light spill	Native vegetation Threatened species Threatened ecological communities	All PCTs	Noise and dust pollution is likely to be more frequent during the construction phase. During the operation phase, the generation of noise and dust is likely to be minimal and restricted to scheduled maintenance times. Light spill is likely to be daily (during night-time hours), however restricted to specific locations such as new switching and sub stations.	Short-term	Construction/ operational	**Negligible.** During construction increased levels of noise and dust are likely however these will be short term and mostly associated with vehicle movements, vegetation clearing, access track and proposed transmission line tower construction, switching station and substation construction. Operational phase would result in no lights on the transmission line sections and minimal additional lighting at switching and sub stations which are likely to have negligible impact except within a very limited and minor footprint. A short-term increase in construction noise will be mostly limited to daylight hours and is unlikely to have long-term adverse effects on the viability of adjacent habitats as they would be short-term in nature only. In terms of increased dust, construction impacts associated with permanent vegetation clearing is limited to Disturbance area A. This clearing area would mostly be buffered by disturbance area B where partial clearing is limited to vegetation above 2 metres growth height. Disturbance area B would have limited dust generation post construction. Increased vehicle movements would have a short-term increase in localised dust levels although given the ongoing agricultural	Anthropogenic noise can alter the behaviour of animals or interfere with their normal functioning (Bowles 1997). The impacts from noise emissions are likely to be localised to the construction areas and are not considered likely to have a significant, long-term, impact on wildlife populations outside the subject land. Within the area of impact, some sensitive species (e.g. woodland birds) may avoid the noise and some more tolerant species, including small mammals, will habituate over the longer-term (Byrnes et al. 2012). Elevated levels of dust may be deposited onto the foliage of vegetation adjacent to the project during construction. This has the potential to reduce photosynthesis and transpiration and cause abrasion and radioactive heating resulting in reduced growth rates and decreases in overall health of the vegetation. Consequently, changes in the structure and composition of plant communities and consequently the grazing patterns of fauna may occur (Auerbach et al. 1997; Walker and Everett 1987). The deposition of dust on foliage is likely to be highly localised, intermittent, and temporary and is therefore not considered likely to be a major impact of the project.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
						landscape usage, current dust levels are unlikely to substantial increase to an extent that would adversely reduce the viability of adjacent habitats. Beyond the easement (such as for construction support sites and switching station/substation works) dust impacts are likely to also be limited and short term in nature. The project is unlikely to generate light spill to an extent that would adversely reduce the viability of adjacent habitats as lighting during construction would be minimal. Mitigation measures will require lighting designs to be in accordance with the National Light Pollution Guidelines for Wildlife (Commonwealth DCCEEW 2023a) (see section 8.4.4). Operational impacts would be mostly limited to vehicle movements for maintenance activities. These activities would be periodic and of an extent and duration that is unlikely to reduced viability of adjacent habitat due to noise, dust or light spill. Any residual negligible impact such as short-term impact aspects is considered likely to be adequately managed with mitigation measures (see section 8.4.4).	Ecological light pollution is the descriptive term for light pollution that includes direct glare, chronic or periodic increased illumination, and temporary unexpected fluctuations in lighting, that can have potentially adverse effects on wildlife (Longcore and Rich 2004). Ecological light pollution may potentially affect nocturnal fauna by interrupting their life cycle. Some species (i.e. light tolerant microchiropteran bats) may benefit from the lighting due to increased food availability (insects attracted to lights) around these areas. Due to the likely short frequency and duration of the lighting, it is unlikely that animals will need to habituate to the light disturbance and only a short-term impact in the area of lighting is likely.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Transport of weeds, pests and pathogens from the site to adjacent vegetation	Native vegetation Threatened flora species Threatened ecological communities	All PCTs		Long-term	Construction/ operation	**Negligible.** Whilst this type of indirect impact has the potential to lead to a reduction of native vegetation integrity in surrounding habitats, management measures would be developed during construction to maintain the integrity of native vegetation in adjoining habitats. During operational phase, all maintenance and associated works would be subject to the Network Operator's biosecurity protocols.	Weed and pest species pose some of the greatest threats to biodiversity as these species displace native species through predation and competition, and damage vegetation by grazing and trampling (Adair and Groves 1998; Clarke, G. M., et al. 2000; Thorp and Lynch 2011). Consequently, proliferation of weed and pest species due to the project has the potential to be a key biodiversity impact. Proliferation of weed and pest species is likely to occur during construction and operation, although impacts will be greatest due to vegetation clearing during the construction phase. The effects of proliferation of weed and pest species may not be experienced immediately or even in the short-term, however, will likely commence a few months after the construction phase commences and gradually increase over months and seasons. Without appropriate management strategies, project activities have the potential to disperse weeds into areas of remnant vegetation where weed species are currently limited or in low density. Project activities also have the potential to import new weed species into the subject land. The most likely causes of weed dispersal and importation associated with the project include earthworks, movement of soil,

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							and attachment of seed (and other propagules) to vehicles and machinery during all phases. Weed dispersal by vehicles along roads and access tracks is a key source of weed invasion (see Birdsall et al. 2012). The subject land is currently habitat for a range of pest species including rabbits. Project activities have the potential to disperse pest species out of the subject land across the surrounding landscape and increase the ability of pest species to utilise habitats due to habitat removal, noise, and human presence during construction and operation. Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species (particularly predators such as foxes and cats) into areas where they are currently absent or in low numbers. However, in the context of the project this impact is predicted to be minimal as all vegetation in the biodiversity study area is likely to be impacted by foxes and cats. The magnitude of this impact will be low.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							Throughout the pre-construction and construction phases, and during operational phase, all maintenance and associated works would be subject to the Network Operator's biosecurity protocols so the potential for a detrimental impact to occur is reduced. In addition to the biosecurity management plan outlined in the proposed mitigation measures (see section 8.4.4), an Amphibian management plan (addressing, among other issues, the control of Chytrid Fungus) would also be implemented during the pre-construction and construction phases.
Increased risk of starvation, exposure and loss of shade or shelter	All fauna species	All PCTs	Impacts of potential starvation, exposure and loss of shade or shelter will occur at 1 time at the clearing/construction phase of the project. Ongoing vegetation management is likely to occur every 12 months, maintaining the vegetation structure. Vegetation management is unlikely to cause any significant changes to the level of the initial impacts.	Short-term to medium-term	Construction	**Negligible.** Displacement of resident fauna species during native vegetation clearing is considered relatively low due to the expansive similar forested and agricultural environments surrounding the project. Given the linear nature of the project and mostly highly mobile nature of most potential resident fauna species the increased risk of starvation, exposure and loss of shade or shelter due to the project is considered low. The proposed mitigation measures (see section 8.4.4) provide guidelines and procedures regarding project design, clearing limits, and biodiversity management that aim to reduce potential impacts to species resulting from shelter and habitat loss (including changes to foraging habitat).	Vegetation clearance and habitat loss can cause indirect impacts associated with increased risk of starvation, exposure and loss of shade or shelter as fauna may not survive due to shortages in available habitat resources. Even small-scale clearing within largely intact patches of vegetation can cause localised depletion of some species (Kutt et al. 2012). However, in the context of the project and subject land the impacts are likely to be minimal. Entire habitat patches will not be removed and habitat adjacent to the easement will remain intact. It is therefore considered unlikely that the project will result in an increase in risk of starvation, exposure and loss of shade or shelter.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Loss of breeding habitats	All fauna species	All PCTs	Impacts to breeding habitat (incl. hollow-bearing trees, nests, dreys, burrows & fallen timber) will occur at 1 time at the clearing/earth works and construction phase of the project. Ongoing vegetation management is likely to occur every 12 months, maintaining the vegetation structure. Vegetation management has the potential to cause further loss breeding habitats such as nests, dreys & burrows.	Long-term	Construction/ operation	**Moderate.** The loss of breeding habitat such as hollow-bearing trees, nests, dreys and burrows and fallen timber has the potential to affect native animals such as: — hollow-dependent bats — hollow-nesting and canopy-nesting birds — arboreal mammals — reptiles and amphibians — terrestrial fauna (including species that utilise burrows and fallen timber). The loss of breeding habitats is unlikely to extend beyond the disturbance area. Impacts beyond this area would be avoided through mitigation and management measures (see section 8.4.4).	Loss of discrete breeding habitats impacts population persistence. Loss of specific breeding habitats is associated with a decrease in roost-site preference or selectivity, an increase in mobility of individuals, and a decrease in social cohesion (Chaverri and Kunz 2011). These responses may reduce fitness by potentially increasing energetic expenditure, predator exposure, and a decrease in cooperative interactions (Chaverri and Kunz 2011). Loss of breeding habitats such as hollow-bearing trees, nests, dreys and burrows and fallen timber will be managed through a Supplementary Hollow and Nest Strategy, as well as several additional mitigation measures that aim to reduce the impacts on trees, breeding habitat, threatened species, and threatened communities. These mitigation measures and management plans are outlined in section 8.4.4.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Trampling of threatened flora species	Threatened flora species	All PCTs providing habitat for these species	Likely maintenance activities would include regular inspection and maintenance of all network infrastructure (ground and aerial), including proposed transmission line towers and poles, that would typically involve the following work and frequencies: — once yearly aerial inspection of the line, easement, vegetation and access tracks as part of seasonal bushfire prevention surveys — twice yearly ground based LIDAR and thermographic inspection of lines — two yearly vehicle-based patrol of access tracks and roads	Construction – Short-term Operation – long-term	Construction/ operation	**Low.** Reduction in population extent and available habitat of threatened flora species that occur in the ground stratum could occur due to trampling or unauthorised material, storage, vehicle and plant equipment. All populations and associated habitat for threatened flora species will be available in GIS files for all contractors and would be designated no-go areas during construction. Mitigation measures (see section 8.4.4) would include protection for these areas and inadvertent impacts such as trampling is considered unlikely. During operational phase any maintenance would be subject to the Network Operator's environmental operational protocols and have a low risk of any inadvertent impacts to any threatened flora species.	Trampling can cause decreases in plant density, plant size and reproductive performance (flowers and fruits production) (see Fenu et al. 2013; Kelly et al. 2003; McDougall and Wright 2004 for some examples). During operational phase any maintenance would be subject to the Network Operator's environmental operational protocols and have a low risk of any inadvertent impacts to any threatened flora species.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
			— six yearly ground-based asset inspection including foundation inspections. This would typically involve 2 to 3 maintenance crews driving light vehicles along the easement (accessed from public roads and access tracks), inspecting each proposed transmission line tower from the ground and by personnel climbing the tower — three to 6 yearly maintenance of transmission lines to address defects identified from inspections, using a light vehicle(s), an elevated work platform and a				

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
			medium sized truck involving multiple maintenance crews to rectify any defects found from routine inspections — ten yearly earth testing at each line structure. Vegetation removal required to maintain appropriate electrical safety clearances to the transmission lines (as required depending on vegetation growth rates).				

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Increased risk of fire	Native vegetation All flora & fauna species	All PCTs	Ongoing	Long-term	Construction/ operation	**Moderate.** Bushfire risk assessment has been considered as part of the project and the bushfire report is in the EIS. The risk of ignition and spreading of a bushfire from project construction activities would be very low. Ignition of bushfires because of the project's operation has the potential to occur during maintenance of project infrastructure and from the infrastructure itself. The project would be designed and managed in accordance with the NSW *Electricity Supply Act 1995* and Electricity Supply (Safety and Network Management) Regulation 2014 which requires a network operator to take all reasonable steps to make sure that all aspects of its network are safe. Vegetation maintenance would occur in accordance with the Network Operator's standard operational procedures. Impact assessment has considered this maintenance provision and is included in disturbance area B calculations.	Most Australian plant species are adapted to specific fire regimes. Different components of the fire regime may have adverse impacts on plant persistence, including fire frequency, severity, seasonality, type and spatial extent and patchiness (Gallagher et al. 2021). High fire frequency is known to threaten the persistence of plant species reliant on specific fire intervals to facilitate regeneration (Fisher et al. 2009; Russell-Smith et al. 2002). Altered fire regimes due to the project may result in impacts to species. In terms of fauna species there are winners and losers with any fire regime and most faunal groups are extremely resilient to fire (highly contrasting fire regimes often having little or no detectable impact on species abundances, at least in the medium term) (Andersen 2021). The most important effects of fire on fauna are typically indirect through habitat modification and fire intensity is not as important a factor as is widely thought; rather, fire frequency is particularly important (Andersen 2021). Vegetation maintenance would occur in accordance with the Network Operator's standard operational procedures. Increased risk of fire is considered likely to be low. Fire would be suppressed, and this may have detrimental impacts to some species.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
Increased risk of collision with transmission lines and electrical and magnetic fields (EMF) impacts from new infrastructure	Larger and higher-flying birds, and which generally reside over larger territories, such as birds of prey, ravens and magpies, cockatoos and some parrots, waterbirds and waterfowl Large-eared Pied Bat Eastern Cave Bat	All PCTs	Daily	Long-term	Operation	**Moderate**. Whilst this type of indirect impact has the potential to lead to some level of increase inbird mortality, mitigation measures would be implemented so the likely impacts are minimised. The project is mostly located well away from watercourses and major wetlands that would provide habitat for large flocks of water birds which reduces the overall risk. The proposed transmission lines are likely to be below flight paths for a majority of species. Mitigation measures will include line markers (i.e. bird flappers/diverters) in appropriate locations (see section 8.4.4).	It is widely known and observed that, of all fauna groups, birds most regularly use electrical power lines, and their associated infrastructure, such as proposed transmission line towers and poles, for perching and nesting. A detailed analysis of potential powerline impacts and ameliorative measures for birds is provided in Appendix I (Powerline impacts on birds and ameliorative measures). The reasons bird species use tall structures such as electrical transmission infrastructure include: — increased separation from terrestrial threats — as vantage points to allow early detection of airborne and terrestrial threats — for a commanding view over a patch of hunting territory — for the defence and proclamation of breeding territories, and — as safe elevated locations to build nests and raise their young. The use of power lines does not extend across all bird species, as the open spaces in which aerial power infrastructure are located is too exposed for many bird species, especially smaller cover preferring bird groups. Therefore, the most common powerline using groups are birds that use open and aerial habitats.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							A review of available scientific literature on EMF indicates that it is likely that EMF's may influence the physiology of birds nesting on proposed transmission line towers. However, the levels of those effects to each species under a range of different conditions is not easily quantifiable and there is currently no conclusive evidence to suggest that such effects would have a significant effect on the long-term viability of local bird populations. The EMF study for the project by BECA (2021) also states that: *"There is a body of research examining the effects of EMF on the reproductive biology and physiology of birds in the wild and under aviary conditions. Most studies indicate that EMF exposure of birds generally changes, but not always consistently in effect or in direction, their behaviour, reproductive success, growth and development, physiology and endocrinology, and oxidative stress under EMF conditions.'*

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							In their 2005 review paper, Fernie and Reynolds (2005) found that the majority of studies found when birds are subjected to EMFs, changes are observed in; bird behaviour, reproductive success, growth and development, physiology and endocrinology, and oxidative stress, although not always with a consistent effect or direction (Fernie and Reynolds 2005). Studies have shown positive effects of EMFs on birds including increased fertility in 2 breeding events studied in American Kestrels (*Falco sparverius*) (Fernie and Reynolds 2005). Furthermore, a study conducted over 9 breeding seasons, Tomas et al. (2012) found that within a single population of Great Tits (*Parus major*), breeding occurrences subjected to the effects of EMF exposure showed an increase in clutch size by 7% and an increase in egg volume by 3%. Despite mitigation efforts reducing the impact of powerline electrocution of raptors, the impacts persist with powerlines still responsible for a significant cause of death (Kagan 2017). This is partially because some of these risks are likely inconspicuous or just more pervasive than originally thought in the late 20th century (Lehman 2001). There is limited data available on estimate impacts within Australia however in 2014 it was

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							estimated power line related mortalities were between 12 to 64 million birds with as much as 11.6 million bird electrocution deaths each year (Loss et al. 2014). Studies have shown power line collision rates varies between species of similar flight trajectories, however overall in respect to population sizes, are not a major threat to populations (Janss and Ferrer 2000). Bats have shown a wide range of behavioural changes in response to anthropomorphic stressors; however the effects of power lines are still relatively uncertain and diverse (Froidevaux et. al. 2023). Studies have shown a mixed response of microbats to EMF with some actively avoiding high EMFs and others unimpacted (Froidevaux et. al. 2023; Nicholls B. and Racey P.A. 2007). Froidevaux et al. (2023) power monitoring showed certain microbat species alter foraging habits around high-voltage power line pylons or cables based on humidity levels despite high voltage EMF radiation possibly just in response to changing invertebrate activity impacted by humidity.

Indirect impact	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							Globally, the predictiveness and effectiveness of bird power line impact and mitigation, is compromised by a general lack of understanding about the regionally specific complexity of bird ecologies and how they interact with different collision drivers (Bernardino et al. 2018). Mitigation for EMF impacts are best implemented by proposed transmission line tower designs that discourage birds from building nest on them. As an important priority for managers maintaining power transmission lines so nesting birds do not constitute a risk to power delivery, proposed transmission line towers being considered are currently designed to discourage their use by birds.

8.2.2 Fauna strike risk assessment

While a number of threatened fauna species are likely to occur in the localities through which the project traverses, only a portion of those species can fly at elevations which might put them at risk of powerline strike.

Therefore terrestrial fauna, mammals, reptiles and amphibians are not at risk of powerline strike.

Flying and gliding mammals have the potential to make aerial movements at elevations where powerlines are located, although many of those species are either not present locally, they do not fly at elevations where powerlines are positioned (many microchiropteran bats and gliders) and they are unlikely to accidentally strike powerlines, because they navigate by radar clicks and not sight (i.e. larger microchiropteran bats).

The general fauna group most likely to have potential for powerline strike are birds, but only small subsets of birds are likely to fly at elevations that would place them at risk of powerline strike.

Birds which are strongly tied to terrestrial habitats, like understorey strata or other strata below the top of canopy height (particularly in open or shrubby habitats) will rarely if ever fly to the height of powerlines and when they do, it is to perch and there is no risk of powerline strike, since flights are made at relatively slow speeds and powerlines represent part of the habitat within their known territories.

Generally, it is those groups of birds which are likely to fly at heights where powerlines are located, and are not familiar with local habitat attributes, which have the most potential to encounter transmission line infrastructure. Such birds can include, birds of prey, quail, and other birds, many of which move in response to changing distributions of resources usually associated with water. Such species groups include waterfowl (ducks and swans), waterbirds (storks, cranes, egrets, herons, bitterns, ibis, spoonbills, water-hens, rails and crakes) and, both resident and migratory waders (stilts, avocets, lapwings, plovers, sandpipers and, snipe). Nevertheless, while there is always likely to be a subset of resident birds of prey, many of those species which are at risk, particularly waterbirds are unlikely to occur in habitats associated with the majority of the subject land, because those habitats remain dry for long periods of time. Many species within the waterbird groups are unlikely to fly at elevations of powerlines, unless making local movements, and a much smaller subset of those overall species are listed as species credit species or ecosystem credit. Furthermore, much of the habitats through which the project traverses is devoid of the shallow aquatic habitats that are most likely to attract such species and there are no birds at risk at the Hunter River floodplains where it is intersected by the assessment area.

A fauna risk assessment is provided in Appendix I (Powerline impacts on birds and ameliorative measures) and it identifies the following threatened species as a high risk of collision with powerline infrastructure These species are all dual credit species (ecosystem credit and species credit species):

- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Calyptorhynchus lathami lathami* (South-eastern Glossy Black-Cockatoo)
- *Ninox strenua* (Powerful Owl)
- *Tyto tenebricosa* (Sooty Owl).

All of these species are wide-ranging in the vicinity of the project's greenfield locations.

8.2.3 Indirect impacts on bird strike and EMF criteria assessment

Vehicle strike prescribed impact assessment criteria were applied for bird strike as no specific assessment criteria has been listed under the BAM for this type of impact for indirect or prescribed impacts. Of the listed prescribed impact assessment criteria under the BAM, vehicle strike was considered most appropriate for bird strike and EMF impacts associated with electrical power infrastructure.

The vehicle strike criteria and assessment of each species are provided below, with relevant assessment undertaken for the potential indirect impacts. A worked example of the assessment process is firstly provided, followed by the individual species assessments. This is provided so that the process for assessment can be clearly followed, given that birdstrike and EMF impacts do not neatly fit into the BAM process.

8.2.3.1 Assessed species selection

Given uncertainty around these indirect operational impacts, in association with discussions with CPHR, additional biodiversity offsets (over and above the biodiversity offsets required by the BAM for direct impacts) have been calculated for the following at risk species as determined by the risk assessment in Appendix I (Powerline impacts on birds and ameliorative methods).

Note these species have been assumed to be impacted by line-strike/EMF only within the subregions that have been assessed as likely for the species in Chapter 5 (Habitat suitability for threatened species).

- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
  - Wyong IBRA subregion
  - Yengo IBRA subregion
  - Hunter IBRA subregion
- *Calyptorhynchus lathami lathami* (South-eastern Glossy Black-Cockatoo)
  - Yengo IBRA subregion
  - Hunter IBRA subregion
- *Ninox strenua* (Powerful Owl)
  - Wyong IBRA subregion
  - Yengo IBRA subregion
  - Hunter IBRA subregion
- *Tyto tenebricosa* (Sooty Owl)
  - Wyong IBRA subregion
  - Yengo IBRA subregion
  - Hunter IBRA subregion.

These species have been selected:

- as surrogate species to be able to calculate proportional impacts to threatened and non-threatened avifauna
- as they have all been recorded within the biodiversity study area
- as they have a greater likelihood of interaction with the powerline infrastructure as outlined in this section.

In the BAM calculator it is not possible to calculate credits for non-threatened or ecosystem credit species, so the use of surrogate species to provide additional impact compensation over and above that required for direct impacts is considered appropriate.

For this assessment these dual credit species have been treated as species credit species to enable calculation of additional species credits to account for these impacts. That is, they have been treated as breeding species (despite breeding not being observed). This is considered to be a precautionary approach.

Within the areas assessed for indirect impacts from bird strike and EMF, impact calculations have assumed 10% of habitat for these species to be impacted. This precautionary assumption is considered to be proportional to the likely extent of impacts to the airspace, when compared to full clearing of directly impacted areas (Disturbance area A) in which the tree canopy layer that these species would use will be impacted. Limiting the assessed impacts to 10% of the available habitat is appropriate and representative given the impacts of birdstrike or EMF are at a much lower level than actual habitat removal. Impacted habitat was cautiously based on the assigned habitat PCT's in BioNet for each species.

8.2.4 Summary of indirect impacts

A summary of affected habitat for the IBRA subregions is presented in the Table 8.20 to Table 8.22.

Table 8.20 Indirect impacts to surrogate species credit species within the Wyong IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	20.22 – complete	14.78 – complete	0.30 – complete	2.96	32.34	35.30	3.53
Ninox strenua	Powerful Owl	V	-	17.69 – complete	12.02 – complete	0.15 – complete	29.86	0.00	29.86	2.99
Tyto tenebricosa	Sooty Owl	V	-	44.40 – complete	27.12 – complete	0.52 – complete	72.06	0.00	72.06	7.21

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.21 Indirect impacts to species credit species within the Yengo IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	19.58 – complete	10.74 – complete	0.13 – complete	0.00	30.45	30.45	3.05
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	8.89 – complete	4.63 – complete	0.05 – complete	0.00	13.57	13.57	1.36
Ninox strenua	Powerful Owl	V	-	47.10 – complete	20.08 – complete	0.29 – complete	60.13	7.34	67.47	6.75
Tyto tenebricosa	Sooty Owl	V	-	83.59 – complete	31.70 – complete	0.14 – complete	108.09	7.34	115.43	11.54

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.22 Indirect impacts to species credit species within the Hunter IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (complete or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Indirect impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	1.78 – complete	1.33 – complete	0.00	0.00	3.11	3.11	0.31
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	1.78 – complete	1.33 – complete	0.00	0.00	3.11	3.11	0.31
Ninox strenua	Powerful Owl	V	-	13.56 – complete	6.47 – complete	0.00	12.28	7.76	20.04	2.00
Tyto tenebricosa	Sooty Owl	V	-	5.43 – complete	0.00	0.00	0.00	5.43	5.43	0.54

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

8.3 Prescribed impacts

An assessment of prescribed biodiversity impacts has been prepared in accordance with section 8.2 of the BAM and is presented in Table 8.23.

Residual prescribed impacts that cannot be avoided or mitigated, would be addressed through retiring additional biodiversity credits. This would be determined in consultation with Conservation Programs, Heritage and Regulation (CPHR).

Table 8.23 Prescribed impacts within the subject land

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Karst, caves, crevices, cliffs, rocks or other geological features of significance				
Wyong	Within the Wyong IBRA subregion exists substantial mountainous terrain. Hillshade analysis followed by ground-truthing and targeted surveys identified discreet cliffline locations that contained habitat for threatened bat species such as Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat. Suitable clifflines and caves were also recorded for the Brush-tailed Rock-wallaby within this subregion. These features were recorded on the edges of the subject land within Olney and Watagan State forests. Known habitat (caves and cliff lines) where Brush-tailed Rock-wallaby and cave-dwelling microbats such as Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat were recorded occurs within 150 m of the subject land in multiple locations but is unlikely to be directly impacted by the project.	Impacts will be negligible; the rocky environment would be minimally impacted and these habitats would remain post-construction.	The minor impacts to the rocky areas would be permanent, although these impacts would be to the ridgetop environments and not the actual clifflines and caves.	The consequence of the impacts would be minor and non-significant because of the pro-active design process (e.g. micro-siting within the biodiversity study area). Micro-siting is described in section 8.4.5.1 and section 8.4.5.2

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Yengo	Within the Yengo IBRA subregion exists substantial mountainous terrain. Hillshade analysis followed by ground-truthing and targeted surveys identified discreet cliffline locations that contained habitat for threatened bat species such as Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat. Suitable clifflines and caves were recorded for the Brush-tailed Rock-wallaby within this subregion. Suitable clifflines and caves were recorded for the Sooty Owl within this subregion. These features were recorded on the edges of the subject land within primarily Pokolbin, Corrabare and Watagan State forests. Known habitat (caves and cliff lines) where Brush-tailed Rock-wallaby and cave-dwelling microbats such as Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat were recorded occurs within 150 m of the subject land in multiple locations but is unlikely to be directly impacted by the project. The known Sooty Owl cave habitat has been purposefully avoided as part of the alignment design. Other caves in which potential use by Sooty Owls was recorded will also not be directly impacted by the project.			
Hunter	No substantial features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this subregion. Minor rocky areas occurred along the HTP corridor and Hunter Valley delma was recorded in some of these locations.			

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Human-made structures				
Wyong Yengo Hunter	No substantial human-made structures (such as old farm buildings, mine infrastructure etc) are present in the subject land.	The project is located predominantly in forested land within Wyong and Yengo IBRA subregions and mining and agricultural land in the Hunter IBRA subregion. No substantial buildings were recorded within the subject land and impacts would be negligible to this type of habitat.	Negligible impacts to human-made structures are expected.	The consequence of any impacts would be minor and non-significant because of the micro-siting process within the biodiversity study area. Micro-siting is described in section 8.4.5.1 and section 8.4.5.2.
Non-native vegetation				
Wyong Yengo Hunter	Areas of non-native vegetation are present in the subject land and includes agricultural land and improved pastures dominated by exotic species (refer to section 4.1.2 for further detail). Areas of exotic-dominated vegetation would be impacted, however these are of comparatively minimal value for the native species and communities along the HTP corridor.	Impacts would be negligible; the exotic vegetation habitats would predominantly remain post-construction.	The minor impacts to the agricultural and exotic vegetation habitats would be permanent.	The consequence of the impacts would be minor and non-significant because of the micro-siting process within the biodiversity study area. Micro-siting is described in section 8.4.5.1 and section 8.4.5.2

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Habitat connectivity				
Wyong	Within this subregion the project has some impacts on habitat connectivity where the HTP corridor bisects vegetation associated with the Watagan and Olney State forests and surrounding native vegetation. Fragmentation impacts may occur where the alignment bisects this vegetation to recorded species such as: — Eastern Pygmy Possum — Long-nosed Potoroo — Brush-tailed Rock-wallaby — Southern Greater Glider — Squirrel Glider — Koala — Parma Wallaby.	The project would result in a highly permeable structure for biodiversity and connectivity is expected to remain largely unaffected for all species. However, an unknown (though likely low) level of interaction such may occur. Mitigating factors include: — the additional gaps for connectivity likely to be created by the project are limited to infrequently used access tracks approximately 10 m in width, which native flora and fauna can generally still disperse across — native vegetation up to 4 growth height along the easement would be retained, providing cover for native species and connectivity. Disturbance area A isn't included in this vegetation retention.	The impacts to connectivity area expected to be permanent, though comparatively minor. They are likely to reduce over time as biodiversity acclimatises to the presence of the proposed transmission line towers and powerlines.	The consequence of the impacts would be comparatively minor in a regional context and non-significant, partly because of the micro-siting process within the biodiversity study area. Micro-siting is described in section 8.4.5.1 and section 8.4.5.2 Appendix J outlines impacts in more detail on habitat connectivity and additional offsets and connectivity measures will be provided to address this aspect.
Yengo	Within this subregion the project has some impacts on habitat connectivity where the alignment bisects vegetation associated with the Pokolbin, Corrabare and Watagan State Forests and surrounding native vegetation. Fragmentation impacts may occur where the alignment bisects this vegetation to recorded species such as: — Eastern Pygmy Possum — Long-nosed Potoroo — Brush-tailed Rock-wallaby — Southern Greater Glider — Squirrel Glider — Koala — Parma Wallaby.			

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Hunter	Impacts on habitat connectivity at this stage are lesser than the other more heavily forested subregions as the alignment largely traverses cleared agricultural or mining land. In those areas connectivity is limited to roads and creek lines, paddock and small patches of remnant woodland proving 'stepping stone' connectivity for native species. The Singleton Military Area is more heavily forested although the project mostly follows an existing power easement at this location.	— some of the project is co-located with existing transmission easements and along roadside, substantially reducing the overall extent of impact to connectivity — mitigation measures will be installed where this is determined to be necessary, potentially including higher priority areas such as National Parks Estate and private lands. State forests are mostly subject to logging and connectivity structures may not be preferred in these locations.		

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Waterbodies, water quality and hydrological processes				
Wyong	The alignment crosses 1 main watercourse in this subregion: — Watagan Creek (4th order stream (Strahler)). The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.	The extent of impact related to this issue at all stages is expected to be minor. The works would mostly be limited to above-ground construction, with appropriate ground disturbance and water management measures to be implemented. All permanent disturbance areas located outside core riparian zone areas. No direct impacts are expected to occur to these aquatic values of reliant threatened species. The many smaller gullies and creeks within the State forests and mountainous areas are located within no clearing zones and will be spanned by the new powerlines.	The highest potential for these impacts is during construction, although these are subject to detailed management measures. Once operational, such impacts are considered to be negligible on an ongoing basis.	The consequence of the predicted low-level of impact to water-values is minor and expected to be able to be appropriately managed. Micro-siting is described in section 8.4.5.1 and section 8.4.5.2
Yengo	The alignment crosses 1 main watercourse in this subregion: — Congewai Creek (7th order stream (Strahler)). The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.			
Hunter	The alignment crosses several main watercourses in this subregion including: — Monkey Place Creek (5th order stream (Strahler)) — Loder Creek (4th order stream (Strahler)) — Hunter River (9th order stream (Strahler)). The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.			
Wind turbine developments				
All stages	N/A – wind turbines are not associated with the project.			

IBRA Subregions	Nature of prescribed impacts	Extent	Duration	Consequence
Vehicle strikes				
Wyong Yengo Hunter	Vehicle strike has the potential to occur within and adjoining the subject land in the construction phase, and to a smaller extent in the operation phase of the project because of increased traffic on both major and local roads.	During construction and operation the increase in construction vehicle movements and increase in road use means potential vehicle strike to native fauna is likely to occur, albeit at likely low levels.	The most vehicular movements would be generated during construction in the daytime. Once construction is completed, vehicular movements are not expected to significantly increase compared to the existing situation and would be generally associated with ongoing inspection and maintenance.	The consequence of the predicted level of impact is expected overall to be minor. Particular focus would be required during the construction phase and, to a smaller extent during the operation phase to manage vehicle and animal interaction.

8.3.1 Karst, caves, crevices, cliffs, rocks and other geological features of significance

Table 8.23 documents the residual predicted impacts on 1) aerial species, and 2) terrestrial species.

Karst, caves, crevices, cliffs, rocks, and other geological features of significance are absent from a large proportion of the subject land.

However, the mountainous areas in the Wyong and Yengo IBRA subregions contain many escarpments and caves and crevices.

The Hunter IBRA subregion is more typical of the Hunter Valley floor and while some rocky areas do occur across the valley floor, these are not substantial or suitable for the species that rely on more extensive and large scale mountainous areas.

These regions are described in more detail below.

8.3.1.1 Wyong IBRA subregion

Within this subregion approximately 10 potential cave and cliff edge locations near proposed transmission line tower footprints were identified through Hillshade mapping and subsequent ground-truthing.

Physical inspection surveys and active monitoring have been undertaken for use by threatened microbat species.

Targeted exit surveys incorporating cave inspections, harp trapping, ultrasonic frequency recorder monitoring and thermal imaging were undertaken on suitable caves recorded for use by threatened microbat species, refer to section 2.4.2 for methodology and section 5.2.2.29 for effort. Of these, regular use by threatened microbat species has been recorded within multiple locations.

No maternity/breeding colonies have been recorded within this subregion.

Of the areas identified for microbat activity (see Figure 14.13f):

- Many Eastern Cave Bat (*Vespadelus troughtoni*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) were recorded foraging along clifflines near the identified best potential cave and cliffline habitat and
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Little Bent-winged Bat (*Miniopterus australis*) were recorded foraging in Olney State Forest.

No evidence of maternity roosts were recorded within 150 metres of the subject land and therefore breeding habitat for these species are unlikely to be directly impacted by the project.

A study by Law et al. (2005) found that Eastern Cave Bats did not use small caves, crevices, and overhangs as day roosts if deep sandstone caves were also present, preferencing larger caves with rear dome features, suggesting small caves inside the subject land may not be as adequate as habitat elsewhere. Both Law et al. (2005) and Williams and Thomson (2019) found that the roosting location of individual bats would change frequently, but that they remained close to the preceding roost. This behaviour is well recorded in Australian bat species, and facilitates the bats' maintained social relationships and maternity sites, without requiring unnecessary energy expenditure searching for new food sources or roosts, while also reducing the risk of disease, predation, and parasite interactions associated with new sites (Williams and Thomson 2019). These roost fidelity behaviours suggest the bats recorded outside the subject land are likely to preference their existing habitat over new roosting sites in the identified potential habitat inside the subject land.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

Brush-tailed Rock-wallabies were recorded in Watagan State Forest at numerous locations. In general, their cave and cliffline habitats will remain in-situ and disturbance will be negligible.

8.3.1.2 Yengo IBRA subregion

Within this subregion approximately 14 potential cave and cliff edge locations near proposed transmission line tower footprints were identified through Hillshade mapping and subsequent ground-truthing.

Physical inspection surveys and active monitoring have been undertaken for use by threatened microbat species.

Targeted exit surveys incorporating cave inspections, harp trapping, ultrasonic frequency recorder monitoring and thermal imaging were undertaken on suitable caves recorded for use of threatened microbat species, refer to section 2.4.2 for methodology and section 5.2.2.29 for effort. Of these, regular use by threatened microbat species has been recorded within multiple locations.

Of the areas identified for microbat activity:

- Large-eared Pied Bat (*Chalinolobus dwyeri*) were recorded breeding in 2 caves, one in Pokolbin State Forest, and another within private lands north of Wollombi Road
- Many Large-eared Pied Bat (*Chalinolobus dwyeri*) and possible Eastern Cave Bat (*Vespadelus troughtoni*) were recorded foraging along clifflines near the identified best potential cave and cliffline habitat and
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Little Bent-winged Bat (*Miniopterus australis*) were recorded foraging in Pokolbin and Corrabare State forests.

These caves and habitats are unlikely to be subject to any direct impacts. Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

Brush-tailed Rock-wallabies were recorded in Watagan State Forest at numerous locations. In general their cave and cliffline habitats will remain in-situ and disturbance will be negligible. Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

Sooty Owl was recorded roosting in a cave in Sweetmans Creek gully in Corrabare State Forest. The design was substantially re-designed to completely avoid the *Sooty Owl cave*, with a buffer of over 450 metres from any impacts. Two other *Sooty Owl cave* locations were recorded in the gullies to the north of Wollombi Road at Cedar Creek, though these are outside of the biodiversity study area. Three other caves were also observed within Corrabare State Forest and were considered to be *Likely Sooty Owl caves*, with glider bones, bone fragments, whitewash and owl pellets present. No owls were actually recorded in these caves and the locations on the mapping are identified as *Likely Sooty Owl cave.* Potential breeding use of these caves is unknown although was not recorded and they will not be subject to direct impacts from the project. The known Sooty Owl cave, these other caves and other potential habitats will not be impacted by the project. Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.1.3 Hunter IBRA subregion

Within this subregion no caves or clifflines were recorded. Small rocky areas were recorded and Hunter Valley delma was recorded in grassy/rocky areas near Bayswater Power Station, Singleton Military Area and Hunter Valley Operations (see Figure 14.13g). Impacts will occur to these small rocky areas and the key species to be impacted is Hunter Valley delma. The residual impacts to this species are already being offset via the direct impact BAM calculations and no additional credits are considered to be required as a result of impacts to any small rocky areas as these are already accounted for in the main direct impact calculations.

8.3.2 Human-made structures

No substantial human-made structures (such as old farm buildings, mine infrastructure etc) are present in the subject land.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.3 Non-native vegetation

Table 8.23 documents the residual predicted impacts on 1) aerial species, and 2) terrestrial species.

The successful introduction of non-native vegetation to novel habitats can have significant ecological impacts across the entire recipient ecosystem (Leege and Murphy 2011). As such, the impacts of this project on non-native vegetation, and the subsequent effect on native species or communities, must be considered.

Non-native vegetation is present in the subject land in the form of agricultural land and improved pastures dominated by exotic species. These areas would experience minor but permanent impacts as a result of the project, but would remain post-construction.

Importantly, these areas are of minimal value for native species and communities along the alignment, and as the impact on non-native vegetation is expected to be minor and non-substantive, the risk to native species or communities is also likely to be negligible.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.4 Habitat connectivity

8.3.4.1 Overview

Table 8.23 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species.

Detailed discussion on regional terrestrial habitat connectivity including mitigation options is provided in Appendix J.

Habitat connectivity is illustrated in Figure 14.17 and Figure 14.18.

The project has the potential to further fragment habitat within the subject land through the creation or use of powerline easements and related infrastructure, thus affecting the connectivity between habitats in the wider landscape. Habitat connectivity is essential for the mitigation of habitat loss and fragmentation resulting from changes to a landscape, with connected habitats providing a means for species dispersal, improved genetic diversity, and movement between populations that might otherwise become isolated by these changes (Doerr et al. 2010). Maintenance of access routes and infrastructure associated with powerline easements is required regularly, creating a significant abrupt difference of habitat condition types. This ultimately leads to dispersal and movement inhibition for many species (Strevens et al. 2008).

However, Clarke et al. (2006) demonstrated the degree of clearing has distinct impacts on biodiversity values in relation to small mammals of NSW. They found that areas with significant clearing and minimal remaining vegetation were utilised mostly by introduced mice. However, moderate vegetation presence had the possibility of improving biodiversity, with an increase in the occurrence of species rarer in established forests, particularly where retained vegetation better suited the habitat needs of those species.

Clarke et al. (2006) outlines that the removal of the canopy cover will result in habitat creation for some species, while reducing it for others, supporting the intention by the project to enable retention of native vegetation up to 4 and 10 metres growth height along the easement, effectively facilitating species movement between suitable areas of habitat.

Gregory et al. (2021) found that the presence of transmission lines can create perching locations for birds of prey in open areas, leading to a reduction in the populations of localised raptor prey, but demonstrating that species will acclimatise to the presence of proposed transmission line towers and powerlines. This has been demonstrated by some threatened raptors, namely the Black Falcon (*Falco subniger*).

8.3.4.2 Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale

For areas of other projects where glider species are potentially impacted, the use of wooden poles to facilitate movement has proven effective. A study by Ball and Goldingay (2008) recorded a maximum glide distance of 25 metres, suggesting that the proposed 20-metre-wide connectivity corridors associated with the project should be functional for gliding species if trees of suitable height are present. Where suitable vegetation is not present wooden poles can be utilised to replace trees (Ball and Goldingay 2008).

An important consideration is that much of the alignment passes through operational State forests such as Olney, Watagan, Pokolbin and Corrabare State forests.

These operational State forests are impacted on an ongoing basis by logging activities within smaller forestry coupes.

Installation of permanent connectivity structures within these locations is likely to still be achievable as forestry operations will generally be excluded from the transmission easements and can be used when forests regrow to a suitable size.

The no clearing zones that are located continuously along the alignment within Wyong and Yengo IBRA subregions will facilitate undisturbed contiguous corridors of wildlife connectivity for all fauna species. These are located primarily within Olney, Watagan, Pokolbin and Corrabare State Forests but also within:

- Corrabare North Flora Reserve
- private properties.

Locations for glider and possum connectivity measures have been identified through the nominated suitable habitat areas that are located within areas that do not contain regular or proximate no clearing zones within 1 kilometre of each other.

Appendix J (Examination of regional terrestrial habitat connectivity) provides an assessment of the regional habitat connectivity and provides detailed information on glider poles. Figure 14.17 and Figure 14.18 provide terrestrial connectivity locations, including locations where Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale populations were recorded.

The mitigation measures outlined in this BDAR that apply to Squirrel Glider, Southern Greater Glider and Eastern Pygmy Possum are considered to be appropriate, including the preparation of a connectivity strategy. However, to address any uncertainties around the impacts to connectivity for this species in the landscape, due to impacts to the tree canopy layer, additional prescribed impact credits are proposed.

Guiding the approach for prescribed impacts on connectivity for the Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale are the following principles:

- areas of impact are calculated for the relevant subregions that have been adopted in this report for each of the selected species
- prescribed impacts to Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale due to habitat connectivity impacts encompass areas at which Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale have been recorded via targeted surveys or assumed present. This includes terrestrial connectivity locations, which are both shown on Figure 14.17 and Figure 14.18 and which also coincide with the nominated connectivity locations (poles, retained tree trunks or rope ladder locations).

Within the areas assessed for prescribed impacts for Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale habitat connectivity, impact calculations have assumed an additional 10% of impacted habitat within disturbance area A, disturbance area B and disturbance area HZ for this species to be impacted. This cautious assumption is considered to be proportional to the likely extent of impacts to the tree canopy connection. This is in addition to the credits generated for Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale for the full clearing of directly impacted areas (disturbance area A) in which the tree canopy layer that this species would use would be impacted and also in addition to the disturbance area B and disturbance area HZ zones.

Limiting the assessed impacts to 10% of the available habitat in these locations is considered to be appropriately representative given the impacts to connectivity for Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale are considered to be at a much lower level than actual habitat removal, given the mitigation measures such as glider poles and rope ladders are also to be used in association with understorey retention. Impacted habitat was cautiously based on the assigned habitat PCT's in BioNet for each species.

The proposed additional credit obligation for impacts to Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale habitat connectivity are provided in the Table 8.24 to Table 8.26. These are for impacts for areas at which Squirrel Glider, Southern Greater Glider, Eastern Pygmy Possum and Brush-tailed Phascogale have been recorded via targeted surveys or assumed present and where these coincide with terrestrial connectivity locations, which are both shown on Figure 14.17 and Figure 14.18.

Table 8.24 Prescribed connectivity impacts to species credit species within the Wyong IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Prescribed impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Cercartetus nanus	Eastern Pygmy-possum	V	-	103.73 – complete	47.43 – partial	1.08 – partial	152.24	0.00	152.24	15.22
Petauroides volans	Southern Greater Glider	E	E	105.29 – complete	42.56 – complete	0.67 – complete	148.52	0.00	148.52	14.85
Petaurus norfolkensis	Squirrel Glider	V	-	136.92 – complete	62.18 – complete	1.24 – complete	200.34	0.00	200.34	20.03

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.25 Prescribed connectivity impacts to species credit species within the Yengo IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Prescribed impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Petauroides volans	Southern Greater Glider	E	E	84.44 – complete	28.11 – complete	0.46 – complete	113.01	0.00	113.01	11.30
Petaurus norfolkensis	Squirrel Glider	V	-	160.44 – complete	51.31 – complete	0.58 – complete	212.33	0.00	212.33	21.23

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 8.26 Prescribed connectivity impacts to species credit species within the Hunter IBRA subregion

Scientific name	Common name	BC Act status[1]	EPBC Act status[2]	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha)	Assumed loss of habitat (ha)	Total impact habitat (ha)	Prescribed impact (10% of direct impact) (ha)
				Disturbance area A	Disturbance area B	Disturbance area HZ				
Petauroides volans	Southern Greater Glider	E	E	19.38 – complete	12.06 – complete	0.00	31.44	0.00	31.44	3.14
Petaurus norfolkensis	Squirrel Glider	V	-	124.75 – complete	81.07 – complete	0.00	205.82	0.00	205.82	20.58
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	60.55 – complete	26.13 – partial	0.00	86.68	0.00	86.68	8.67

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

8.3.5 *Waterbodies, water quality and hydrological processes*

The project crosses a number of watercourses at various locations. However, the extent of impact to waterbodies, water quality and hydrological processes is expected to be minor throughout the subject land, subsequently reducing the risk of impacts on threatened species within the subject land.

The works would be mostly limited to above-ground construction, with appropriate ground disturbance and water management measures to be implemented.

All permanent disturbance areas in the subject land are located outside core riparian zone areas. This is essential as the degradation of riparian areas can result in significant soil and riverbank erosion, increased nutrients and sediment in watercourses, and a reduction in the ability to filter overland run-off contaminants from watercourses (Chua et al. 2019). Such changes to watercourses also have the potential to impact both the aquatic and terrestrial biodiversity associated with affected habitats (Lind et al. 2019). Recognising this, the mitigation measures in section 8.4 outline that any riparian areas subject to disturbance would be stabilised and rehabilitated, and that only vegetation of the tree-stratum can be cleared (with tree trunks to be retained to a safe operational height), protecting the understory in such areas. As no core riparian zones are being permanently impacted, no direct impacts are expected to occur to these aquatic values of reliant threatened species.

Proposed transmission line towers would be located at least 50 metres away from watercourses, further reducing the risk of potential impacts to waterbodies, water quality and hydrological processes.

The highest potential for these impacts is during construction, although these are subject to detailed management measures. Once operational these impacts are considered to be negligible in an ongoing basis. The consequence of the predicted low-level of impact to water-values is minor and expected to be able to be appropriately managed.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.5.1 Key fish habitats

Impacts from the project on aquatic habitats, particularly mapped key fish habitats are considered likely to be negligible. Avoiding and minimising impacts on aquatic habitats is a priority of detailed design and any residual indirect impacts would be subject to mitigation measures. Transmission line towers would be located around 50 to 100 metres from the watercourses to minimise impact to riparian areas.

The only likely impact to occur in an area of key fish habitat would be the removal or trimming of tree canopy on the creek banks to facilitate the construction and operation of the powerlines spanning each riparian area. All trunk bases and understorey would be retained in-situ adjoining the creek banks. All potential indirect impacts associated with erosion and sedimentation impacts would be managed and monitored so these do not impact the riparian areas.

All waterway crossing will be designed in accordance with *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003) and *Policy & Guidelines for Fish Habitat Conservation & Management* (2013 update) (DPIE 2013). Where the project involves works within 40 metres of the high bank of any river, lake or wetlands (collectively waterfront land), such as waterway crossings, the work will be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land.

Temporary impact associated with vehicle water crossings during the construction phase will be limited where possible to existing forestry and farm tracks and crossing points.

Appendix L (Aquatic biodiversity impact assessment) outlines the crossing locations of Key Fish Habitat and these include:

- Hunter River (Strahler 9)
- Wollombi Brook (Strahler 8)
- Loader Creek (Strahler 4)
- Monkey Place Creek (Strahler 5)
- Congewai Creek (Strahler 6)
- Watagan Creek (Strahler 4).

At most, any impact to water quality would be temporary and negligible. Each riparian area would continue to function as it currently performs. It is considered unlikely that temporary impacts would result in any long-term degradation of mapped key fish habitat areas.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.5.2 Groundwater dependent ecosystems

Impacts to groundwater associated with the project are identified in the Groundwater impact assessment report in the EIS (EMM 2025) and include the construction of concrete pilings and switching stations. These potential impacts on groundwater and subsequent GDEs is considered very low and restricted to direct impact areas for which this BDAR assesses related impacts. The following information outlines key points from the EMM (2025) report for context in relation to potential biodiversity impact considerations.

In terms of impacts, concrete pilings may intercept the local water table where the water table is close to surface, most commonly within the Hunter Valley floor and floodplains. During construction concrete would be poured into the excavated pile, and water removed from the pile as it is displaced by the concrete. There is no permanent take of water, and therefore, there is no permanent change to groundwater levels and associated sensitive receivers, during the project construction or operation.

Subsurface excavations for the construction of other project infrastructure are considered unlikely to intercept groundwater, given their shallow nature and the depth of groundwater in these locations. In particular, this has been reviewed for the Olney and Bayswater substations, and the maximum excavation depths for both substations are above the expected water table.

None of the structures or construction activities within the subject land would result in any permanent groundwater take that would alter the groundwater flow outside of the direct impact areas.

A review of potential drawdown associated with the use of groundwater bores for incidental groundwater take during construction indicates there are no drawdown impacts expected at any high priority listed GDEs.

During the projects operational phase there will be no groundwater take, however there are minor potential for contamination incidents relating to accidental spills of hazardous materials and/or chemicals resulting in the contamination of groundwater. In addition, as part of the project's water supply strategy, where feasible and reasonable, extraction of groundwater from existing licensed sources would be considered as a potential source of construction water. Preliminary desktop investigations have identified that there is up to 5,500 megalitres per year of entitlements from active, non-mining licensed groundwater bores within 5 kilometres of the project impact area. These licenses are largely assigned for irrigation or farming purposes. Should the construction contractor (once appointed) enter negotiations for the temporary use of any existing groundwater bores with the licence holder(s), the authorised use of these existing licenced groundwater bores would be converted to cover the intended use for construction water supply. The water entitlements associated with the respective water access licences (WALs) would be available for use as part of construction water supply, should they become available for use. While ordinarily a change in the water use purpose would require approval from the NSW Department of Climate Change, Energy, the Environment and Water, the project has been declared SSI under section 5.12(4) and section 5.13 of the New South Wales (NSW) *Environmental Planning and Assessment Act*

1979 (EP&A Act) by the NSW Minister for Planning and Public Spaces in July 2022. By virtue of the SSI declaration, a water use approval under section 89 of the NSW Water Management Act 2000 is not required for the project in the event that this water supply option is pursued.

Given this, native vegetation assessment under BAM is considered adequate to address the direct impacts on terrestrial GDE native vegetation and the project is considered unlikely to result in any indirect additional impact on GDEs.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.5.3 Surface water

The Surface water impact assessment by EMM (2025) outlines the following:

The majority of potential surface water impacts would take place during the construction phase. The following potential impacts to the receiving surface water environment were identified:

- changes to water quality
- changes to streamflow regime
- interactions with watercourses and riparian corridors.

Risks to surface water quality are higher in the State forests where the topography is steep and disturbance activities are located upstream of sensitive biodiversity areas. Steep topography increases the risk of erosion and sediment mobilisation due to higher velocity of runoff which can increase erosive forces, causing greater scour and mobilisation of sediments. Erosion and mobilisation of sediments can affect water quality by increasing turbidity and suspended sediments, increasing nutrients, and mobilising a range of contaminants that bind to soil particles such as pesticides and metals.

Risks to surface water quality are substantially lower in areas of the Hunter Valley of low to moderate grades where the receiving environment is highly modified as a result of land clearing, coal mining, and energy generation. With the implementation of mitigation measures, predicted impacts to water quality are considered low to moderate, depending on the sensitivity of the receiving environment.

Predicted impacts to streamflow regime are localised and largely associated with stormwater control measures. These impacts would, however, be very localised, short term, dissipate downstream and insignificant to streamflow. Predicted impacts to streamflow regime are low. The extraction of water from any surface water source would be undertaken in accordance with the NSW water regulatory framework including any conditions on water access licences (WALs) and water supply works and use approvals as well as rules in the relevant water sharing plan (WSP). This framework considers measures to manage extractions such that there are minimal impacts to downstream water users and the environment.

Potential impacts to riparian corridors would be highest in the State forests where there is a greater presence of vegetation and disturbance activities are located in or upstream of sensitive biodiversity areas. The removal of vegetation from riparian corridors can affect bed and bank stability of watercourses, alter the suitability of habitats for terrestrial and aquatic species and alter the conveyance functionality and geomorphic form of watercourses. Construction of watercourse crossings, as well as vegetation clearing, would also impact riparian corridors. The potential impacts to riparian corridors would be substantially lower in low lying areas of the Hunter Valley where vegetation clearing is extensive and the receiving environment is highly modified as a result of land clearing, coal mining, and energy generation.

The ongoing design refinement process has the objective of developing an efficient project design that avoids and minimises environmental impacts. With the implementation of mitigation measures, predicted impacts to watercourses and riparian corridors are considered low to moderate, depending on the sensitivity of the receiving environment. The implementation of the mitigation and management measures provided in the Surface water impact assessment are key to managing risks to surface water quality, streamflow regime and watercourses and riparian corridors. Mitigation measures to avoid or minimise potential surface water impacts from the construction and operation of the project are provided in the Surface water impact assessment. Specifically, a soil and water management plan will be developed for the project.

This management plan will outline site specific surface water and groundwater measures to be implemented to prevent potential negative impacts to water resources during the construction and operational phases.

Based on the above, additional mitigation measures or additional credits for prescribed impacts are not considered to be warranted.

8.3.6 Vehicle strike

Table 8.27 documents the residual predicted impacts of vehicle strike on: 1) threatened fauna species, and 2) protected fauna species that are part of a TEC. Evidence-based justification for predicted impacts is provided.

Increased traffic as a result of the project has the potential to result in vehicle strike to threatened species and protected fauna species that are part of a TEC occurring in the subject land.

Vehicle collision is a direct impact that reduces local population numbers and is a common occurrence in Australia (Coffin 2007; Rowden et al. 2008).

Australia lacks national data on roadkill (Englefield et al. 2020) and as such the impact on animal population are largely unquantified. However, there are some NSW based studies that provide an evidence base. Taylor and Goldingay (2004) showed that roadkill rates of vertebrate species on 3 major roads in northeastern NSW equated to 0.3 road-kills km^{-1} $week^{-1}$ or one road-kill every 3.8 km $week^{-1}$.

The likelihood of vehicle collisions with kangaroos has been shown to increase exponentially with traffic volume rather than linearly (Klöcker et al., 2006). Kangaroos initially perceive vehicles as a threat and flee at low traffic volumes, but as traffic increases, they become habituated and reduce their flight distance from the road edge (Klöcker et al. 2006).

Higher traffic volumes may make kangaroos more alert, jumpy, and flighty, resulting in scattered and undirected flights (Klöcker et al. 2006) which may result in increased likelihood of vehicle collision. Other evidence suggests that the majority of vehicle strike are caused by very few vehicles as most roadkill deaths occur at night and the majority of traffic volume occurs during the day (Ramp et al. 2005). Although high traffic volume is commonly associated with high fatality rates of fauna on roads, roads that are travelled infrequently but at high speed often incur high fatality rates as species do not appear to become habituated to vehicle presence (Ramp et al. 2005). It is likely that increased vehicle movements, specifically at night, would increase the risk of vehicle strike. An older study by Vestjens (1973) showed that the roadkill on a road between Canberra, ACT and Lake Cowal, NSW was composed of birds (65.9%), mammals (29.1%), reptiles (4.9%) and amphibia (0.1%). This provides evidence upon which to base assumptions of likely vehicle strike impacts to various fauna groups.

Areas in the Hunter Valley are generally near existing infrastructure and highly disturbed areas with limited native vegetation patches.

During operation in the State Forests, vehicle speeds would generally be very low due to the topography and nature of the roads, combined with project speed limits and driver training.

Key considerations in relation to vehicle strike for the project are the following:

- the project has already been subject to substantial design refinement to minimise the quantum of native vegetation that is impacted, which therefore also reduces the risk to vehicle strike overall
- the key risk period for vehicle strike of fauna is during the night, particularly for those mammal species (such as macropods) or owls known to be at higher risk of vehicle strike. The project construction and operation traffic will generally be during the daytime, and this substantially minimises any overall increase in vehicle strike risk to native fauna from the project
- the Hunter Valley flats (Hunter subregion) are in generally open disturbed landscapes with limited native remnant vegetation, which overall means that risk in this part of the project is unlikely to substantially increase

- the National Parks and State Forests within the Wyong subregion and Yengo subregion are contiguously forested with native vegetation, either being remnant or planted for forestry. These contiguously forested landscapes provide an extensive source of potential fauna that may be subject to vehicle strike risk and these areas are actually likely to be the higher risk areas (albeit overall minor risk) within the biodiversity study area.

Based on the Technical report 4 – Traffic and transport impact assessment report for the project, the following indicative movements of vehicles are likely during construction:

- Hebden Road construction support site: 434 light vehicles and 406 heavy vehicles per day maximum
- Pikes Gully Road construction support site: 378 light vehicles and 335 heavy vehicles per day maximum
- Gouldsville Road construction support site: 434 light vehicles and 406 heavy vehicles per day maximum
- Wollombi Road construction support site: 378 light vehicles and 335 heavy vehicles per day maximum
- Freemans Drive construction support site: 562 light vehicles and 480 heavy vehicles per day maximum.

So, during the project construction a maximum of 5000 vehicles per day along the entire alignment would undertake construction trips. While this sounds like a high number, this is distributed across the entire alignment and in context to existing vehicle movements within the biodiversity study area this would be a small number of vehicle movements in terms of vehicle strike potential impacts.

Access to the transmission line easement and switching stations during operation would be via existing public and private roads and access tracks, and new access tracks established as part of the project during construction. Priority has been given to the use and upgrade of existing access tracks over the creation of new access tracks, where possible. Ongoing use of the upgraded tracks and new tracks during operation would be required for asset maintenance activities. These general asset maintenance activities can predominantly be undertaken with light vehicle access within the easement.

Figure 14.17 and Figure 14.18 provides indicative potential locations of vehicle strike and these are generally at:

- specific locations in the Hunter subregion where the project and related roads are location in proximity to remnant native vegetation
- within the Wyong subregion and Yengo subregion at the following locations:
  - brownfield areas of subject land including potential locations of vehicle strike (note that these are generally existing roads subject to some upgrading as part of the project). Where locations are shown as only brownfield areas and do not include potential locations of vehicle strike, such locations are mostly existing transmission tower footing subject to upgrade and not likely to affect vehicle strike risk
  - forestry roads where increased vehicle strike is possible are those forestry roads that the project roads feed into and that will not be upgraded but that will still have increased traffic, particularly during construction.

While locations of higher risk have been provided as required by the BAM, as outlined above it is considered that, subject to mitigation and management measures proposed, that the risk to native fauna will not be substantially increased.

Due to the generally low likelihood of vehicle strike, and mitigation measures that would be implemented (i.e., detailed design of roads/access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impacts are likely to be low.

Table 8.27 Residual prescribed impacts – vehicle strikes

Threatened fauna or protected fauna that are part of a TEC that are at risk of vehicle strike (identified in Chapter 6)	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
Threatened species				
Squirrel Glider	No	Low	Squirrel Gliders have potential for vehicle strike when gliding across road corridors. Consequently, risk of vehicle strike is low, but could occur on rare occasion.	Due to the low likelihood of vehicle strike, and mitigation measures that would be undertaken (i.e., detailed design of access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impact for Squirrel Glider is likely to be low.
Spotted-tailed Quoll (*Dasyurus maculatus*)	No	Low	Threatened terrestrial and sedentary species, and species with broad home ranges have higher potential for vehicle strike when crossing roads and tracks, and vehicle movement may be slightly increased during construction and operation of the project. However, due to the minor rate of traffic increase the overall risk of vehicle strike for these species is low.	Due to the low likelihood of vehicle strike and mitigation measures that would be undertaken (i.e. detailed design of access routes, implementation of road signs and speed limits and driver training), the residual impact for these threatened species is minor.
New Holland Mouse (*Pseudomys novaehollandiae*)	No			
Eastern Pygmy-possum (*Cercartetus nanus*)	No			
Yellow-bellied Glider (*Petaurus australis*)	No			
Booroolong Frog (*Litoria booroolongensis*)	No			
Pink-tailed Legless Lizard (*Aprasia parapulchella*)	No			
Hunter Valley delma (*Delma vescolineata*)	No			
Pale-headed Snake (*Hoplocephalus bitorquatus*)	No			
Bush Stone-curlew (*Burhinus grallarius*)	No			
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	Yes			
Brush-tailed Phascogale (*Phascogale tapoatafa*)	No			
Koala (*Phascolarctos cinereus*)	No			

Threatened fauna or protected fauna that are part of a TEC that are at risk of vehicle strike (identified in Chapter 6)	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
Protected fauna species that are part of these TECs that are most at risk from vehicle strike based on observations of roadkill made in the locality and database records				
Mammals including Eastern Grey Kangaroo, Red-necked Wallaby, Common Wallaroo, Swamp Wallaby, Common Wombat, Short-beaked Echidna, Common Brushtail Possum, Common Ringtail Possum, Sugar Glider.	No	High	Roadkill rates for mammals has been shown to be second only to birds (Vestjens 1973). Taylor and Goldingay (2004) showed that roadkill rates of vertebrate species on 3 major roads in northeastern NSW equated to 0.3 road-kills km^{-1} $week^{-1}$ or 1 road-kill every 3.8 km $week^{-1}$. Due to the minor rate of predicted traffic increase the overall risk of increased vehicle strike for these species is low.	Due to the low likelihood of vehicle strike, and mitigation measures that would be undertaken (i.e., detailed design of roads/access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impacts are likely to be low.
Reptiles including Common Bearded Dragon, Jacky Lizard, Nobbi Dragon, Red-bellied Black Snake, Eastern Brown Snake, Eastern Bluetongue, Shingleback Lizard (Boggi), Lace Monitor, Snake-necked Turtle.	No	High	Roadkill rates for reptiles has been shown to be lower than for other fauna groups such as mammals and birds (Vestjens 1973). Due to the minor rate of predicted traffic increase the overall risk of increased vehicle strike for these species is low.	Due to the low likelihood of vehicle strike, and mitigation measures that would be undertaken (i.e., detailed design of roads/access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impacts are likely to be low.
Amphibians including Ornate Burrowing Frog, Common Froglet, Eastern Sign-bearing Froglet, Brown Toadlet, Striped Marsh Frog, Spotted Grass Frog, Eastern Banjo Frog, Peron's Tree Frog, Broad-palmed Frog, Green Tree Frog, Tyler's Tree Frog, Eastern Dwarf Tree Frog.	No	High	Roadkill rates for amphibians has been shown to be lower than for other fauna groups (Vestjens 1973). Due to the minor rate of predicted traffic increase the overall risk of increased vehicle strike for these species is low.	Due to the low likelihood of vehicle strike, and mitigation measures that would be undertaken (i.e., detailed design of roads/access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impacts are likely to be low.

Threatened fauna or protected fauna that are part of a TEC that are at risk of vehicle strike (identified in Chapter 6)	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
Birds including Wedge-tailed Eagle, Whistling Kite, Australian Wood Duck, Pacific Black Duck, Masked Lapwing, Australian Magpie, Pied Currawong, White-winged Chough, Apostlebird, Australian Raven, Red-browed Finch, Double-barred Finch, Zebra Finch, Superb Fairy-wren, Variegated Fairy-wren, Noisy Miner, Australian Pipit, Willie Wagtail, Grey Fantail, Sulphur-crested Cockatoo, Little Corella, Galah, Cockatiel, Yellow-tailed Black-cockatoo, Australian King-parrot, Red-winged Parrot, Musk Lorikeet, Budgerigar, Bluebonnet, Eastern Rosella, Crimson Rosella, Red-rumped Parrot, Scaly-breasted Lorikeet, Rainbow Lorikeet, Southern Boobook, Barn Owl, Emu.	No	High	Roadkill rates for birds has been shown to be higher than for other fauna groups (Vestjens 1973). Taylor and Goldingay (2004) showed that roadkill rates of vertebrate species on 3 major roads in northeastern NSW equated to 0.3 road-kills km^{-1} $week^{-1}$ or 1 road-kill every 3.8 km $week^{-1}$. Due to the minor rate of predicted traffic increase the overall risk of increased vehicle strike for these species is low.	Due to the low likelihood of vehicle strike, and mitigation measures that would be undertaken (i.e., detailed design of roads/access routes to avoid areas of key habitat, implementation of road signs and speed limits and driver training), the residual impacts are likely to be low.

8.4 Mitigating residual impacts – management measures and implementation

8.4.1 Approach to environmental management

The Network Operator appointed by EnergyCo will design, build, finance, operate and maintain the project. The proposed Network Operator would be required to have an environmental management system that is ISO 14000 accredited.

The environmental performance of the project would be managed in accordance with:

- the Network Operator's environmental management system, including processes and procedures
- the project as described in the EIS, Submissions Report and Amendment Report (if required)
- the mitigation measures that have been identified to minimise environmental impacts (as summarised in Table 8.28)
- the conditions of approval and other licences, permits and consents granted for the project
- the environmental management strategy (EMS) during construction
- an environmental management system during operation.

The environmental management approach for the HTP is illustrated in Figure 8.1 and further described in the following sections.

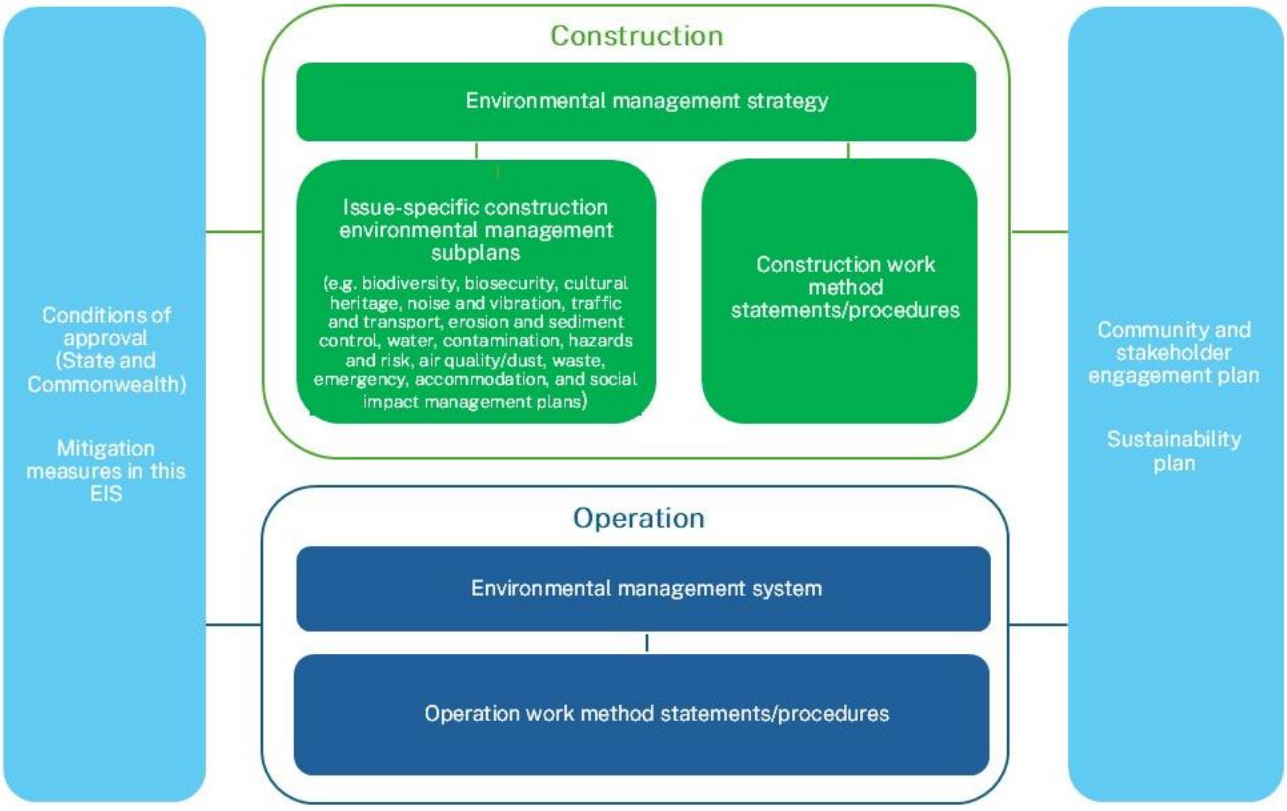


Figure 8.1 Environmental management of the HTP

8.4.2 Construction environmental management

A range of processes, procedures and actions would be implemented so that construction activities are undertaken in accordance with the environmental, stakeholder and community management requirements identified in the EIS, Submissions Report and Amendment Report (if required) throughout the construction period. Specifically, this would include, but not be limited to the following:

- preparation and implementation of environmental work method statements for post-approval pre-construction activities
- preparation and implementation of the EMS, construction environmental management sub-plans and other supporting documentation for each specific environmental impact
- identification of roles and responsibilities including the relationship between EnergyCo, the Network Operator and the Environmental Representative (if required by the conditions of approval)
- implementation of environmental management training and awareness for construction staff
- continuation of stakeholder and community engagement activities during construction.

These requirements are summarised in the following sections.

8.4.2.1 Post-approval pre-construction activities

Pre-construction activities would need to be carried out before the start of the main construction work. It would involve finalising the detailed design and construction methodology, completing pre-construction surveys and monitoring requirements and facilitating establishment of construction support sites for construction commencement.

The conditions of approval for critical State significant infrastructure (CSSI) projects typically require that all construction activities occur in accordance with an approved environmental management strategy and associated construction environmental management subplans. Typical conditions of approval, however, often exclude certain pre-construction minor work (including exempt development) and activities with low potential for environmental and community impacts (minor/low impact activities) from the definition of construction. When this occurs, the minor impact activities can occur prior to approval of an environmental management strategy/construction environmental management subplans.

The pre-construction minor impact work would be carried out in accordance with the construction contractors' certified environmental management system and would be subject to the relevant mitigation measures detailed in *Appendix E Proposed mitigation measures* of the EIS. The contractors would prepare construction work method statements/procedures or similar environmental management documents for these activities. Any work that is not considered to be of minor/low environmental impact, or otherwise provided for in the conditions of approval would be carried out in accordance with an approved environmental management strategy and environmental management subplans as part of the main construction work.

8.4.2.2 Construction environmental management

Environmental management strategy

An environmental management strategy would be developed to provide the overall strategic framework for environmental management during construction.

It is possible that 2 construction contractors (1 to construct the transmission line and 1 to construct the switching stations) could deliver the HTP. This would result in the 2 contractors preparing separate environmental management strategies and issue-specific construction environmental sub-plans.

The environmental management strategy/strategies would overarch issue-specific construction environmental management subplans and contractor construction work method statements/procedures (see Figure 8.1).

The purpose of the environmental management strategy/strategies would be to ensure that environmental mitigation and management measures are incorporated into a comprehensive framework to facilitate appropriate management throughout construction.

The environmental management strategy/strategies would:

- describe the role, responsibility, authority and accountability of key personnel involved in the environmental management of the project
- set out the procedures that would be implemented to:
  - keep the local community and relevant agencies informed about the project and environmental performance of the project
  - receive, handle, respond to, and record complaints
  - resolve any disputes that may arise
  - respond to any non-compliance
  - respond to emergencies
- include references to strategies, plans and programs approved under the conditions of approval
- include a clear plan showing the monitoring to be carried out in relation to the project, including all the monitoring and reporting obligations under the conditions of approval.

The environmental management strategy/strategies would be developed to be consistent with applicable guidelines/policies/standards, such as *Australian Standards (AS)/New Zealand Standards (NZS) ISO 14001:2016 Environmental management systems* and construction cannot commence until the environmental management strategy is approved by the Planning Secretary.

8.4.2.3 Issue-specific environmental management sub-plans

Issue-specific environmental management subplans that would be developed and implemented during construction would include (but not necessarily be limited to):

- biodiversity management plan
- contamination management plan
- biosecurity management plan
- hazards and risk management plan
- cultural heritage management plan
- air quality and dust management plan
- noise and vibration management plan
- waste management and resource recovery plan
- traffic and transport management plan
- emergency management plan
- erosion and sediment control plan
- accommodation management plan
- water management plan
- social impact management plan.

The issue-specific environmental management subplans would be living documents and would be reviewed and amended, as necessary, during construction of the HTP.

The issue-specific environmental management subplans would be prepared in accordance with the mitigation measures and commitments detailed in the EIS and the conditions of consent (both State and Commonwealth) for the HTP.

Further information relating to sub-plans is provided in Chapter 24 (Environmental management) of the EIS.

8.4.2.4 Clearing and grubbing environmental work method statement

A detailed clearing and grubbing environmental work method statement (EWMS) will be prepared and implemented for all clearing activities, including those impacting upon or in proximity of threatened species or habitat, so all required mitigation and management measures are identified and effectively communicated to personnel involved.

It will include:

- sensitive biodiversity area maps (showing clearing boundaries and exclusion zones)
- types of flagging used for construction footprint, clearing limits, exclusion zones, habitat trees and services
- measures for the management of fauna encountered
- measures for the management of weeds.

Noting that different clearing methods will be required across the project, the EMWS will provide the relevant clearing methodology to accommodate:

- site specific conditions such as topography and ground stability
- access to the clearing locations
- disturbance area categories.

Specific clearing methods for removal of trees in threatened species habitats

There would be the requirement to remove trees from areas of known threatened species habitat in disturbance area B and HZ. Where trees are to be removed in known threatened species habitats, work must be done so that the shrub and ground layer is not disturbed. Work methods including manual dismantling of trees with chainsaws ensuring that tree sections are lowered to the ground without damaging the ground or shrub layer would be required. Likewise, no vehicular access to the areas of known threatened species habitats would be permitted to avoid any impacts.

Noting that different clearing methods will be required across the project, the EMWS will provide the relevant clearing methodology.

Careful tree removal is required in areas of known threatened species presence where the species is expected to be retained and not impacted.

8.4.2.5 Community and stakeholder engagement

A community and stakeholder engagement plan would be prepared before construction work begins and in consultation with the relevant stakeholders.

The community and stakeholder engagement plan would detail the approach to communication between the construction contractors, the community, community groups, government authorities, other identified stakeholders, the network operator and the Energy Corporation of NSW (EnergyCo) during construction of the HTP.

Further information relating to the content of the community and stakeholder engagement plan is provided in Chapter 24 (Environmental management) of the EIS.

8.4.3 Operational environmental management

8.4.3.1 Environmental management system

Operation of the project would be managed through the accredited environmental management system maintained by the Network Operator.

8.4.3.2 Work method statements/procedures

No issue-specific environmental management sub-plans would be developed for the operation of the project. Rather, work method statements/procedures contained within the environmental management system would be used to assess and manage the potential impacts of maintenance activities associated with the operation of the HTP.

8.4.4 Proposed mitigation measures

The proposed mitigation and management measures for the project are outlined in Table 8.28. These measures are focused on the residual impacts from the project to native vegetation and threatened species habitat (including areas of planted native vegetation). In terms of the statutory or policy basis for the mitigation measures outlined in Table 8.28, the identification of measures to mitigate or manage impacts has been done in accordance with BAM subsection 8.4.1 and BAM subsection 8.4.2.

These safeguards seek to minimise potential adverse impacts of the project. All mitigation measures described in this BDAR, and the EIS, would be incorporated into the Network Operator's construction contractor's environmental management strategies and issue-specific construction environmental plans, or the Network Operator's operational environmental management system.

The timing and responsibility for the implementation of the safeguards would also be outlined in the environmental management sub-plans. However, the Network Operator or its construction contractor would be responsible for the environmental management of the project and the implementation of the majority of the mitigation measures. The estimated costs of environmental mitigation measures have been captured in project capital costs.

Likely efficacy mitigation measure ranges from high, where the measure is known to previously have a high likelihood of success to low where measure are unproven. Mitigation measure proposed mostly have a high to moderate efficacy based on known and likely effective outcomes. Risk of failure is the likelihood that the proposed mitigation measure will not be effective. This also ranges from high to low and again is based on known and likely mitigation effectiveness.

The overarching and guiding document for HTP mitigation will be the preparation of a Biodiversity Management Plan (BMP) (see mitigation measure B1 in Table 8.28). The BMP will be developed in consultation with relevant government agencies and form the central guidance document for the management of biodiversity for the project. All other biodiversity mitigation plans outlined in Table 8.28 will form sub-plans to this primary document.

Table 8.28 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B1	Biodiversity impacts	A biodiversity management plan (BMP) will be prepared and implemented for the duration of construction. The plan will include (as a minimum): — the location and extent of areas of vegetation clearance and habitat disturbance, and how these will be suitably demarcated on site — the location and extent of areas to be protected (e.g. retained vegetation, hollow-bearing trees, nests, burrows and other habitat features (including applicable buffers to habitat features) located inside the construction area or in close proximity to the clearing areas — pre-clearing surveys and procedures	Pre-construction Construction	Prior to the commencement of clearing works.	Construction contractor	Efficacy: High. Risk of failure: Low, subject to the implementation of ongoing management.	All locations	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		— two-phase clearing process to allow fauna to move into adjoining habitat — measures to be implemented on site to clearly demarcate areas to be retained as 'no go areas' — a threatened species unexpected finds protocol — revegetation/rehabilitation plan (including seed collection where appropriate) — monitoring of partial clearance — controlling erosion (unless separate ERSED) — bushfire management — salvage of resources — fauna handling and rescue procedure — education of construction teams								

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		— adaptive management procedures (including triggers) — monitoring, evaluation reporting and compliance. 'No go area' demarcation devices must be established prior to the commencement of clearing works in each construction area and be maintained throughout the construction phase.							
B2	Avoidance of threatened species, threatened ecological communities and SAII entities	The locations of threatened ecological communities and habitat for threatened species and SAII entities will be considered and potential impacts avoided or minimised to the greatest extent practicable during finalisation of the detailed design and construction methodology. This will include: — micro-siting of transmission line infrastructure within the HTP corridor	Detailed design Construction	Prior to finalisation of detailed designs and implemented during construction.	Proponent Construction contractor	Efficacy: Moderate. Risk of failure: High. Feasibility can't be tested	Identified sensitive biodiversity areas Avoidance micro-siting areas Regent honeyeater and Swift parrot important areas See Figure 14.21	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		— prioritising disturbance in areas with a vegetation integrity score <17 as per section 9 of the NSW Biodiversity Assessment Method (2020) (BAM) — sensitive biodiversity areas to be avoided (including species polygons, buffered threatened species locations, areas of threatened ecological communities, relevant serious and irreversible impact (SAII) and matters of national environmental significance (MNES). As part of this measure a hierarchy of biodiversity constraints will be developed and mapped to provide an overarching avoidance prioritisation framework to inform detailed design and the BMP.							

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B3	Avoidance of threatened species and threatened ecological communities	Prior to construction activities taking place within 100 m of rocky areas containing caves, overhangs or crevices, cliffs or escarpments and during the breeding season for the Large-eared Pied Bat, Eastern Cave Bat (November to February) and Large Bent-winged Bat, Little Bent-winged Bat (December to February), an ecologist will be engaged to determine if the species are present. If present, an assessment of proposed activities will be completed to determine what, if any, activities can take place within the 100 m and what mitigation measures need to be implemented. Measures may include cessation of certain activities, amending the construction methodology including selecting alternative plant or equipment. Any requirements for a management plan could also be determined at that time.	Detailed design Construction	Prior to finalisation of designs and implemented during construction.	Construction contractor	Efficacy: Moderate. Risk of failure: Moderate.	Within 100 metres of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments See Figure 14.3	Large-eared Pied Bat	Large-eared Pied Bat

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B4	Micro-siting of associated works and access tracks	Micro-siting of temporary construction infrastructure (including laydown areas, construction support sites and access tracks) will be undertaken to minimise vegetation clearing and disturbance of watercourses within the biodiversity study area. This will include: — prioritising areas of low biodiversity value — utilising existing access tracks, where feasible — locating waterway crossings at narrow width locations — minimising the quantity of cut and fill activities.	Detailed design Construction	Prior to finalisation of designs and implement during construction.	Proponent Contractor contactor	Efficacy: Moderate. Risk of failure: High without management.	All locations	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B5	Connectivity corridors	A Connectivity strategy will be developed and implemented to avoid and minimise impacts to connectivity for threatened species. The exact location and detailed design of under-transmission line glider poles, retained tall tree stumps and/or rope bridges will be nominated as part of a connectivity strategy guided by the locations of habitat connectivity outlined in Figure 14.17 and Figure 14.18. Connectivity corridors, in the form of installation of under-transmission line glider poles (in accordance with clearance requirements for transmission lines and infrastructure) where the construction area will impact habitat connectivity for arboreal species (see Appendix J – Examination of regional and terrestrial habitat connectivity) will be investigated and installed in appropriate locations. Key BC Act target species are	Detailed design (connectivity strategy) Construction Operation (easement management)	A Connectivity strategy is to be finalised prior to construction. This strategy will require ongoing management of connectivity corridors.	Proponent Construction contractor Network operator	Efficacy: Moderate – High. Risk of failure: Low.	Relevant locations See Figure 14.17 and Figure 14.18	Southern Greater Glider Yellow-bellied Glider	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		Squirrel Glider, Yellow-bellied Glider and Greater Glider. The strategy will be developed for all relevant threatened species. This strategy will require ongoing management of connectivity corridors.							
B6	Compensatory habitat methodology	A supplementary hollow and nest strategy will be developed and implemented for the installation of nest boxes or other hollow creation method to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing. Nest box/chainsaw-type hollows will be installed prior to commencement of clearing works where practicable in each construction area. Where supplementary hollows are proposed to be established on land adjacent to the easement.	Detailed design Construction	Prior to the commencement of clearing works.	Construction contractor Network operator	Efficacy: Ranges from low to high depending on target species. Risk of failure: low, subject to the implementation of ongoing management.	Relevant locations	Gang-gang Cockatoo Glossy Black-Cockatoo Swift Parrot Southern Greater Glider Yellow-bellied Glider	All SAII entities impacted by the project

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B7	Biosecurity impacts	A biosecurity management plan will be prepared in accordance with EIS mitigation measure AG3. This will be prepared to cover biosecurity aspects such as weed and pathogen introduction and management. The plan will form a sub-plan to the BMP.	Detailed design Construction	Prior to the commencement of clearing works.	Construction contractor	Efficacy: Moderate. Risk of failure: High (mostly due to the absence of checks).	All locations	All MNES impacted by the project.	All SAII entities impacted by the project.
B8	Tree protection measures	Tree protection measures are to be installed and maintained for trees to be retained within the hazard zone, in accordance with AS 4970-2009 – Protection of Trees in Development Sites throughout construction.	Construction	Must remain installed and be maintained throughout the construction.	Construction contractor	Efficacy: High. Risk of failure: Low.	Applicable trees within the hazard tree zone (disturbance area HZ).	All MNES impacted by the project.	Hunter Floodplain Red Gum Woodland Warkworth Sands Woodland

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B9	Pre-clearing surveys	Pre-clearing surveys will be guided by the biodiversity management plan and completed prior to clearing at each location by a suitability qualified ecologist. The proposed clearing extents will be marked out on site prior to the pre-clearing surveys. Pre-clearing surveys will be carried out prior to the commencement of clearing works. During the surveys, the ecologist will: — survey the proposed clearing extent (including confirmed clearing extents within the assumed habitat of SAII entities) — identify any fauna that will require relocation prior to clearing, including inspection of any built structures and wooden fence posts to be demolished	Detailed design Construction	To be undertaken prior to the commencement of clearing works.	Construction contractor	Efficacy: High. Risk of failure: Moderate.	All locations	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		— confirm if occupied habitats need to remain until fledging/movement of young can occur — confirm that biodiversity exclusion zones are demarcated — confirm that hollow-bearing trees within and adjacent to the clearing extents are prominently marked/tagged; and — confirm that nest boxes are in place (where required) in suitable locations adjacent to areas to be cleared, or suitable locations for installation have been identified.							

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B10	Ecology inductions, toolbox talks, targeted training	All relevant project personnel, including relevant sub-contractors will be trained on biodiversity management protocols and requirements for the project, through inductions, toolbox talks and targeted training, and provided with sensitive biodiversity area maps (showing clearing boundaries and exclusion zones) and updates as required. Inductions and training will be completed prior to commencement of work for all relevant personnel.	Construction	Inductions and training are to be completed once prior to commencing work. Toolbox talks will be undertaken daily or as required.	Construction contractor	Efficacy: High. Risk of failure: Moderate.	All locations	All MNES impacted by the project.	All SAII entities impacted by the project.
B11	Retention of understorey vegetation in riparian areas	Understorey vegetation will be protected within vegetated riparian zones where reasonable and feasible (within the definition of NSW *Water Management Act 2000*). Vegetation clearing will be limited to the tree stratum and shrubs above 2 metres in height only, with root systems and trunk bases being retained in-situ.	Construction Operation	N/A	Construction contractor Network operator	Efficacy: High. Risk of failure: Low.	Riparian environments disturbed as part of construction	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B12	Rehabilitation of riparian areas	A riparian vegetation management plan (RVMP) will be developed and implemented for the project to manage activities within vegetated riparian zones to minimise impacts to aquatic environments. The plan will be prepared prior to and implemented during any disturbance to a riparian area. The plan will identify the measures to be implemented to minimise impacts from construction activities (such as temporary and permanent waterway crossings) within riparian and aquatic environments. A schedule of works will be stipulated within the approved RVMP. Riparian areas subject to disturbance will be progressively stabilised and rehabilitated. The RVMP will form a sub-plan to the BMP.	Detailed design Construction	The schedule of works will be stipulated within the approved RVMP.	Construction contractor	Efficacy: Moderate. Risk of failure: Moderate.	Riparian environments disturbed as part of construction	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B13	Installation of bird diverters	Bird diverters will be installed on transmission lines at appropriate locations to reduce impacts on aerial fauna species from collision with transmission lines and infrastructure. The exact position and diverter model will be finalised during detailed design by a qualified ecologist in consultation with CPHR. Installation of the bird diverters will occur within 2 weeks of transmission line installation or as soon as practical and will remain in place and/or replaced as required.	Detailed design Construction Operation	To remain in place and inspected and/or replaced as required.	Construction contractor Network Operator	Likely efficacy: Moderate. Risk of failure: Moderate.	Relevant locations	Bird MNES impacted by the project	Regent Honeyeater Sooty Owl Swift Parrot

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B14	Vegetation offsets requirements	The predicted clearing of native vegetation identified in the biodiversity development assessment report (BDAR) will be monitored against the recorded clearing. A revised BAM calculation (BAM-C) on the project's final disturbance to biodiversity post construction will be completed. Any additional (or reduced) credit liability identified will be met as part of the biodiversity offset scheme requirements and secured under the SODA.	Construction	Ongoing during construction. Monitored at each stage of clearing when completed, or as often as needed.	Proponent	Likely efficacy: High. Risk of failure: Low.	Disturbance area	All MNES impacted by the project.	All SAII entities impacted by the project.
B15	Unexpected finds	A species unexpected finds protocol will be implemented if threatened ecological communities or flora and fauna species, not assessed in the biodiversity assessment, are identified in the subject land.	Construction	Will require ongoing implementation during construction.	Construction contractor	Efficacy: High. Risk of failure: Low	Disturbance area	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B16	Water quality, watercourse geomorphology and aquatic habitat	Watercourse crossings (especially but not only to Key Fish Habitat) will be designed to minimise disturbance and harm within riparian corridors and aquatic habitat will be rehabilitated where practicable in accordance with the following guidelines: — *Guidelines for controlled activities on waterfront land* (NRA 2018) — *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull and Witheridge 2003) — *Policy and guidelines for fish habitat conservation and management* (DPI 2013).	Detailed design Construction	Prior to finalisation of designs and implement during construction.	Construction contractor	Efficacy: High. Risk of failure: Low	All locations	Not applicable.	Stuttering Frog

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B17	Operational guidelines and procedures	Guidelines and procedures will be developed and implemented for maintenance of the project during operation as part of the Network Operator's environmental management system. These guidelines and procedures will cover the following: — vegetation clearing and maintenance commitments in the BDAR and environmental impact statement (EIS) — avoiding access and disturbance in areas of high biodiversity conservation significance; outside of the areas required for construction — avoiding maintenance of vegetation that does not need to be maintained during operation.	Operation	Will require ongoing implementation operation.	Network operator	Efficacy: High. Risk of failure: Low	Operation impact area	All MNES impacted by the project.	All SAII entities impacted by the project.

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B18	Minimise indirect impacts from light spill	Lighting designs to be in accordance with the *National Light Pollution Guidelines for Wildlife* (Commonwealth DCCEEW 2023).	Detailed design Operation	To occur prior to finalisation of detailed designs.	Proponent Network operator	Efficacy: High. Risk of failure: Low	Operation impact area	All MNES impacted by the project.	Hunter Floodplain Red Gum Woodland Warkworth Sands Woodland Stuttering Frog Regent Honeyeater Sooty Owl Swift Parrot Brush-tailed Rock Wallaby Large-eared Pied Bat

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
B19	Minimise indirect impacts on threatened Amphibians	An Amphibian management plan will be prepared and implemented for the duration of construction. The plan is to include (as a minimum): — the location and extent of areas of threatened Amphibians breeding habitats, and how these will be suitably demarcated on site — the location and extent of areas to be protected (e.g. retained vegetation and other habitat features (including applicable buffers to habitat features) located inside the construction area or in close proximity to the clearing areas — measures to control the spread of Chytrid Fungus within the subject land and adjoining threatened Amphibian habitat	Detailed design Construction	Prior to finalisation of designs and implement during construction.	Construction contractor Network operator	Efficacy: High. Risk of failure: Low	Disturbance area	All MNES amphibians impacted by the project.	Stuttering Frog

EIS mitigation reference no.	Mitigation measure	Method/technique	Timing (project stage)	Frequency	Responsibility	Likely efficacy (including risk of failure)	Applicable locations	MNES (when relevant)	SAII entity (when relevant)
		— monitoring requirements to ensure effective control — measures to be implemented on site to clearly demarcate areas to be retained as 'no go areas'. 'No go area' demarcation devices will be established prior to the commencement of clearing works in the location and extent of areas of threatened Amphibians breeding habitats. This plan will form a sub-plan to the BMP.							
B20	Minimise indirect impacts of Myrtle Rust on threatened plants	A Myrtle Rust procedure will be developed to ensure the project is consistent with the objectives of NSW Forestry Corporation and NPWS Myrtle Rust management.	Detailed design Construction	Will require ongoing implementation during construction.	Construction contractor	Efficacy: High. Risk of failure: Low	Disturbance area	All MNES impacted by the project.	*Rhodamnia rubescens* *Rhodomyrtus psidioides*
B21	Minimise impacts to biodiversity as a result of vegetation clearing	Implement the clearing procedures, control measures and post-construction restoration measures to ensure biodiversity values are retained as assessed in the BDAR.	Detailed design Construction Operation	Will require ongoing implementation.	Construction contractor	Efficacy: High. Risk of failure: Low	Disturbance area A, B and HZ	All MNES impacted by the project.	All SAII entities impacted by the project.

8.4.5 *Specific targeted mitigation measures for TECs and threatened species*

The proposed mitigation and management measures for the project are outlined in Table 8.28. These measures are focused on the residual impacts from the project to native vegetation and threatened species habitat (including areas of planted native vegetation). This section outlines some specific targeted mitigation measures for TECs and threatened species that would be implemented as part of the broader mitigation measures outlined in Table 8.28.

8.4.5.1 Micro-siting

Mitigation measure B4, outlined in section 8.4 of this BDAR, involves micro-siting of associated works and access tracks. Micro-siting of temporary construction infrastructure (including construction support sites, laydown areas and access tracks) will be undertaken to minimise vegetation clearing and disturbance of watercourses (within the biodiversity study area). This would be done at the detailed design phase and on ground as works progress. This micro-siting process will include:

- prioritising areas of low biodiversity value
- utilising existing access tracks, where feasible
- locating waterway crossings at narrow width locations
- minimising the quantity of cut and fill activities.

The micro-siting process will occur within the subject land. Micro-siting involves small site based changes that may be required for constructability or to avoid an unexpected feature and it does not involve large scale movements of project features that would result in a disturbance outside of the subject land.

8.4.5.2 Specific micro-siting to minimise impact to TECs

The specific mitigation measures targeted to TECs centre on the micro-siting process, pre-clearing surveys, delineation of 'no go' zones and project clearing boundaries and monitoring to enable compliance with the approved impact as presented in this BDAR. Combined, these measures will allow for small site based changes to the project design and construction methodology in the detailed design phase that may minimise impacts to TECs.

Table 8.29 outlines some specific areas for avoidance and minimisation of impacts targeted to TECs with a focus on minimising impacts to the highest quality TEC occurrences. To drive consideration of avoidance and minimisation in specific areas during the detailed design phase, an overview map has been prepared to show locations of where to focus efforts (see Figure 14.21).

Table 8.29 Specific areas for avoidance and minimisation of impacts on TECs

BC Act TEC name	EPBC Act TEC name	Micro-siting of project features to avoid or minimise impacts
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Central Hunter Valley eucalypt forest and woodland	Areas for consideration during detailed design phase include: — Singleton Military Area — Mount Thorley — HVO (at multiple locations) — AGL.
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	Central Hunter Valley eucalypt forest and woodland	Areas for consideration during detailed design phase include: — Singleton Military Area.

BC Act TEC name	EPBC Act TEC name	Micro-siting of project features to avoid or minimise impacts
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	–	Areas for consideration during detailed design phase include: — Singleton Military Area — Along the south-western boundary of Singleton Military Area adjoining Pokolbin State Forest.
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	–	Areas for consideration during detailed design phase include: — Multiple locations on HVO land, including the crossing of the Hunter River on HVO land.
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Areas for consideration during detailed design phase include: — Singleton Military Area (at multiple locations).
Warkworth Sands Woodland in the Sydney Basin Bioregion	Warkworth Sands Woodland of the Hunter Valley	Areas for consideration during detailed design phase include: — Gouldsville off Long Point Road East — Lemington of Archerfield Road in HVO land.

8.5 Adaptive management strategy for uncertain impacts (where relevant)

Some impacts are difficult to anticipate or evaluate before the start of a project. Managing these uncertain impacts involves creating an adaptive management plan that allows for adjustments based on monitoring results, with the goal of achieving specific outcomes for biodiversity.

An adaptive management plan would need to be developed to deal with uncertain impacts. This adaptive management plan would be developed and managed as part of the Network Operator's accredited environmental management system. The adaptive management plan will develop trigger levels and mitigation measures designed to manage such impacts through the operation phase.

As outlined in the BAM, the adaptive management plan will identify and describe the following:

- the threatened species and/or TECs likely to be impacted
- a monitoring program of sufficient scope and duration to provide data that can inform when direct and indirect impacts on biodiversity occur
- thresholds or triggers associated with the monitoring program that identify when a prescribed impact has occurred or is likely to occur. The adaptive management plan should include justification for which of these will trigger the implementation of adaptive management actions
- suite of potential adaptive management actions to be implemented during the operational phase. The management actions can be targeted at minimising or mitigating the prescribed impact, or in response to meeting or exceeding a threshold or trigger.

8.5.1 Threatened species and/or TECs likely to be impacted

The threatened species and/or TECs likely to be impacted are outlined in detail in Chapter 5 (Habitat suitability for threatened species). The TECs are well understood and as such there is no need for adaptive management to be applied. TECs will however still be subject to the biodiversity monitoring program. Adaptive management will be focused on the species that have assumed presence as these are the species with uncertain impacts. The adaptive management program will focus on the threatened species outlined in Table 8.30.

To aid in identifying the threatened species that may be impacted, pre-clearing surveys are an important mitigation measure (mitigation measure B9, outlined in section 8.4 of this BDAR). Pre-clearing surveys aid in minimising impacts to threatened species where presence is based on assumed presence in this BDAR. Pre-clearing surveys are an important step which may trigger the threatened species unexpected finds protocol (see mitigation measure B15) that will be implemented if threatened ecological communities or flora and fauna species, not assessed in the biodiversity assessment, are identified in the disturbance area. This is an important component of adaptive management.

Table 8.30 Threatened species for which there is an uncertain impact and will be subject to adaptive management

Scientific name	Common name	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Flora				
Acacia bynoeana	Bynoe's Wattle	0.00	9.77	9.77
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	0.00	16.92	16.92
Angophora inopina	Charmhaven Apple	0.00	1.74	1.74
Asperula asthenes	Trailing Woodruff	0.00	2.29	2.29
Brachyscome brownii	–	25.42	0.00	25.42
Callistemon linearifolius	Netted Bottle Brush	0.00	446 individuals	446 individuals
Corybas dowlingii	Red Helmet Orchid	0.00	11.37	11.37
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* population in the Hunter Catchment	1 individual	22 individuals	23 individuals
Cynanchum elegans	White-flowered Wax Plant	0.00	9.75	9.75
Dillwynia tenuifolia	–	0.00	1.46	1.46
Diuris tricolor	Pine Donkey Orchid	0.00	26.56	26.56
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis population in the Hunter catchment	1.50	1.80	3.30
Eucalyptus castrensis	Singleton Mallee	0.00	0.21	0.21
Eucalyptus fracta	Broken Back Ironbark	4.53	16.15	20.68
Eucalyptus glaucina	Slaty Red Gum	0.00	1,176 individuals	1,176 individuals
Eucalyptus pumila	Pokolbin Mallee	0.00	17.68	17.68
Grammitis stenophylla	Narrow-leaf Finger Fern	0.00	5.76	5.76
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	0.00	3.55	3.55

Scientific name	Common name	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Melaleuca biconvexa	Biconvex Paperbark	0.00	9.35	9.35
Melaleuca groveana	Grove's Paperbark	187 individuals	3,155 individuals	3,342 individuals
Olearia cordata	–	0.00	4.03	4.03
Ozothamnus tesselatus	–	0.00	7.69	7.69
Persoonia hirsuta	Hairy Geebung	0.00	1.46	1.46
Pomaderris queenslandica	Scant Pomaderris	0.00	6.85	6.85
Prasophyllum petilum	Tarengo Leek Orchid	0.00	30.99	30.99
Prasophyllum sp. Wybong	–	0.00	30.99	30.99
Prostanthera cineolifera	Singleton Mint Bush	30.01	27.71	57.72
Pterostylis chaetophora	–	0.00	30.99	30.99
Pterostylis gibbosa	Illawarra Greenhood	1.97	0.21	2.18
Rhizanthella slateri	Eastern Australian Underground Orchid	0.00	9.45	9.45
Rhodamnia rubescens	Scrub Turpentine	1,164 individuals	1,230 individuals	2,394 individuals
Rhodomyrtus psidioides	Native Guava	1.69	18.3	19.99
Rutidosis heterogama	Heath Wrinklewort	0.00	15.68	15.68
Senna acclinis	Rainforest Cassia	0.00	5.95	5.95
Syzygium paniculatum	Magenta Lilly Pilly	0.00	513 individuals	513 individuals
Tetratheca juncea	Black-eyed Susan	0.00	2.85	2.85
Velleia perfoliata	–	0.00	4.02	4.02
Zieria involucrata	–	0.00	4.03	4.03
Fauna				
Anthochaera phrygia	Regent Honeyeater	93.77	0.00	93.77
Callocephalon fimbriatum	Gang-gang Cockatoo	2.96	90.27	93.23
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	0.00	69.50	69.50
Cercartetus nanus	Eastern Pygmy-possum	155.55	0.00	155.55
Chalinolobus dwyeri	Large-eared Pied Bat	506.36	0.00	506.36
Delma vescolineata	Hunter Valley Delma	233.04	0.00	233.04
Heleioporus australiacus	Giant Burrowing Frog	20.53	6.22	26.75
Hoplocephalus bitorquatus	Pale-headed Snake	0.00	2.02	2.02
Hoplocephalus stephensii	Stephens' Banded Snake	141.86	3.85	145.71
Lathamus discolor	Swift Parrot	42.76	0.00	42.76
Litoria littlejohni	Littlejohn's Tree Frog	63.53	0.00	63.53
Mixophyes balbus	Stuttering Frog	180.09	0.00	180.09

Scientific name	Common name	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Total impact habitat (ha) or individuals
Mixophyes iteratus	Giant Barred Frog	2.34	1.47	3.81
Myotis macropus	Southern Myotis	120.25	0.00	120.25
Ninox connivens	Barking Owl	29.30	7.34	36.64
Ninox strenua	Powerful Owl	103.73	21.10	124.83
Notamacropus parma	Parma Wallaby	304.98	0.00	304.98
Petauroides volans	Southern Greater Glider	477.12	0.00	477.12
Petaurus norfolkensis	Squirrel Glider	647.62	0.00	647.62
Petrogale penicillata	Brush-tailed Rock-wallaby	145.64	10.38	156.02
Phascogale tapoatafa	Brush-tailed Phascogale	90.41	0.00	90.41
Phascolarctos cinereus	Koala	244.24	40.50	284.74
Planigale maculata	Common Planigale	18.21	0.00	18.21
Potorous tridactylus	Long-nosed Potoroo	135.10	0.00	135.10
Pseudophryne australis	Red-crowned Toadlet	39.39	4.15	43.54
Tyto novaehollandiae	Masked Owl	22.38	19.70	42.08
Tyto tenebricosa	Sooty Owl	195.05	12.77	207.82
Vespadelus troughtoni	Eastern Cave Bat	383.77	0.00	383.77

8.5.2 Monitoring program

As outlined in mitigation measure B14, the predicted clearing of native vegetation by the project identified in this BDAR will be monitored against the recorded clearing. A revised biodiversity assessment method (BAM-C) calculation on the project's final disturbance to biodiversity post construction will be completed. Any additional credit liability identified will be met as part of the biodiversity offset scheme requirements. This is an important step so clearing limits are complied with and that no inadvertent impacts to PCTs, TECs or threatened species occurs.

The biodiversity monitoring program will be developed post-approval and approved prior to construction as part of the biodiversity management plan outlined in mitigation measure B7. This approach has been used successfully to manage uncertain impacts on approved transmission line projects including the Snowy 2.0 Transmission Connection Project. The aim of the monitoring program is to monitor the implementation of mitigation measures and to gauge their effectiveness. The monitoring program would provide for the implementation of adaptive management where performance measures are not met. The monitoring will be performance-driven and will include triggers for necessary corrective actions, such as modifying the activity causing the impact or adjusting mitigation measures. The monitoring process enables planned measures to be effectively implemented and serves as an early warning system for ineffective measures or realised uncertain impacts.

The adaptive management would manage uncertain impacts to the threatened species that have assumed presence as outlined in Table 8.30. The aim is to determine whether these species are in fact present within the disturbance areas so appropriate avoidance and minimisation measures (i.e. micro-siting, delineation of 'no go zones') can be implemented and so that the actual impact to these species can be accounted for in the project impact monitoring against the approval.

A broad recommended framework for the adaptive management program to manage uncertain impacts to threatened species in outlined in Table 8.31. The framework is intentionally limited to confirming presence or absence of threatened species in an area of assumed habitat prior to construction work commencing.

Table 8.31 Recommended framework for the adaptive management program to manage uncertain impacts to threatened species

Uncertain impact being managed	Phase	Actions	Threshold / trigger	Outcomes
Impact to areas of assumed habitat for threatened species	Construction phase. Targeted surveys to occur before construction commences in any area of assumed habitat.	Targeted surveys to be undertaken in areas of assumed habitat for threatened plant and animal species as part of the Biodiversity Management Plan.	Species presence or absence determined prior to construction. Confirmed species presence triggers avoidance and minimisation measures. Confirmed absence triggers a revised biodiversity assessment method (BAM-C) calculation.	Areas of assumed habitat that are confirmed as occupied by the species will be determined.
				Areas of assumed habitat that are not occupied by the species will be determined.
				A revised biodiversity assessment method (BAM-C) calculation on the project's final disturbance to biodiversity post construction will be completed.

8.6 Biodiversity offset strategy

EnergyCo intends to enter into a Strategic Offset Delivery Agreement (SODA) with the Secretary of the Department of Climate Change, Energy, Environment and Water (Commonwealth DCCEEW, the Department) for the project. Under this agreement, responsibility for delivering biodiversity offsets will be transferred to the Department with commensurate funding.

Offset selection will be guided by a conservation investment strategy for the region. The strategy will outline priority areas and actions to protect and restore biodiversity values, improve habitat connectivity, support species resilience to climate change and provide permanent conservation outcomes while also benefitting landholders. The Department is preparing a strategy which will be published on the DCCEEW website prior to entry into the SODA.

Biodiversity offsets secured under the SODA will constitute either the retirement of like-for-like credits or conservation actions that are targeted at impacted entities. The Department will engage with credit owners, landholders and other potential partners in offset delivery through a range of programs including Credit Supply Fund auction processes, sponsored biodiversity stewardship agreements under the Stewardship Support Program, acquisition of new public land to create credits and tailored Savings our Species projects.

8.7 Impacts to NPWS estate and State forests

The project will connect a new overhead 500 kV transmission line between 2 new 500 kV substations at Bayswater and in Olney State Forest. The new substations will be connected to the existing 500 kV transmission lines near Bayswater and Eraring to unlock electricity supply from the Central West Orana and New England Renewable Energy Zones.

From the new 500 kV Bayswater substation, the line will maximise use of existing disturbed mining areas to run south-easterly to Lemington before making several crossings of the Hunter River to pass through the Hunter Valley Operations (HVO) coal mine, eventually reaching Bulga Coal mine operations, continuing south to cross over the existing 330 kV lines – Lines 81 and 82, and then co-locates for approximately 4.5 kilometres.

The line then continues south to maximise the use of public land into Pokolbin State Forest, emerging just east of Cedar Creek near Wollombi. It then traverses through NSW National Parks and Wildlife Service (NPWS) managed Corrabare North Flora Reserve and into Corrabare State Forest. The line then spans across to the Watagans through Watagan State Forest and Olney State Forest before truncating at the new 500 kV Olney substation and connection to the existing Eraring-Kemps Creek double circuit 500 kV transmission line.

Ancillary works including road upgrades, access tracks, and temporary construction facilities are included in the design across these NPWS managed estates and State forests. These road upgrades include sections of Martinsville Hill Road and Watagan Road, parts of which are within Jilliby State Conservation Area.

The subject land is located within the Hunter-Central Rivers catchment. The subject land crosses several poor to good quality watercourses including the Hunter River. Watercourses include the upper catchments of Wollombi Brook, which flow towards the north, and crossing the subject land again just before entering the Hunter River near Warkworth.

Additionally, sections of the Dora Creek catchment cross through areas of NPWS managed estate and State forests throughout the southeast end of the subject land. This catchment ends within Lake Macquarie, with the other catchments of the subject land flowing through the Hunter River and into the Tasman Sea at Newcastle (NSW DPI 2006).

The catchments within the subject land have been impacted from a mixture of rural activities, forestry, urban development and mining. These activities have modified the natural aquatic environment substantially, including major infrastructure developments, roads, rail and agriculture.

Within the subject land, there have been 19 PCTs identified within State forest and 11 identified in NPWS managed estates. Of these PCTs, 2 met the criteria for their associated threatened ecological community (TEC) under either the BC or EPBC Act. There were no TECs identified within the NPWS managed estate.

There have been 24 threatened flora species either confirmed or assumed to date in the State forests and 18 in the NPWS managed estate. There have been 25 threatened fauna species either confirmed or assumed to date in the State forests and 18 in the NPWS managed estate.

Overall impacts on PCTs, flora and fauna across the NPWS managed estate and State forests have been summarised in Table 8.32 to Table 8.34. The impacts across each of the NPWS managed estate and State forests are discussed further in sections 8.7.1 and 8.7.2.

Table 8.32 Direct impacts to PCTs within the NPWS estate and State forests

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
NPWS Estate	PCT 0 - Not classified	-	-	-	1.02	0	0	1.02
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	0.01	0	0	0.01
	PCT 3086 - Lower North Hinterland Riparian Dry Rainforest (Mod-good condition)	-	-	-	0.38	0.2	0	0.58
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	0.19	0.04	0	0.23
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	0	0.02	0	0.02
	PCT 3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest (Mod-good condition)	-	-	-	0.49	0.79	0	1.27
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	0.83	0.09	0	0.91
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	0.9	0.81	0	1.71
	PCT 3250 - Northern Foothills Blackbutt Grassy Forest (Mod-good condition)	-	-	-	0.19	0	0	0.19
	PCT 3489 - Hunter Escarpment Grey Box Forest (Mod-good condition)	-	-	-	0.15	0	0	0.16
	PCT 3581 - Hunter Coast Foothills Apple Forest (Mod-good condition)	-	-	-	0.09	0	0	0.09
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	9.8	4.23	0.16	14.19
Subtotal					**14.05**	**6.18**	**0.16**	**20.38**

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
State Forests	PCT 0 - Not classified	-	-	-	39.98	0.03	0	40.02
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	1.23	2.82	0	4.05
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	1.07	1.43	0	2.5
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	15.81	15.54	0.55	31.91
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Plantation)	-	-	-	0.92	1.12	0.01	2.05
	PCT 3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest (Mod-good condition)	-	-	-	0.12	0.33	0	0.46
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	40.3	15.65	0.08	56.03
	PCT 3230 - Central Coast Escarpment Moist Forest (Plantation)	-	-	-	9.79	1.83	0.01	11.63
	PCT 3237 - Hunter Range Blue Gum Gully Forest (Mod-good condition)	-	-	-	1.14	1.14	0	2.28
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	45.68	14.98	0.07	60.73
	PCT 3241 - Lower North White Mahogany-Spotted Gum Moist Forest (Mod-good condition)	-	-	-	8.19	0	0	8.19
	PCT 3242 - Lower North Ranges Turpentine Moist Forest (Mod-good condition)	-	-	-	17.94	18.2	0.22	36.34
	PCT 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest (Mod-good condition)	-	-	-	0.15	0.18	0	0.33
	PCT 3263 - Watagan Range Turpentine-Mahogany Grassy Forest (Mod-good condition)	-	-	-	26.98	8.54	0.22	35.75
	PCT 3438 - Hunter Escarpment Footslopes Ironbark Forest (Mod-good condition)	-	CE	N	1.14	0.88	0	2.02
	PCT 3439 - Hunter Escarpment Grey Gum Sheltered Forest (Mod-good condition)	-	-	-	0.12	0.29	0	0.41
	PCT 3444 - Lower Hunter Spotted Gum-Ironbark Forest (Mod-good condition)	E	-	N	0.63	0.09	0	0.72

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
	PCT 3489 - Hunter Escarpment Grey Box Forest (Mod-good condition)	-	-	-	0	0	0	0
	PCT 3599 - Blue Mountains Peppermint Shrub Forest (Mod-good condition)	-	-	-	7.23	0.01	0	7.24
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	19.97	5.45	0	25.43
	PCT 3617 - Sydney Hinterland Peppermint-Apple Forest (Mod-good condition)	-	-	-	29.83	5.52	0.21	35.56
	PCT 3621 - Sydney Hinterland Turpentine-Apple Gully Forest (Mod-good condition)	-	-	-	2.02	2.84	0	4.86
Subtotal					**270.24**	**96.87**	**1.37**	**368.51**
Total					**284.29**	**103.05**	**1.53**	**388.89**

Table 8.33 Impacts to threatened flora within NPWS estate and State forests

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
NPWS Estate	*Callistemon linearifolius*	Netted Bottle Brush	V	-	No	8 individuals	0	0	0	8 individuals
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	0.17	0.00	0.00	0.00	0.17
	Dillwynia tenuifolia	-	V	-	No	0.49	0.00	0.00	0.00	0.49
	Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	0.49	0.00	0.00	0.00	0.49
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	25 individuals	0	0	0	25 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	0.49	0.00	0.00	0.00	0.49
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	0.00	0.08	0.00	0.00	0.08
	Melaleuca groveana	Grove's Paperbark	V	-	No	61 individuals	0	0	0	61 individuals
	Olearia cordata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Persoonia hirsuta	Hairy Geebung	E	E	Yes	0.49	0.00	0.00	0.00	0.49
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	0.49	0.00	0.00	0.00	0.49
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	0.17	0.00	0.00	0.00	0.17
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	87 individuals	87 individuals	0	162 individuals	12 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	0.17	0.08	0.00	0.00	0.25
	Rutidosis heterogama	Heath Wrinklewort	V	V	No	0.49	0.00	0.00	0.00	0.49
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	9 individuals	4 individuals	0	0	13 individuals
	Velleia perfoliata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Zieria involucrata	-	E	V	No	0.49	0.00	0.00	0.00	0.49

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
State Forests	*Asperula asthenes*	Trailing Woodruff	V	V	No	1.08	0.00	0.00	0.00	1.08
	Brachyscome brownii	-	-	CE	No	12.57	0.00	0.00	12.57	0
	Callistemon linearifolius	Netted Bottle Brush	V	-	No	146 individuals	51 individuals	0	0	197 individuals
	Corybas dowlingii	Red Helmet Orchid	E	-	No	9.88	0.00	0.00	0.00	9.88
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	1.44	1.43	0.00	0.00	2.87
	Dillwynia tenuifolia	-	V	-	No	0.11	0.00	0.00	0.00	0.11
	Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	3.67	1.29	0.00	4.53	0.43
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	54 individuals	49 individuals	0	0	103 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	1.08	0.97	0.00	0.00	2.05
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	4.19	0.00	0.00	0.00	4.19
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	3.22	6.03	0.00	0.00	9.25
	Melaleuca groveana	Grove's Paperbark	V	-	No	321 individuals	121 individuals	0	187 individuals	255 individuals
	Olearia cordata	-	V	V	No	1.08	0.00	0.00	0.00	1.08
	Persoonia hirsuta	Hairy Geebung	E	E	Yes	0.11	0.00	0.00	0.00	0.11
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	14.38	0.00	0.00	13.3	1.08
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	7.52	0.00	0.00	0.00	7.52
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	884 individuals	677 individuals	5 individuals	920 individuals	646 individuals

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	5.5	9.58	0.1	0.65	14.53
	Rutidosis heterogama	Heath Wrinklewort	V	V	No	0.11	0.00	0.00	0.00	0.11
	Senna acclinis	Rainforest Cassia	E	-	No	4.73	0.00	0.00	0.00	4.73
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	117 individuals	247 individuals	0	0	364 individuals
	Tetratheca juncea	Black-eyed Susan	V	V	No	1.95	0.00	0.00	0.00	1.95
	Velleia perfoliata	-	V	V	No	1.08	0.00	0.00	0.00	1.08
	Zieria involucrata	-	E	V	No	1.08	0.00	0.00	0.00	1.08

Table 8.34 Impacts to threatened fauna within NPWS estate and State forests

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
NPWS Estate	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	0.36	0.00	0.00
	Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	0.00	13.81	1.38
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	10.19	1.02
	Cercartetus nanus	Eastern Pygmy-possum	V	-	No	1.44	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	19.34	0.00	0.00
	Heleioporus australiacus	Giant Burrowing Frog	V	E	No	0.03	0.00	0.00
	Hoplocephalus bitorquatus	Pale-headed Snake	V	-	No	0.00	0.19	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	1.44	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	0.03	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	0.52	0.00	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	19.43	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	19.58	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	19.43	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	0.32	0.00	0.00
	Phascolarctos cinereus	Koala	E	E	No	17.57	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	1.43	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	15.10	0.00	1.51
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	16.27	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
State Forests	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	3.14	0.00	0.00
	Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	2.96	43.57	4.65
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	24.58	2.46
	Cercartetus nanus	Eastern Pygmy-possum	V	-	No	150.7	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	325.36	0.00	0.00
	Heleioporus australiacus	Giant Burrowing Frog	V	E	No	20.40	6.22	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	137.03	0.00	0.00
	Lathamus discolor	Swift Parrot	E	CE	Yes	0.33	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	63.40	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	174.37	0.00	0.00
	Mixophyes iteratus	Giant Barred Frog	V	V	No	2.34	1.47	0.00
	Myotis macropus	Southern Myotis	V	-	No	0.69	0.00	0.00
	Ninox connivens	Barking Owl	V	-	No	14.77	0.00	0.00
	Ninox strenua	Powerful Owl	V	-	No	69.96	0.00	7.00
	Notamacropus parma	Parma Wallaby	V	V	No	272.22	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	332.03	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	332.03	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	122.37	2.67	0.00
	Phascolarctos cinereus	Koala	E	E	No	178.59	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
	Planigale maculata	Common Planigale	V	-	No	0.79	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	130.46	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	37.62	0.00	0.00
	Tyto novaehollandiae	Masked Owl	V	-	No	10.69	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	141.99	0.00	14.20
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	220.16	0.00	0.00

8.7.1 NPWS estate

The NPWS Estate within the subject land included Jilliby State Conservation Area and Corrabare North Flora Reserve, with 11 PCTs identified within these lands. Five threatened flora and 20 threatened fauna species were either confirmed or assumed within the NPWS Estate. Overall impacts to PCTs, flora and fauna across the NPWS Estate have been summarised in Table 8.35, Table 8.36 and Table 8.37.

Table 8.35 Direct Impacts to PCTs within the NPWS Estate

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Jilliby State Conservation Area	PCT 0 - Not classified	-	-	-	0.35	0.00	0.00	0.35
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	0.01	0.00	0.00	0.01
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	0.00	0.02	0.00	0.02
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	0.83	0.09	0.00	0.91
	PCT 3250 - Northern Foothills Blackbutt Grassy Forest (Mod-good condition)	-	-	-	0.19	0.00	0.00	0.19
	PCT 3581 - Hunter Coast Foothills Apple Forest (Mod-good condition)	-	-	-	0.09	0.00	0.00	0.09
Subtotal					**1.47**	**0.11**	**0.00**	**1.57**

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Corrabare North Flora Reserve	PCT 0 - Not classified	-	-	-	0.67	0.00	0.00	0.67
	PCT 3086 - Lower North Hinterland Riparian Dry Rainforest (Mod-good condition)	-	-	-	0.38	0.20	0.00	0.58
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	0.19	0.04	0.00	0.23
	PCT 3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest (Mod-good condition)	-	-	-	0.49	0.79	0.00	1.27
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	0.90	0.81	0.00	1.71
	PCT 3489 - Hunter Escarpment Grey Box Forest (Mod-good condition)	-	-	-	0.15	0.00	0.00	0.16
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	9.80	4.23	0.16	14.19
Subtotal					**12.58**	**6.07**	**0.16**	**18.81**
Total					**14.05**	**6.18**	**0.16**	**20.38**

Table 8.36 Impacts to Threatened Flora within the NPWS Estate

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
Jilliby State Conservation Area	*Callistemon linearifolius*	Netted Bottle Brush	V	-	No	8 individuals	0	0	0	8 individuals
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	0.00	0.08	0.00	0.00	0.08
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	10 individuals	7 individuals	0	10 individuals	7 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	0.00	0.08	0.00	0.00	0.08
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	0	4 individuals	0	0	4 individuals
Corrabare North Flora Reserve	*Cynanchum elegans*	White-flowered Wax Plant	E	E	No	0.17	0.00	0.00	0.00	0.17
	Dillwynia tenuifolia	-	V	-	No	0.49	0.00	0.00	0.00	0.49
	Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	0.49	0.00	0.00	0.00	0.49
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	25 individuals	0	0	0	25 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	0.49	0.00	0.00	0.00	0.49
	Melaleuca groveana	Grove's Paperbark	V	-	No	61 individuals	0	0	0	61 individuals
	Olearia cordata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Persoonia hirsuta	Hairy Geebung	E	E	Yes	0.49	0.00	0.00	0.00	0.49
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	0.49	0.00	0.00	0.00	0.49

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	0.17	0.00	0.00	0.00	0.17
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	77 individuals	80 individuals	0	152 individuals	5 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	0.17	0.00	0.00	0.00	0.17
	Rutidosis heterogama	Heath Wrinklewort	V	V	No	0.49	0.00	0.00	0.00	0.49
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	9 individuals	0	0	0	9 individuals
	Velleia perfoliata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Zieria involucrata	-	E	V	No	0.49	0.00	0.00	0.00	0.49

Table 8.37 Impacts to Threatened Fauna within the NPWS Estate

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
Jilliby State Conservation Area	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	No	1.44	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	1.43	0.00	0.00
	Heleioporus australiacus	Giant Burrowing Frog	V	E	No	0.03	0.00	0.00
	Hoplocephalus bitorquatus	Pale-headed Snake	V	-	No	0.00	0.19	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	1.44	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	0.03	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	0.52	0.00	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	1.44	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	1.44	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	1.44	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	0.32	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	1.43	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	0.29	0.00	0.03
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	0.37	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
Corrabare North Flora Reserve	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	0.36	0.00	0.00
	Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	0.00	13.81	1.38
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	10.19	1.02
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	17.91	0.00	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	17.99	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	18.14	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	17.99	0.00	0.00
	Phascolarctos cinereus	Koala	E	E	No	17.57	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	14.81	0.00	1.48
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	15.90	0.00	0.00

8.7.2 State forests

The State forests within the subject land included Olney SF, Watagan SF, Corrabare SF and Pokolbin SF, with 19 PCTs identified within these lands. 24 threatened flora and 25 threatened fauna species were either confirmed or assumed within the State forests. Overall impacts to PCTs, flora and fauna across these State Forests have been summarised in Table 8.38, Table 8.39 and Table 8.40.

Table 8.38 Direct impacts to PCTs within State forests

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Olney State Forest	PCT 0 - Not classified	-	-	-	6.95	0.00	0.00	6.95
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	0.48	0.97	0.00	1.45
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	6.19	5.50	0.07	11.76
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	28.44	11.09	0.03	39.56
	PCT 3263 - Watagan Range Turpentine-Mahogany Grassy Forest (Mod-good condition)	-	-	-	0.09	0.24	0.00	0.34
	PCT 3617 - Sydney Hinterland Peppermint-Apple Forest (Mod-good condition)	-	-	-	27.92	5.52	0.21	33.65
	PCT 3621 - Sydney Hinterland Turpentine-Apple Gully Forest (Mod-good condition)	-	-	-	2.02	2.84	0.00	4.86
Subtotal					**72.09**	**26.16**	**0.31**	**98.57**
Olney State Forest (hardwood plantation)	PCT 0 - Not classified	-	-	-	0.09	0.03	0.00	0.13
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	0.08	0.14	0.00	0.22
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	0.12	0.13	0.00	0.25
	PCT 3230 - Central Coast Escarpment Moist Forest (Plantation)	-	-	-	2.77	0.61	0.00	3.38
Subtotal					**3.06**	**0.91**	**0**	**3.98**

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Watagan State Forest	PCT 0 - Not classified	-	-	-	11.85	0.00	0.00	11.85
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	0.40	1.09	0.00	1.49
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	0.23	0.57	0.00	0.80
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	5.94	4.02	0.11	10.07
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	10.96	4.28	0.05	15.29
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	13.63	3.16	0.02	16.80
	PCT 3242 - Lower North Ranges Turpentine Moist Forest (Mod-good condition)	-	-	-	12.68	15.32	0.14	28.13
	PCT 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest (Mod-good condition)	-	-	-	0.02	0.00	0.00	0.02
	PCT 3263 - Watagan Range Turpentine-Mahogany Grassy Forest (Mod-good condition)	-	-	-	21.24	4.57	0.12	25.93
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	1.28	0.00	0.00	1.28
Subtotal					**78.23**	**33.01**	**0.44**	**111.66**
Watagan State Forest (hardwood plantation)	PCT 0 - Not classified	-	-	-	3.13	0.00	0.00	3.13
	PCT 3029 - Lower North Wet Gully Palm Rainforest (Mod-good condition)	-	-	-	0.35	0.76	0.00	1.11
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	2.68	4.07	0.37	7.13
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Plantation)	-	-	-	0.92	1.12	0.01	2.05
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	0.41	0.15	0.00	0.56
	PCT 3230 - Central Coast Escarpment Moist Forest (Plantation)	-	-	-	7.02	1.22	0.01	8.25
	PCT 3242 - Lower North Ranges Turpentine Moist Forest (Mod-good condition)	-	-	-	0.54	0.41	0.01	0.95
	PCT 3263 - Watagan Range Turpentine-Mahogany Grassy Forest (Mod-good condition)	-	-	-	0.99	1.81	0.10	2.90
Subtotal					**16.04**	**9.54**	**0.5**	**26.08**

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Corrabare State Forest	PCT 0 - Not classified	-	-	-	9.36	0.00	0.00	9.36
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	0.45	0.86	0.00	1.30
	PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest (Mod-good condition)	-	-	-	0.92	1.81	0.00	2.73
	PCT 3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest (Mod-good condition)	-	-	-	0.11	0.26	0.00	0.37
	PCT 3230 - Central Coast Escarpment Moist Forest (Mod-good condition)	-	-	-	0.37	0.00	0.00	0.37
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	7.59	2.69	0.05	10.33
	PCT 3242 - Lower North Ranges Turpentine Moist Forest (Mod-good condition)	-	-	-	4.72	2.47	0.07	7.26
	PCT 3263 - Watagan Range Turpentine-Mahogany Grassy Forest (Mod-good condition)	-	-	-	4.66	1.92	0.00	6.58
	PCT 3599 - Blue Mountains Peppermint Shrub Forest (Mod-good condition)	-	-	-	7.23	0.01	0.00	7.24
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	15.13	4.48	0.00	19.61
	PCT 3617 - Sydney Hinterland Peppermint-Apple Forest (Mod-good condition)	-	-	-	1.91	0.00	0.00	1.91
Subtotal					**52.45**	**14.5**	**0.12**	**67.06**

Location	BAM-C – Vegetation zone name	BC Act	EPBC Act	SAII	Disturbance area A (ha)	Disturbance area B (ha)	Disturbance area HZ (ha)	Total impact (ha)
Pokolbin State Forest	PCT 0 - Not classified	-	-	-	8.60	0.00	0.00	8.60
	PCT 3087 - Lower North Ranges Riparian Turpentine Forest (Mod-good condition)	-	-	-	0.39	0.00	0.00	0.40
	PCT 3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest (Mod-good condition)	-	-	-	0.01	0.07	0.00	0.09
	PCT 3237 - Hunter Range Blue Gum Gully Forest (Mod-good condition)	-	-	-	1.14	1.14	0.00	2.28
	PCT 3239 - Hunter Range Sheltered Grey Gum Forest (Mod-good condition)	-	-	-	24.46	9.13	0.00	33.60
	PCT 3241 - Lower North White Mahogany-Spotted Gum Moist Forest (Mod-good condition)	-	-	-	8.19	0.00	0.00	8.19
	PCT 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest (Mod-good condition)	-	-	-	0.13	0.18	0.00	0.31
	PCT 3438 - Hunter Escarpment Footslopes Ironbark Forest (Mod-good condition)	-	CE	N	1.14	0.88	0.00	2.02
	PCT 3439 - Hunter Escarpment Grey Gum Sheltered Forest (Mod-good condition)	-	-	-	0.12	0.29	0.00	0.41
	PCT 3444 - Lower Hunter Spotted Gum-Ironbark Forest (Mod-good condition)	E	-	N	0.63	0.09	0.00	0.72
	PCT 3489 - Hunter Escarpment Grey Box Forest (Mod-good condition)	-	-	-	0.00	0.00	0.00	0.00
	PCT 3605 - Hunter Range Ironbark Forest (Mod-good condition)	-	-	-	3.56	0.97	0.00	4.54
Subtotal					**48.37**	**12.75**	**0**	**61.16**
Total					**270.24**	**96.87**	**1.37**	**368.51**

Table 8.39 Impacts to threatened flora within State forests

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
Olney State Forest	*Callistemon linearifolius*	Netted Bottle Brush	V	-	No	127	44	0	0	171
	Corybas dowlingii	Red Helmet Orchid	E	-	No	5.64	0.00	0.00	0.00	5.64
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	0.37	0.54	0.00	0.00	0.91
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	1.00	0.00	0.00	0.00	1.00
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	1.00	1.32	0.00	0.00	2.32
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	3.54	0.00	0.00	0.00	3.54
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	276 individuals	148 individuals	1 individual	221 individuals	204 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	1.45	1.96	0.01	0.00	3.42
	Senna acclinis	Rainforest Cassia	E	-	No	1.45	0.00	0.00	0.00	1.45
Olney State Forest (hardwood plantation)	*Callistemon linearifolius*	Netted Bottle Brush	V	-	No	15 individuals	0	0	0	15 individuals
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	0.30	0.00	0.00	0. 00	0.30
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	11 individuals	0	0	2 individuals	9 individuals

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
Watagan State Forest	*Asperula asthenes*	Trailing Woodruff	V	V	No	1.08	0.00	0.00	0.00	1.08
	Callistemon linearifolius	Netted Bottle Brush	V	-	No	4 individuals	7 individuals	0	0	11 individuals
	Corybas dowlingii	Red Helmet Orchid	E	-	No	1.21	0.00	0.00	0.00	1.21
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	0.49	0.00	0.00	0.00	0.49
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	25 individuals	0	0	0	25 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	0.49	0.00	0.00	0.00	0.49
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	1.85	0.00	0.00	0.00	1.85
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	1.36	3.26	0.00	0.00	4.62
	Melaleuca groveana	Grove's Paperbark	V	-	No	61 individuals	0	0	0	61 individuals
	Olearia cordata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	0.49	0.00	0.00	0.00	0.49
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	2.07	0.00	0.00	0.00	2.07
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	265 individuals	345 individuals	2 individuals	342 individuals	270 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	1.93	4.70	0.03	0.00	6.66
	Senna acclinis	Rainforest Cassia	E	-	No	1.92	0.00	0.00	0.00	1.92
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	68 individuals	163 individuals	0	0	231 individuals
	Tetratheca juncea	Black-eyed Susan	V	V	No	1.46	0.00	0.00	0.00	1.46

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
	Velleia perfoliata	-	V	V	No	0.49	0.00	0.00	0.00	0.49
	Zieria involucrata	-	E	V	No	0.49	0.00	0.00	0.00	0.49
Watagan State Forest (hardwood plantation)	*Corybas dowlingii*	Red Helmet Orchid	E	-	No	0.61	0.00	0.00	0.00	0.61
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	0.56	0.00	0.00	0.00	0.56
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	0.56	0.74	0.00	0.00	1.30
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	0.56	0.00	0.00	0.00	0.56
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	198 individuals	94 individuals	2 individuals	204 individuals	90 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	1.71	1.98	0.06	0.65	3.10
	Senna acclinis	Rainforest Cassia	E	-	No	1.06	0.00	0.00	0.00	1.06
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	28 individuals	37 individuals	0	0	65 individuals
	Tetratheca juncea	Black-eyed Susan	V	V	No	0.49	0.00	0.00	0.00	0.49
Corrabare State Forest	*Corybas dowlingii*	Red Helmet Orchid	E	-	No	0.92	0.00	0.00	0.00	0.92
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	0.18	0.43	0.00	0.00	0.61
	Dillwynia tenuifolia	-	V	-	No	0.11	0.00	0.00	0.00	0.11
	Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	0.11	0.32	0.00	0.00	0.43
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	9 individuals	26 individuals	0	0	35 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	0.19	0.51	0.00	0.00	0.70
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	0.38	0.00	0.00	0.00	0.38

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
	Melaleuca biconvexa	Biconvex Paperbark	V	V	No	0.30	0.71	0.00	0.00	1.01
	Melaleuca groveana	Grove's Paperbark	V	-	No	210 individuals	64 individuals	0	187 individuals	87 individuals
	Olearia cordata	-	V	V	No	0.19	0.00	0.00	0.00	0.19
	Persoonia hirsuta	Hairy Geebung	E	E	Yes	0.11	0.00	0.00	0.00	0.11
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	0.19	0.00	0.00	0.00	0.19
	Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	1.05	0.00	0.00	0.00	1.05
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	48 individuals	74 individuals	0	74 individuals	48 individuals
	Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	0.41	0.94	0.00	0.00	1.35
	Rutidosis heterogama	Heath Wrinklewort	V	V	No	0.11	0.00	0.00	0.00	0.11
	Senna acclinis	Rainforest Cassia	E	-	No	0.30	0.00	0.00	0.00	0.30
	Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	21 individuals	47 individuals	0	0	68 individuals
	Velleia perfoliata	-	V	V	No	0.19	0.00	0.00	0.00	0.19
	Zieria involucrata	-	E	V	No	0.19	0.00	0.00	0.00	0.19

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Disturbance area applicable to the species (full or partial impact) (ha)			Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat or individuals
						Area A	Area B	Area HZ		
Pokolbin State Forest	*Brachyscome brownii*	-	-	CE	No	12.57	0.00	0.00	12.57	0.00
	Corybas dowlingii	Red Helmet Orchid	E	-	No	1.50	0.00	0.00	0.00	1.50
	Cynanchum elegans	White-flowered Wax Plant	E	E	No	0.40	0.46	0.00	0.00	0.86
	Eucalyptus fracta	Brocken Back Ironbark	E	-	Yes	3.56	0.97	0.00	4.53	0.00
	Eucalyptus glaucina	Slaty Red Gum	V	V	No	20 individuals	23 individuals	0	0	43 individuals
	Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	0.40	0.46	0.00	0.00	0.86
	Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	0.40	0.00	0.00	0.00	0.40
	Melaleuca groveana	Grove's Paperbark	V	-	No	50 individuals	57 individuals	0	0	107 individuals
	Olearia cordata	-	V	V	No	0.40	0.00	0.00	0.00	0.40
	Prostanthera cineolifera	Singleton Mint Bush	V	V	No	13.70	0.00	0.00	13.30	0.40
	Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	86 individuals	16 individuals	0	77 individuals	25 individuals
	Velleia perfoliata	-	V	V	No	0.40	0.00	0.00	0.00	0.40
	Zieria involucrata	-	E	V	No	0.40	0.00	0.00	0.00	0.40

Table 8.40 Impacts to threatened fauna within State forests

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
Olney State Forest	*Callocephalon fimbriatum*	Gang-gang Cockatoo	E	E	No	0.00	19.52	1.95
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	1.28	0.13
	Cercartetus nanus	Eastern Pygmy-possum	V	-	No	94.70	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	93.15	0.00	0.00
	Heleioporus australiacus	Giant Burrowing Frog	V	E	No	20.40	6.22	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	94.70	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	57.04	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	90.87	0.00	0.00
	Mixophyes iteratus	Giant Barred Frog	V	V	No	1.56	0.00	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	94.70	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	94.70	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	94.70	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	87.90	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	24.59	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	13.52	0.00	1.35
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	52.65	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
Olney State Forest (hardwood plantation)	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	No	3.85	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	3.85	0.00	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	0.47	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	1.92	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	2.29	0.00	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	3.85	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	3.85	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	3.85	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	3.85	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	1.56	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	0.47	0.00	0.05
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	0.22	0.00	0.00
Watagan State Forest	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	0.31	0.00	0.00
	Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	2.96	10.78	1.37
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	5.68	0.57
	Cercartetus nanus	Eastern Pygmy-possum	V	-	No	29.21	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	97.60	0.00	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	29.21	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	1.53	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	55.08	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
	Mixophyes iteratus	Giant Barred Frog	V	V	No	0.04	0.75	0.00
	Ninox connivens	Barking Owl	V	-	No	3.22	0.00	0.00
	Ninox strenua	Powerful Owl	V	-	No	34.54	0.00	3.45
	Notamacropus parma	Parma Wallaby	V	V	No	99.90	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	99.90	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	99.90	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	85.75	0.00	0.00
	Phascolarctos cinereus	Koala	E	E	No	70.69	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	19.78	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	7.86	0.00	0.00
	Tyto novaehollandiae	Masked Owl	V	-	No	3.66	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	67.81	0.00	6.78
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	57.51	0.00	0.00
Watagan State Forest (hardwood plantation)	*Callocephalon fimbriatum*	Gang-gang Cockatoo	E	E	No	0.00	7.88	0.79
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	1.80	0.18
	Cercartetus nanus	Eastern Pygmy-possum	V	-	No	22.94	0.00	0.00
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	21.83	0.00	0.00
	Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	12.65	0.00	0.00
	Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	2.91	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	22.18	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
	Mixophyes iteratus	Giant Barred Frog	V	V	No	0.74	0.72	0.00
	Notamacropus parma	Parma Wallaby	V	V	No	22.94	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	22.94	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	22.94	0.00	0.00
	Potorous tridactylus	Long-nosed Potoroo	V	V	Yes	18.93	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	1.26	0.00	0.00
	Tyto novaehollandiae	Masked Owl	V	-	No	1.08	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	5.04	0.00	0.50
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	10.13	0.00	0.00
Corrabare State Forest	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	2.37	0.00	0.00
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	3.57	0.36
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	56.77	0.00	0.00
	Lathamus discolor	Swift Parrot	E	CE	Yes	0.33	0.00	0.00
	Mixophyes balbus	Stuttering Frog	E	V	Yes	3.95	0.00	0.00
	Ninox connivens	Barking Owl	V	-	No	11.55	0.00	0.00
	Ninox strenua	Powerful Owl	V	-	No	12.28	0.00	1.23
	Notamacropus parma	Parma Wallaby	V	V	No	50.83	0.00	0.00
	Petauroides volans	Southern Greater Glider	E	E	No	58.08	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	58.08	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	20.41	0.00	0.00

Location	Scientific name	Common name	BC Act	EPBC Act	SAII	Confirmed loss of habitat (ha) or individuals	Assumed loss of habitat (ha) or individuals	Indirect impact (10% of direct disturbance impact) (ha)
	Phascolarctos cinereus	Koala	E	E	No	58.08	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	42.87	0.00	4.29
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	47.58	0.00	0.00
Pokolbin State Forest	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	Yes	0.46	0.00	0.00
	Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	0.00	5.39	0.54
	Calyptorhynchus lathami lathami	South-eastern Glossy Black Cockatoo	V	V	No	0.00	12.25	1.23
	Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	52.16	0.00	0.00
	Myotis macropus	Southern Myotis	V	-	No	0.69	0.00	0.00
	Ninox strenua	Powerful Owl	V	-	No	23.14	0.00	2.31
	Petauroides volans	Southern Greater Glider	E	E	No	52.56	0.00	0.00
	Petaurus norfolkensis	Squirrel Glider	V	-	No	52.56	0.00	0.00
	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	16.21	2.67	0.00
	Phascolarctos cinereus	Koala	E	E	No	49.82	0.00	0.00
	Planigale maculataq	Common Planigale	V	-	No	0.79	0.00	0.00
	Pseudophryne australis	Red-crowned Toadlet	V	-	No	2.35	0.00	0.00
	Tyto novaehollandiae	Masked Owl	V	-	No	5.95	0.00	0.00
	Tyto tenebricosa	Sooty Owl	V	-	Yes	12.28	0.00	1.23
	Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	52.07	0.00	0.00

9 Serious and irreversible impacts

This section identifies every potential serious and irreversible impact (SAII) entity that is listed in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE 2019). The assessment of SAII is outlined under Chapter 9 of the NSW Biodiversity Assessment Method 2020 (BAM).

Clause 6.7 of the Biodiversity Conservation Regulation 2017 outlines that an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1), or
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2), or
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3), or
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

9.1 Assessment for serious and irreversible impacts on biodiversity values

To assist the determining authority to evaluate the nature of an impact on a potential entity at risk of a serious and irreversible impact, the BDAR must contain details of the assessment of SAII, in accordance with the assessment criteria set out in the BAM and addresses all principles/criteria for each SAII entity.

Table 9.1 outlines the SAII entities relevant to the project and identifies the SAII criteria relevant to each entity.

Table 9.2 outlines the relevant SAII principles that apply to each SAII entity subject to assessment.

Table 9.1 Entities at risk of an SAII

Common name	Scientific name	Reason for inclusion in assessment	Notes
SAII Threatened ecological communities			
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the community.
Warkworth Sands Woodland in the Sydney Basin Bioregion	Warkworth Sands Woodland in the Sydney Basin Bioregion	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the community.

Common name	Scientific name	Reason for inclusion in assessment	Notes
SAII Threatened flora species			
-	*Acacia pendula population in the Hunter catchment*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	This species is included based on the presence of assumed habitat only. The species has not been confirmed within the subject land but has been recorded in the locality.
Singleton Mallee	*Eucalyptus castrensis*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal	This species is included based on the presence of assumed habitat only.
Broken Back Ironbark	*Eucalyptus fracta*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
Pokolbin Mallee	*Eucalyptus pumila*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	This species is included based on the presence of assumed habitat only.
Variable Midge Orchid	*Genoplesium insigne*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
Hairy Geebung	*Persoonia hirsuta*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	This species is included based on the presence of assumed habitat only.
Eastern Australian Underground Orchid	*Rhizanthella slateri*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	This species is included based on the presence of assumed habitat only.
Scrub Turpentine	*Rhodamnia rubescens*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
Native Guava	*Rhodomyrtus psidioides*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
SAII Threatened fauna species			
Regent Honeyeater	*Anthochaera phrygia*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to the presence of a mapped important habitat area.
Large-eared pied bat	*Chalinolobus dwyeri*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species and cave roosts within the locality.

Common name	Scientific name	Reason for inclusion in assessment	Notes
Swift Parrot	*Lathamus discolor*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to the presence of a mapped important habitat area.
Stuttering Frog	*Mixophyes balbus*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.
Sooty Owl	*Tyto tenebricosa*	Included in current list of entities at risk of an SAII and is likely to be impacted by the project	Included due to known occurrence of the species.

Table 9.2 SAII principles that apply to each SAII entity subject to assessment

TEC / Species	Principle 1	Principle 2	Principle 3	Principle 4
SAII Threatened ecological communities				
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	✓	✓	–	–
Warkworth Sands Woodland in the Sydney Basin Bioregion	–	–	✓	–
SAII Threatened flora species				
Acacia pendula population in the Hunter catchment	–	–	–	✓
Eucalyptus castrensis (Singleton Mallee)	–	–	✓	–
Eucalyptus fracta (Broken Back Ironbark)	–	–	✓	–
Eucalyptus pumila (Pokolbin Mallee)	–	–	✓	–
Genoplesium insigne (Variable Midge Orchid)	–	–	✓	–
Persoonia hirsuta (Hairy Geebung)	–	✓	–	–
Rhizanthella slateri (Eastern Australian Underground Orchid)	–	✓	–	–
Rhodamnia rubescens (Scrub Turpentine)	✓	–	–	✓
Rhodomyrtus psidioides (Native Guava)	✓	–	–	✓
SAII Threatened fauna species				
Anthochaera phrygia (Regent honeyeater)	✓	✓	–	–
Chalinolobus dwyeri (Large-eared pied bat)	–	–	–	✓
Lathamus discolor (Swift Parrot)	✓	–	–	-
Mixophyes balbus (Stuttering Frog)	–	–	–	✓
Petrogale penicillata (Brush-tailed Rock-wallaby)	–	–	–	✓
Tyto tenebricosa (Sooty Owl)	–	–	–	✓

9.1.1 Additional impact assessment provisions for TECs at risk of an SAII

Figure 14.14 shows the extent of TECs at risk of SAII within the subject land.

9.1.1.1 Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions

Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC is listed as a SAII entity because an impact to this TEC may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened ecological community becoming extinct because:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

This assessment takes into account these 3 SAII principles (see Table 9.4).

The following SAII principles are not applicable to this TEC:

- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this TEC at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Alternative technologies, routes, locations, and sites have been considered. As outlined in section 8.4, mitigation measures have been prepared for the project that will be implemented as part of the construction and operational environmental management procedures by the Network Operator. The specific mitigation measures targeted to Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC involve:

- the micro-siting process (see section 7.2 and section 8.4.5)
- pre-clearing surveys (see section 8.4.5)
- delineation of ‘no go’ zones and project clearing boundaries (see section 8.4.5)
- monitoring to enable compliance with the approved impact as presented in this BDAR so the total area of impact is not exceeded (see section 8.4.5).

Combined, these measures will allow for small site based changes to design in the detailed design phase that may minimise impacts to the Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC.

Current status (excluding impacts of the project)

A summary of the current status of this SAII entity in presented in Table 9.3 with an impact assessment presented in Table 9.4.

Table 9.3 Current status – Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of reduction in geographic distribution (Principle 1) based on the TEC's geographic range in NSW			
Current total geographic extent (ha) of the TEC in NSW	This TEC is identified to be associated with PCT 4089 and 2 legacy PCTs, PCT 42 and PCT 1698. — PCT 42 has been split into PCT 3397 and PCT 4089, with PCT 3397 not being associated with this TEC. — PCT 1698 is no longer recognised in the NSW North Coast and Sydney Basin IBRA bioregions. Therefore, PCT 1698 doesn't meet the requirements for this TEC. Excluding these legacy PCTs, only PCT 4089 remains to represent this TEC. Therefore, the maximum current extent of this TEC is the current extent of PCT 4089, which is 2,589 ha (TBDC 2025). However, this total may be significantly lower, since this PCT is also recognised to occur in the Brigalow Belt South and Nandewar IBRA bioregions, which does not form part of the Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions TEC listing.	NSW BioNet Vegetation Classification Database TBDC	This TEC is identified to be associated with PCT 4089 and 2 legacy PCTs (being PCT 42 and PCT 1698). There is no estimate of extent for PCT 1698. Extent is therefore likely to be an underestimate.
Estimated reduction in geographic extent of the TEC since 1970	The reduction in geographic extent of the TEC since 1970 is unknown. TBDC states under Principle 1 that the community is estimated to meet a population reduction of >80% in 10 years or 3 generations. Estimates of clearing of PCT 4089 since 1750 is greater than 94.33% with pre-European extent estimated at be 45,694 ha.	NSW Scientific Committee (2011) NSW Bionet Vegetation Classification Database TBDC (2025)	Moderate confidence of the estimated reduction in geographic extent of the TEC since 1970, based on available extent data on associated PCTs.
Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2)			

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Change in community structure	The structure of the community is that of a tall to very tall (18–35 m) woodland. It may occur as remnant woodland/forest, scattered paddock trees or regeneration. The structure of any remnant is dependent on past land uses and disturbances. Ecological function would differ across these different structures. Most patches of this community occur less than 10 ha and are likely to have been subject to a change in community structure.	NSW Scientific Committee (2021)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Change in species composition	The species composition of a site will be influenced by the size of the site, recent rainfall, flooding or drought condition and by its disturbance (including fire and grazing) history. The number of species, and the above ground relative abundance of species will change with time, and may also change in response to changes in disturbance regime (including changes in flood frequency). At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given in the TECs final determination is of vascular plant species, the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.	NSW Scientific Committee (2011)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Disruption of ecological processes	Impacts to the community to date make the possibility of re-establishment of ecological processes, such as species composition and structure, back to its original extent unlikely, even with human intervention.	NSW Scientific Committee (2011)	Estimated based on inferences made from other woodland threatened ecological communities. Further research on ecological processes required to confirm.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Invasion and establishment of exotic species	Land degradation and the area of the landscape this community occupies have led to weed invasion being a common threat for the community. Removal of the native understorey for dairying and cropping has resulted in the invasion of weed species and changed community structure. These weed species include *Pennisetum clandestinum* (Kikuyu), *Galenia pubescens* (Galenia), *Ehrharta erecta* (Panic Veldtgrass), *Axonopus affinis* (Carpet Grass), *Alternanthera pungens* (Khaki Weed) and *Ricinis communis* (Caster Oil Plant). The presence of weeds, grazing and fertilizer application is limiting the recruitment of understorey plants and tree species. 'Invasion of native plant communities by exotic perennial grasses', and 'Invasion and establishment of exotic vines and scramblers' are listed as Key Threatening Processes under the *NSW Biodiversity Conservation Act 2016* (BC Act).	NSW Scientific Committee (2011)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Degradation of habitat	Land clearing and other land practices have led to the degradation of large areas of this community throughout its extent. Degradation can affect the community's structure, species composition, functionality and viability. 'Anthropogenic climate change', 'Clearing of native vegetation', 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands' are listed as Key Threatening Processes under the BC Act.	NSW Scientific Committee (2011)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Fragmentation of habitat	Land clearing and other land practices have led to the fragmentation of this community throughout its extent. Fragmentation can affect the community's structure, species composition, functionality and viability. Mapped occurrences of the community include a few remnants greater than 10 ha and many small remnants less than 10 ha indicating severe fragmentation.	NSW Scientific Committee (2011)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Evidence of restricted geographic distribution (Principle 3) based on the TEC's geographic range in NSW			
Extent of occurrence (ha)	1,244,830 ha	NSW TEC profile (NSW DCCEEW 2024) and IBRA subregions of Hunter, Kerrabee, Upper Hunter and Ellerston.	Assumptions that extent of occurrence is the IBRA subregion as outlined in TEC profile
Area of occupancy (ha)	2589 ha	NSW BioNet Vegetation Classification Database TBDC (2025)	TBDC identifies 3 PCTs to be associated with this TEC. Of these 2 are legacy PCTs, with only PCT 4089 meeting the TEC requirements. Area of occupancy is therefore an estimate of the current extent of PCT 4089.
Number of threat-defined locations	Not identified	Not available	The number of threat-defined locations is unknown.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the TEC is unlikely to respond to management (Principle 4) – note Principle 4 is not applicable to this TEC			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Known reproductive characteristics of this ecological community are unlikely to severely limit the ability to increase it area of occupancy/extent.	NSW TEC profile (NSW DCCEEW 2024)	High confidence that threatening processes are the main issue rather than reproductive characteristics. Hunter Floodplain Red Gum Woodland is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the TEC is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	The community profile for the community identifies the following threats: — clearing of remaining remnants and paddock trees — in appropriate fire regimes — weed invasion — climate change — grazing by domestic stock and by an overabundance of native herbivores — degradation of the landscape including acidification, salinisation, extensive erosion scolds and loss of connectivity — herbicide drift — aggressive exclusion of small woodland birds by an overabundance of Noisy Miners. Some of these threats such as wildlife, climate change and pests cannot be effectively managed on a biodiversity stewardship site.	NSW TEC profile (OEH 2022)	High confidence in knowledge of key threatening processes and limited control options. Hunter Floodplain Red Gum Woodland is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the TEC is unlikely to respond to management.

Table 9.4 Impact assessment – Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Impact on the geographic extent of the TEC (Principles 1 and 3)			
Area of TEC to be impacted by the project (ha)	The project will impact 4.22 ha of the TEC. This is made up of the following disturbance types: – 1.18 ha of impact in Disturbance area A (full impact) – 3.04 ha of impact in Disturbance area B (partial impact). The impact to this TEC is only recognised for areas of PCT 4089_Poor. Areas of PCT 4089_Derived is not assigned to this TEC as it does not exhibit a tall to very tall woodland structure and was not recorded to contain any regenerating diagnostic canopy species. In terms of floristic composition and structural changes to Hunter Floodplain Red Gum Woodland, the proposal will impact 1.18 ha within disturbance area A where all vegetation will be removed to ground level, thereby substantially changing the vegetation structure and composition (especially to patches with tree canopy). 3.04 ha (disturbance area B) will only require vegetation trimming to meet vegetation clearance heights and the ground cover will be undisturbed. This will change the vegetation structure but will change the species composition to a lesser degree compared to area A leading to a reduced change in VI score. However, the TEC will still exist in these areas. There will be no impact of trees in the hazard tree zone area.	GIS analysis	N/A

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
	Changes in VI scores per disturbance areas and total VI loss can be viewed in section 8.1.2.		
Area of TEC to be impacted by the project as a % of the current geographic extent in NSW (%)	Area of TEC to be impacted by the project as a % of the current geographic extent in NSW is 0.16%. This is based on the direct impact of 4.22 ha of the TEC when compared to the mapped extent (SVTM) at 2589 ha.	NSW BioNet Vegetation Classification Database SVTM GIS Analysis	NSW State Vegetation Type Map (2024) – current release C2.0M2.1 (November 2024) is assumed to be correct.
Direct/indirect impacts likely as a result of the project to contribute to loss of flora/fauna species characteristic of the TEC (BAM subsection 9.1.1(4.a.ii.))	The direct impact on this TEC is 4.22 ha which represents 0.16% of the current geographic extent in NSW. Indirect impacts to large trees beyond the disturbance area have been considered within an area known as a hazard tree zone (disturbance area HZ). Areas of identified hazard trees within this zone have been assessed as direct impacts and are include within the direct impact calculation stated above. The project is not expected to further impact the characteristics of this TEC.	N/A	N/A
Impacts likely to contribute to further environmental degradation or disruption of biotic processes (Principle 2)			
Remaining extent of isolated areas of TEC (ha)	An analysis of Hunter Floodplain Woodland (excluding derived condition class) with patch size area greater than 10 ha has been undertaken for the project impact and within the locality (10 km buffer to the project). The project will impact some patches of the TEC that exceed 10 ha. These are mainly situated along the Hunter River. In the locality there are 9 patches >10 ha. The project will have an impact on some of the larger patches in the locality.	GIS analysis NSW BioNet Vegetation Classification Database SVTM	Relies on available datasets.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Average distance between remaining remnants – remnant is retained (m) Average distance between remaining remnants – remnant is removed (m)	The average distance between remnants retained will be unchanged over most of the TECs current geographic extent. The average distance between existing remnant patches is highly variable due to the landscape position this TEC occupies in narrow linear bands fringing the Hunter River floodplain and margins. Distances range from >100 m to several kms depending on historic and current land use practices. The maximum average distance of isolation between retained remnants adjacent to the subject land will be <100 m including partial clearing within the hazard tree zone.	GIS analysis	Relies on available datasets.
Estimated maximum dispersal distance of species associated with the TEC (km)	There is currently insufficient data available to account for all complex species interactions. In terms of *Eucalyptus camaldulensis* (River Red Gum) dispersal the project is considered unlikely to disrupt current vectors. The current dispersal mechanism for this species is water, ants and wind (Bonney 2003). Dispersal for this species is likely to occur during flooding events and as such is considered likely to be >100 m.	Bonney (2003)	Low confidence – insufficient data available
Area to perimeter ratio of remaining remnants (ratio)	The area to perimeter ratio of remaining remnants is unlikely to be significantly altered in the locality. This TEC currently occurs in narrow linear bands fringing the Hunter River floodplain and margins.	GIS analysis SVTM	Based on NSW State Vegetation Type Map (SVTM) and aerial imagery

9.1.1.2 Warkworth Sands Woodland in the Sydney Basin Bioregion

Warkworth Sands Woodland in the Sydney Basin Bioregion TEC is listed as a SAII entity because an impact to this TEC may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened ecological community becoming extinct.

This assessment considers the following applicable SAII principle:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

The following SAII principles are not applicable to this TEC:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this TEC at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Alternative technologies, routes, locations, and sites have been considered. As outlined in section 8.4, mitigation measures have been prepared for the project that will be implemented as part of the construction and operational environmental management procedures by the Network Operator. The specific mitigation measures targeted to Warkworth Sands Woodland in the Sydney Basin Bioregion TEC involve:

- the micro-siting process (see section 7.2 and section 8.4.5)
- pre-clearing surveys (see section 8.4.5)
- delineation of ‘no go’ zones and project clearing boundaries (see section 8.4.5)
- monitoring to enable compliance with the approved impact as presented in this BDAR so the total area of impact is not exceeded (see section 8.4.5).

Combined, these measures will allow for small site based changes to design in the detailed design phase that may minimise impacts to the Warkworth Sands Woodland in the Sydney Basin Bioregion TEC.

Current status (excluding impacts of the project)

A summary of the current status of this SAII entity in presented in Table 9.5 with an impact assessment presented in Table 9.6.

Table 9.5 Current status – Warkworth Sands Woodland in the Sydney Basin Bioregion

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of reduction in geographic distribution (Principle 1) based on the TEC's geographic range in NSW			
Current total geographic extent (ha) of the TEC in NSW	This TEC is identified to be only be associated with PCT 3636. The current distribution of this PCT is 1569.87 ha.	NSW BioNet Vegetation Classification Database TBDC (2025)	Moderate confidence of current total geographic extent of the TEC in NSW, based on available current extent data on associated PCTs.
Estimated reduction in geographic extent of the TEC since 1970	The reduction in geographic extent of the TEC since 1970 is unknown. Estimates of clearing since 1750 is about 87% (NSW Scientific Committee, 2011) and 61.44% (NSW DCCEEW 2024).	NSW Scientific Committee (2011) NSW DCCEEW 2024	Moderate confidence of estimated reduction in geographic extent of the TEC since 1970, based on available data.
Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2)			
Change in community structure	The structure of the community is that of a low woodland. It may occur as remnant woodland, scattered paddock trees or regeneration. The structure of any remnant is dependent on past land uses and disturbances. Ecological function would differ across these different structures. Most patches of this community occur less than 10 ha and are likely to have been subject to a change in community structure.	TBDC (2025)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Change in species composition	The species composition of a site will be influenced by the size of the site, recent rainfall or drought condition, and by its disturbance (including fire) history. At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given in the TECs final determination is of vascular plant species, the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.	NSW Scientific Committee (2011) TBDC (2025)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Disruption of ecological processes	Impacts to the community to date make the possibility of re-establishment of ecological processes, such as species composition and structure, back to its original extent unlikely, even with human intervention.	NSW Scientific Committee (2011)	Estimated based on inferences made from other woodland threatened ecological communities. Further research on ecological processes required to confirm.
Invasion and establishment of exotic species	Invasion and establishment of weed species changing community structure and floristic composition, including *Lycium ferocissimum* (African Boxthorn), *Bryophyllum delagoense* (Mother of Millions), *Galenia pubescens* (Galenia), *Opuntia aurantiaca* (Tiger Pear), *Opuntia stricta* (Common Prickly Pear), *Lantana camara* (Lantana) and invasive grasses such as *Eragrostis curvula* (African Lovegrass).	TBDC (2025)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Degradation of habitat	Land clearing and other land practices have led to the degradation of large areas of this community throughout its extent. Degradation can affect the community's structure, species composition, functionality and viability. 'Clearing of native vegetation', 'Invasion of native plant communities by exotic perennial grass' and 'Invasion, establishment and spread of Lantana' are listed as Key Threatening Processes under the *BC Act 2016*.	TBDC (2025)	Moderate confidence based on limited data available and inferences made from other woodland threatened ecological communities.
Fragmentation of habitat	The TEC is highly fragmented, with a median average patch size of less than 3 ha. Most of the patches (at least 70% are less than 10 ha).	Threatened Species Scientific Committee (2016)	High confidence based on its EPBC listed counterpart *Warkworth Sands woodland of the Hunter Valley ecological community*.
Evidence of restricted geographic distribution (Principle 3) based on the TEC's geographic range in NSW			
Extent of occurrence (ha)	800 ha (NSW Scientific Committee 2011) 3279.34 ha (pre-1750 SVTM for PCT 3636)	NSW Scientific Committee (2011) SVTM	Moderate confidence based on the assumptions that extent of occurrence is the IBRA subregion as outlined in TEC profile. This TEC is identified to only be associated with PCT 3636.
Area of occupancy (ha)	1569.87 ha (SVTM for PCT 3636)	SVTM	This TEC is identified to only be associated with PCT 3636.
Number of threat-defined locations	Not identified	Not available	The number of threat-defined locations are unknown.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the TEC is unlikely to respond to management (Principle 4) – note Principle 4 is not applicable to this TEC			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Known reproductive characteristics of this ecological community are unlikely to severely limit the ability to increase it area of occupancy/extent.	–	High confidence that threatening processes are the main issue rather than reproductive characteristics. Warkworth Sands Woodlands is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the TEC is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by Chytrid Fungus).	The community profile for the community identifies the following threats: — clearing of remaining remnants — inappropriate fire regimes — weed invasion — grazing by domestic stock and by an overabundance of native herbivores — disturbance and damage caused by recreational users. Some of these threats such as wildlife, climate change and pests cannot be effectively managed on a biodiversity stewardship site.	NSW TEC profile (OEH 2022)	High confidence in knowledge of key threatening processes and limited control options. Warkworth Sands Woodlands is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the TEC is unlikely to respond to management.

Impact assessment

Table 9.6 Impact assessment – Warkworth Sands Woodland in the Sydney Basin Bioregion

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Impact on the geographic extent of the TEC (Principles 1 and 3)			
Area of TEC to be impacted by the project (ha)	The project will impact 12.37 ha of the TEC. This is made up of the following disturbance types: — 9.26 ha of impact in Disturbance area A (full impact) — 3.11 ha of impact in Disturbance area B (partial impact) Of this impact, 4.86 ha (39% of the direct impact) is to Disturbed Grassland condition class, which has been included when within 30 metres of a woodland patch that exceed 0.1 hectares in size. In terms of floristic composition and structural changes to Warkworth Sands Woodland, the proposal will impact 9.26 ha within disturbance area A where all vegetation will be removed to ground level, thereby substantially changing the vegetation structure and composition (especially to patches with tree canopy). 3.11 ha (disturbance area B) will only require vegetation trimming to meet vegetation clearance heights and the ground cover will be undisturbed. This will change the vegetation structure but will change the species composition to a lesser degree compared to area A leading to a reduced change in VI score. However, the TEC will still exist in these areas. There will be no impact of trees in the hazard tree zone area.	GIS Analysis	N/A

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
	Changes in VI scores per disturbance areas and total VI loss can be viewed in section 8.1.2.		
Area of TEC to be impacted by the project as a % of the current geographic extent in NSW (%)	Area of TEC to be impacted by the project as a % of the current geographic extent in NSW is 0.79%. This is based on the direct impact of 12.37 of the TEC (this includes the 30 m buffer of derived condition) when compared to the mapped extent (SVTM) at 1569.87 ha (this doesn't include derived grassland).	NSW BioNet Vegetation Classification Database SVTM GIS Analysis	NSW State Vegetation Type Map (2024) – current release C2.0M2.1 (November 2024) is assumed to be correct.
Direct/indirect impacts likely as a result of the project to contribute to loss of flora/fauna species characteristic of the TEC (BAM subsection 9.1.1(4.a.ii.))	The direct impact on this TEC is 12.37 ha which represents 0.79% of the current geographic extent in NSW. Indirect impacts to large trees beyond the disturbance area have been considered within an area known as a hazard tree zone (disturbance area HZ). Areas of identified hazard trees within this zone have been assessed as direct impacts and are include within the direct impact calculation stated above. The project is not expected to further impact the characteristics of this TEC.	N/A	N/A

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Impacts likely to contribute to further environmental degradation or disruption of biotic processes (Principle 2)			
Remaining extent of isolated areas of TEC (ha)	The analysis of Warkworth Sands Woodland (excluding derived condition class) with patch size area greater than 10 ha has been undertaken for the project impact and within the locality (10 km buffer to the project). The project will impact some patches of the TEC that exceed 10 ha. In the locality there are 9 patches >10 ha. The project will have an impact on some of the larger patches in the locality.	GIS analysis NSW BioNet Vegetation Classification Database SVTM	Relies on available datasets.
Average distance between remaining remnants – remnant is retained (m) Average distance between remaining remnants – remnant is removed (m)	The average distance between remnants retained will be unchanged over most of the TECs current geographic extent. The average distance between existing remnant patches is highly variable due to the landscape position this TEC.	GIS analysis	Relies on available datasets.
Estimated maximum dispersal distance of species associated with the TEC (km)	There is currently insufficient data available to account for all complex species interactions. In terms of *Angophora floribunda* (Rough-barked Apple) dispersal, the project is considered unlikely to disrupt current vectors. The current dispersal mechanism for this species is likely wind dispersal, which is likely dispersed >20 m (Benson and McDougall, 1998).	Benson & McDougall (1998)	Low confidence – insufficient data available
Area to perimeter ratio of remaining remnants (ratio)	The area to perimeter ratio of remaining remnants is unlikely to be significantly altered in the locality. This TEC currently occurs on aeolian sands near the Wollombi Brook and Hunter River.	GIS analysis GIS analysis SVTM	Based SVTM and aerial imagery

9.1.2 *Additional impact assessment provisions for threatened flora species at risk of an SAII*

Figure 14.15 shows the extent of threatened flora species at risk of SAII within the subject land.

9.1.2.1 Acacia pendula population in the Hunter catchment

Acacia pendula population in the Hunter catchment is listed as a SAII entity because an impact to this species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened population becoming extinct because:

This assessment considers the following applicable SAII principle:

- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened population:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

As *Acacia pendula population in the Hunter Catchment* is only assumed to occur based on the presence of an associated PCT and absence of surveys within these areas, the impacts to this species are uncertain.

Actions to avoid and minimise direct and indirect impacts to this threatened population at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.7 with an impact assessment presented in Table 9.8.

Table 9.7 Current status – Acacia pendula population in the Hunter catchment

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Data deficient The population of *Acacia pendula population in the Hunter catchment* is estimated to contain less than 1000 individuals across all 6 known subpopulations.	TBDC (2025)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	The population of *Acacia pendula population in the Hunter catchment* is estimated to contain less than 1000 individuals across all 6 known subpopulations.	NSW Scientific Committee – final determination (2005)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	There is currently no evidence that the species population size has declined in 3 years or 1 generation. The species is considered at risk to overgrazing by domestic stock that affects root sucker growth of the species. The population is also threatened by demographic and environmental stochasticity due to its small population size.	TBDC (2025) NSW Scientific Committee – final determination (2005)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	A subpopulation near Broke in the Hunter Valley consisted of 10 live individuals, with 7 of these being mature individuals. This subpopulation is protected from grazing by domestic stock. Data is deficient regarding the current composition of the other remaining subpopulations, most of which reside in private or non-conservation land.	TBDC (2025) Bell (2018)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence Area of occupancy	Data deficient There are no estimates of the extent of occurrence or area of occupancy of the species. Considering this endangered population listing is restricted to the Hunter catchment area, its extent of occurrence would be less than 21,460 km^2.	Bell & Driscoll (2014)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of threat-defined locations	There are currently no recognised threat defined locations for *Acacia pendula in the Hunter Catchment*.	–	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	There is no evidence to suggest the species will undergo extreme fluctuations.	TBDC (2025)	*Acacia pendula in the Hunter Catchment* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Successful fruiting has never been observed in the Hunter, and all populations are sterile. Plants have never produced seed and flowers are usually aborted. Plants sucker to expand vegetatively.	TBDC (2025) Bell & Driscoll (2014)	Moderate confidence in knowledge of reproductive characteristics that severely limit the ability to increase the existing population on, or occupy new habitat. Therefore, meets criteria for Principle 4.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Within the Hunter catchment the species typically occurs on heavy soils, sometimes on the margins of small floodplains, but also in more undulating locations. This species isn't known to be reliant on abiotic habitats which cannot be restored on a biodiversity stewardship site.	TBDC (2025)	Moderate confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, *Acacia pendula population in the Hunter Catchment* doesn't meet this criterion for Principle 4.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include overgrazing, disturbance from road/track works, mining subsidence, weed invasion, insufficient understanding of species' phylogeny, distribution and/or abundance. Some of these threats can be managed on biodiversity stewardship sites. However, some threats such as mining subsidence cannot be effectively managed.	TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.8 Impacts assessment – Acacia pendula population in the Hunter catchment

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. *Acacia pendula population in the Hunter catchment* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey. There are several records neighbouring the subject land, however some are potentially the result of horticultural plantings. It's unknown whether some of these represent the endangered population.	BioNet (2025) Bell & Driscoll (2014) TBDC (2025)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. *Acacia pendula population in the Hunter catchment* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey.	TBDC (2025) BioNet (2025)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. *Acacia pendula population in the Hunter catchment* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon based on areas of potential habitat. TBDC (2025) BioNet (2025)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. *Acacia pendula population in the Hunter catchment* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon based on areas of potential habitat. TBDC (2025) BioNet (2025)	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Acacia pendula population in the Hunter catchment* is approximately 16.92 ha. This area includes: — 11.22 ha of disturbance area A (full impact) — 5.70 ha of disturbance area B (partial impact).	Field survey and mapped species polygon based on areas of potential habitat.	Based on field surveys and assumptions of potential habitat.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of the species' geographic range to be impacted by the project (ha)	A total of 16.92 ha of *Acacia pendula population in the Hunter catchment* geographic range is expected to be impacted. Considering this endangered population listing is restricted to the Hunter catchment area, its extent of occurrence would be less than 21,460 km^2. The percentage of the species geographic range likely to be impacted is greater than 0.001%.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			
Individuals impacted	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.2 *Eucalyptus castrensis* (Singleton Mallee)

Eucalyptus castrensis (Singleton Mallee) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct because:

This assessment considers the following applicable SAII principle:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.11 with an impact assessment presented in Table 9.12.

Table 9.9 Current status – *Eucalyptus castrensis* (Singleton Mallee)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Whilst the species is considered at risk to future stochastic high intensity fire events there is currently no evidence to suggest rapid population decline.	Copeland & Hunter (2005)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	The population of *Eucalyptus castrensis* is estimated to exceed 30000 individuals across its populations.	Copeland & Hunter (2005)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	There is currently no evidence that the species population size has declined in 3 years or one generation. The species is considered at risk to future high intensity and higher frequency fire events.	TBDC; Copeland & Hunter (2005)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	The species comprises of one main population in the Singleton Military Area, with 5 additional populations ranging from one to 150 individuals.	Copeland & Hunter (2005)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence	4 km^2	Copeland & Hunter (2005)	High confidence in the extent of occurrence, based on current known species habitat distribution.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of occupancy	0.1 km^2	Copeland & Hunter (2005)	High confidence in the area of occupancy, based on current known actual species occupation.
Number of threat-defined locations	Data deficient Restricted distribution. Only known from the Singleton Military Area on the northern footslopes of the Brocken Back Range. Fire history shows that the main population and its satellite populations are likely to be impacted by the same fire event. A fire event in early 2003 demonstrated that while the periphery of the main population was burnt, the centre was left unburnt. All other smaller strands were severely burnt, however a few unburnt individuals were recorded in rockier, open areas. All burnt individuals from this event were resprouting a year later.	Copeland & Hunter (2005)	Moderate confidence of the number of threat-defined locations, based on the assumption that the species is restricted to the northern footslopes of the Brocken Back Range
Whether the species' population is likely to undergo extreme fluctuations	The species has been observed to recover from severe fire events, although smaller stands have been observed to be more severely burnt than the larger type population. The species is therefore considered highly susceptible to undergo extreme population fluctuations given fire weather is predicted to become harsher, and the time spent in drought is predicted to increase on the East Coast through the 21st century. The species is considered to have a high sensitivity to gain based on seedbank persistence although seedling recruitment post severe fire events has not been observed or studied sufficiently.	Copeland & Hunter (2005) TBDC (2025)	Moderate confidence of whether the species' population is likely to undergo extreme fluctuations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Readily resprouts from a lignotuber. Seeds retained in capsules until tree or branch death, or following dislodgement.	Bell, Rockley & Llewellyn (2019)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable. *Eucalyptus castrensis* occurs on a low broad ridgetop on loam over sandstone of Triassic Narrabeen origin. The understory consists of grasses and scattered shrubs, with bare ground and litter.	Bell, Rockley & Llewellyn (2019) TBDC (2025)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include inappropriate fire regimes, competition with native species (overabundant mistletoes) and uncertainty of future land management practices. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Eucalyptus castrensis* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.10 Impacts assessment – *Eucalyptus castrensis* (Singleton Mallee)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. *Eucalyptus castrensis* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland & Hunter (2005) BioNet (2025)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland & Hunter (2005)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland & Hunter (2005)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the proposal to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland & Hunter (2005)	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%) to be known and not assumed.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Eucalyptus castrensis* is approximately 0.21 ha. This assumed habitat resides entirely in Disturbance area A.	Field survey and mapped species polygon based on areas of potential habitat.	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted by the project (ha) Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	A total of 0.21 ha of assumed habitat is expected to be impacted by the project. This is 0.05% of the known EOO and 2.1% of the AOO. However, subject land occurs outside the species current known geographic range and extent of occupancy (nearest recent record is >2 km north-east of the subject land).	Field survey and mapped species polygon. BioNet (Department of Planning and Environment 2025) Copeland & Hunter (2005)	Based on field survey and assumptions of potential habitat.
Individuals impacted	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.3 *Eucalyptus fracta* (Broken Back Ironbark)

Eucalyptus fracta (Broken Back Ironbark) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct because:

This assessment considers the following applicable SAII principle:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.11 with an impact assessment presented in Table 9.12.

Table 9.11 Current status – *Eucalyptus fracta* (Broken Back Ironbark)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Whilst the species is considered at risk to future stochastic high intensity fire events there is currently no evidence to suggest rapid population decline.	Phillips G.P. (2023)	*Eucalyptus fracta* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	The population of *Eucalyptus fracta* is estimated to contain a minimum of 3539–3639 individuals across all 3 known subpopulations.	Phillips G.P. (2023)	This number considered to be highly conservative (NSW TSSC 2024) *Eucalyptus fracta* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	There is currently no evidence that the species population size has declined in 3 years or 1 generation. The species is considered highly susceptible to population decline given fire weather is predicted to become harsher, and the time spent in drought is predicted to increase on the East Coast through the 21st century.	Phillips G.P. (2023)	*Eucalyptus fracta* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	The species comprises of 3 known subpopulations, being: — Northern part of the Broken Back Range. Minimum estimate of population 3,039 although it is unclear what proportion of this subpopulation is mature. — Sentry Box Point. Minimum estimate of population 50 although it is unclear what proportion of this subpopulation is mature. — Glen Gallic. Minimum estimate of population 450 although it is unclear what proportion of this subpopulation is mature. Whilst this subpopulation is small, suitable potential habitat in the area remains relatively surveyed and there is likely to be many plants further up ridges in the area.	Phillips G.P. (2023)	Whilst the Sentry Box Point and Glen Gallic subpopulations are small, additional suitable potential habitat in both areas remains relatively surveyed and there is likely to be many plants further up ridges in these areas (Phillips G.P. 2023) *Eucalyptus fracta* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence	233 km^2	Phillips G.P. (2023)	High confidence in the extent of occurrence, based on current known species habitat distribution.
Area of occupancy	52 km^2	Phillips G.P. (2023)	High confidence in the area of occupancy, based on current known actual species occupation.
Number of threat-defined locations	Data deficient Restricted distribution Known from<= 3 locations Fire history shows that these 3 locations have different fire histories and are unlikely to be impacted by the same individual fire event, or have the same fire regime (frequency and/or severity) now and in the future.	TBDC (2025)	Moderate confidence of the number of threat-defined locations, based on the assumption that the species is restricted to 3 subpopulations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Whether the species' population is likely to undergo extreme fluctuations	The species has been observed to recover from severe fire events although loss of coppice vigour is apparent in subpopulations subject to severe fire intensity and frequency. The species is therefore considered highly susceptible to undergo extreme population fluctuations given fire weather is predicted to become harsher, and the time spent in drought is predicted to increase on the East Coast through the 21st century. The species is considered to have a high sensitivity to gain based on seedbank persistence although seedling recruitment post severe fire events has not been observed.	Phillips G.P. (2023) TBDC (2025)	High confidence of whether the species' population is likely to undergo extreme fluctuations. Information on potential population extreme fluctuations extracted from Conservation Assessment of *Eucalyptus fracta* K.D. Hill (Myrtaceae) (NSW Threatened Species Scientific Committee 2024) to support threat status listing adjustment under the NSW *Biodiversity Conservation Act 2016* (BC Act).
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	As with other eucalypts, *E. fracta* develops an aerial seed bank where seeds can be stored for several years in the canopy, with seed being slowly released over time or *en masse* following death of stem or branch. Little data on seedling recruitment regimes has been collected for *E. fracta* to date, but given the sparse recruitment observed on site in years away from disturbance it is possible that the species requires fire to stimulate stronger germination events. This however may depend heavily on the fire regime, as limited seedling recruitment has also been observed in areas where repeat severe fires have occurred.	Conservation Assessment of Eucalyptus fracta (NSW Department of Climate Change, Energy, the Environment and Water) (2024)	*Eucalyptus fracta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable. *Eucalyptus fracta* is a dominant tree in a narrow band along the upper edge of a sandstone escarpment. It occurs in dry eucalypt woodland in shallow soils.	TBDC (2025)	*Eucalyptus fracta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include forestry activity and risk of adverse fire/wildfire. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Eucalyptus fracta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.12 Impacts assessment – *Eucalyptus fracta* (Broken Back Ironbark)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	189 individuals are present in the locality of the subject land.	BioNet (2025) Field Survey	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Between 3.57–3.67% of the total NSW population is present in the locality of the subject land.	BioNet (2025) Field Survey	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) to be impacted by the project	A total of 66 recorded individuals are expected to be impacted by the project, with: — 61 individuals in disturbance area A — 5 individuals in disturbance area B.	Field survey	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	Between 1.81–1.86% of the total NSW population is expected to be impacted by the project, with: — 1.68–1.72% in disturbance area A — 0.14% in disturbance area B.	Field survey and mapped species polygon.	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	A total of 20.68 ha of *Eucalyptus fracta* habitat is expected to be impacted, with 16.15 ha of this as assumed habitat. This area includes: — 15.49 ha of disturbance area A (full impact) — 5.19 ha of disturbance area B (partial impact).	Field survey and mapped species polygon.	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted by the project (ha)	A total of 20.68 ha of *Eucalyptus fracta* geographic range is expected to be impacted. 0.1% of extent of occurrence, and 0.4% of the area of occupancy is expected to be impacted.	Field survey and mapped species polygon.	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.4 *Eucalyptus pumila* (Pokolbin Mallee)

Eucalyptus pumila (Pokolbin Mallee) is listed as a SAII entity because an impact to this species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.13 with an impact assessment presented in Table 9.14.

Table 9.13 Current status – *Eucalyptus pumila* (Pokolbin Mallee)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Whilst the species is considered at risk to future stochastic high intensity fire events there is currently no evidence to suggest rapid population decline.	TBDC (2025)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	Data deficient Between the 3 known populations, its estimated that there's approximately 150 plants in each population.	Copeland and Hunter (2005)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Decline in species' population size in 3 years or 1 generation	There are currently no recognised threat defined locations for *Eucalyptus pumila.*	–	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Current number of mature individuals is unknown. In 2004, it was estimated that there were approximately 150 individuals present in each population, although these estimates were difficult to make due to the tightly-packed nature of the individuals and the dense regrowth.	Copeland and Hunter (2005)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence	Data deficient There are no estimates of the extent of occurrence or area of occupancy of the species. Considering the current extent of all associated PCTs, its geographic range would be less than 2,231.96 km^2. This area is likely significantly smaller when considering all current records of plants of *Eucalyptus pumila* are restricted to Singleton Military Area and Pokolbin Flora Reserve. A population of over 100 mature plants were previously reported to be present in the Sandy Hollow area, although the species hasn't been recorded there recently.	Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008) TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	Low confidence in the extent of occurrence, based on current known species habitat distribution.
Area of occupancy	Data deficient All known plants of *Eucalyptus pumila* occur within 5–6 km of each other.	Copeland and Hunter (2005)	Low confidence in the area of occupancy, based on current known actual species occupation.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of threat-defined locations	Data deficient Restricted distribution Known from <= 3 locations. *Eucalyptus pumila* is restricted to two locations in the Singleton Military Area and Pokolbin Flora Reserve. A population of over 100 mature plants were previously reported to be present in the Sandy Hollow area, although the species hasn't been recorded there recently.	Copeland and Hunter (2005) Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	Low confidence of the number of threat-defined locations, based on the assumption that the species is restricted to <= 3 locations.
Whether the species' population is likely to undergo extreme fluctuations	The species has been observed to recover from severe fire events although loss of coppice vigour is apparent in subpopulations subject to severe fire intensity and frequency. The species is therefore considered highly susceptible to undergo extreme population fluctuations given fire weather is predicted to become harsher, and the time spent in drought is predicted to increase on the East Coast through the 21st century.	Copeland and Hunter (2005)	Moderate confidence of whether the species' population is likely to undergo extreme fluctuations.
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Very little is known about the biology or ecology of this species. Individual plants are understood to regrow by sprouting from a basal lignotuber and therefore can persist following fires. However, such vegetative reproduction may suppress the production of fruits/seeds, necessary for the recruitment of new individuals to a population, and the time between such disturbance and the onset of sexual reproduction is not known.	TBDC (2025)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable. *Eucalyptus pumila* occurs on a very steep hill on sandy soil over sandstone with conglomerate outcrops. It appears to grow only on the north and north-west aspects of the hill. Rainfall is uniform, approximately 800 mm/year, and there are frequent fires in the area.	Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include restricted distribution, inappropriate fire regimes, uncertainty of future land management practices and insufficient understanding of distribution and/or abundance. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Eucalyptus pumila* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.14 Impacts assessment – *Eucalyptus pumila* (Pokolbin Mallee)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. *Eucalyptus pumila* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to access constraints. This species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland and Hunter (2005) BioNet (2025) Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland and Hunter (2005) Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland and Hunter (2005) Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Copeland and Hunter (2005) Approved Conservation Advice for *Eucalyptus pumila* (DEWHA 2008)	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Eucalyptus pumila* is approximately 17.68 ha. Within this area: — 15.10 ha is in disturbance area A — 2.58 ha is in disturbance area B.	Field survey and mapped species polygon based on areas of potential habitat.	Based on field survey and assumptions of potential habitat.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of the species' geographic range to be impacted by the project (ha)	Subject land occurs outside the species current known extent of occupancy (nearest recent record is >2 km northeast of the subject land). However, considering the current extent of all associated PCTs, its geographic range would be less than 2,231.96 km^2. Of this, 17.68 ha (0.008%) is expected to be impacted.	Field survey and mapped species polygon. BioNet (2025) TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	Based on field survey and assumptions of potential habitat.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			
Individuals impacted	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.5 *Genoplesium insigne* (Variable Midge Orchid)

Genoplesium insigne (Variable Midge Orchid) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct because:

This assessment considers the following applicable SAII principle:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.15 with an impact assessment presented in Table 9.16.

Table 9.15 Current status – *Genoplesium insigne* (Variable Midge Orchid)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	There is currently no evidence to suggest rapid population decline. The total known population of flowering stems of *Genoplesium insigne* has increased from 27 in 2017 to 432 in 2020. This increase resulted from the ongoing discovery of new populations from only 5 populations in 2017 to 14 populations in 2020. Of these, 4 populations where flowering stems were counted from 2017 to 2020 the number of plants has remained relatively constant, although some annual fluctuation has occurred.	Towle et. al. (2022)	*Genoplesium insigne* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	Data deficient The current known (published) population size of *Genoplesium insigne* in NSW is 432 flowering stems from 14 subpopulations.	Towle et. al. (2022)	Population estimate is based on a 4-year monitoring period and is likely to be subject to fluctuation based on annual variability in climatic cycles. *Genoplesium insigne* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Decline in species' population size in 3 years or 1 generation	There is currently no evidence to suggest rapid population decline. The total known population of flowering stems of *Genoplesium insigne* has increased from 27 in 2017 to 432 in 2020. This increase resulted from the ongoing discovery of new populations from only 5 populations in 2017 to 14 populations in 2020. Of these, 4 populations where flowering stems were counted from 2017 to 2020 the number of plants has remained relatively constant, although some annual fluctuation has occurred.	Towle et. al. (2022)	*Genoplesium insigne* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Data deficient The number of flowering stems detected within individual sub-populations where monitoring programs have been established were identified to be varied, ranging from a single individual to more than 100. The species has been observed to exhibit low reproductive success and given mall population size and restricted distribution the species is considered highly susceptible to undergo extreme fluctuations.	Towle et. al. (2022)	Variability on the number of mature individuals in each subpopulation is estimated based on a 4-year monitoring period and is likely to be subject to fluctuation based on annual irregularity in climatic cycles. *Genoplesium insigne* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence	In 2015 Final Determination, the EOO was calculated to be 40 km^2 when considering the three known extant locations or 100 km^2 when all previously known locations were included. Since there were additional sub-populations identified since the 2015 Final Determination, Towle et. al. (2022) recalculated the EOO to be 210 km^2.	Threatened Species Scientific Committee (2015) Towle et. al. (2022)	High confidence in the extent of occurrence, based on current known species habitat distribution. Extent of occurrence was estimate calculated by Towle et. al. (2022) using Bland et al. (2016).

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of occupancy	In 2015 Final Determination, the AOO was estimated to be between 12–20 km^2, based on five 2 x 2 km grid cells. Since there were additional sub-populations identified since the 2015 Final Determination, Towle et. al. (2022) recalculated the AOO to be 576 km^2, based on 18 2 x 2 km grid cells.	Threatened Species Scientific Committee (2015) Towle et. al. (2022)	High confidence in the area of occupancy, based on current known actual species occupation. Area of occupancy was estimate calculated by Towle et. al. (2022) using Bland et al. (2016).
Number of threat-defined locations	Data deficient There are currently no published threat-defined locations for this species. Most current known subpopulations occur in disturbed habitats within electrical and transport infrastructure easements. Listed threats for *Genoplesium insigne* include: — habitat loss — land management practices — disturbance from recreational users — lack of knowledge — lack of disturbance resulting in competition and overshading — invasive grasses overcrowding the species — browsing by feral herbivores — unknown disease/syndrome — overabundant native herbivores.	TBDC (2025)	Low confidence of the number of threat-defined locations, based on insufficient understanding of distribution and/or abundance. Insufficient understanding of the species ecology, including genetics, pollination, seed germination, mycorrhizae, reproductive ecology and response to fire.
Whether the species' population is likely to undergo extreme fluctuations	Highly restricted distribution coupled with low population numbers and low fruit set rates combined with *Genoplesium insigne* inhabiting land under constant development pressure indicate the species has a high risk of undergoing potential extreme population fluctuations.	Towle et. al. (2022)	High confidence of whether the species' population is likely to undergo extreme fluctuations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	There is little known about the ecology of *Genoplesium insigne* and many details of pollination, seed set, dispersal and germination are unknown. Targeted surveys and monitoring of reproductive success if *Genoplesium insigne* (Towle et. al., 2022) have provided insights into the population dynamics and ecology of the species. Fruit sets rates within the species were identified to be low, compared to rates for other *Genoplesium* species, and nectariferous orchids in general.	Threatened Species Scientific Committee (2015) Towle et. al. (2022)	*Genoplesium insigne* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable. *Genoplesium insigne* grows in patches of *Themeda triandra* (Kangaroo Grass) amongst shrubs and sedges in heathland and forests.	Threatened Species Scientific Committee (2015) Towle et. al. (2022)	*Genoplesium insigne* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include loss of habitat through development, road and track maintenance and off road driving by 4WDs and trail bikes. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Genoplesium insigne* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.16 Impacts assessment – *Genoplesium insigne* (Variable Midge Orchid)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	59 individuals (refer Figure 14.13 and Figure 14.15)	BioNet (2025)	Based on field surveys and available records.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	13.66%	TBDC (2025) BioNet (2025)	Based on field surveys and available records. present as a percentage of total NSW population (%).
Number of individuals (mature and immature) to be impacted by the project	Whilst the species was recorded during field surveys, the occurrence was within an existing electrical transmission easement and does not form part of impacts for this project. To ensure any impacts associated with the project are mitigated, the following measures will be applied: — B3 (Micro-siting of associated works and access tracks) — B7 (Biodiversity impacts) — B9 (Pre-clearing surveys) — B10 (Ecology inductions, toolbox talks, targeted training) — B11 (Retention of understorey vegetation in riparian areas) — B12 (Rehabilitation of riparian areas)	Field survey and mapped species polygon based on areas of potential habitat. TBDC (2025) BioNet (2025)	Based on field surveys and available records.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)			
Area of habitat to be impacted (ha) (for species measured by area only)			
Area of the species' geographic range to be impacted by the project (ha)			
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
	— B14 (Vegetation offsets requirements) — B15 (Unexpected finds) — B17 (Operational guidelines and procedures). These proposed mitigation measures are further discussed in section 8.4.4 – Proposed Mitigation Measures.		
Individuals impacted	Whilst the species was recorded during field surveys, the occurrence was within an existing electrical transmission easement and does not form part of impacts for this project.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.6 *Persoonia hirsuta* (Hairy Geebung)

Persoonia hirsuta (Hairy Geebung) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct because:

This assessment considers the following applicable SAII principle:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.17 with an impact assessment presented in Table 9.18.

Table 9.17 Current status – *Persoonia hirsuta* (Hairy Geebung)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Surveys conducted between 2017–2019 confirmed several recently extinct populations and ~50% of the more than 600 historical records were not recorded. Since then, the 2019–2020 bushfires have severely affected several populations at the northern and southern limits of its known distribution.	Emery & Offord (2022)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2)			
Current population size in NSW	Plants, and sometimes seedbanks, of *Persoonia hirsuta* are generally killed by all but the lowest intensity fire or partial burning. Considering this, records of the species prior to the 2019–2020 bushfires may not be a reliable estimate of the current population size in NSW. Therefore, since the 2019-2020 bushfires, 460 individuals have been recorded in BioNet Atlas. This estimates the species to have a minimum known population of 460 individuals.	TBDC (2025) BioNet (2025)	Low confidence in the current population size in NSW.
Decline in species' population size in 3 years or 1 generation	The 1998 Final Determination states that there is evidence of continued decline in the number of locations and the number of individuals, and the species is particularly prone to local population extinctions because of the small number of plants found at all locations.	NSW Threatened Species Scientific Committee (1998)	Moderate confidence in the decline in species' population size in 3 years or 1 generation.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Surveys conducted between 2017–2019 confirmed 12 surviving populations and isolated individuals remained, down from 21 populations a decade prior. While most of these populations contained less than 10 individuals, a study in 2022 recorded 20 adult plants in Glenorie and another 18 adult plants in Parr SCA. Plants, and sometimes seedbanks, of *Persoonia hirsuta* are generally killed by all but the lowest intensity fire or partial burning. Recruitment events among populations are rare, but may be triggered by disturbance events such as fire or grading fire trails. This sensitivity to fire can likely result in extreme fluctuations and extinctions in subpopulations. This was seen in the 2019–2020 bushfires, which had severely affected several populations at the northern and southern limits of its known distribution.	Emery & Offord (2022) TBDC (2025)	Moderate confidence in the number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence Area of occupancy	Data deficient. There are no estimates of the extent of occurrence or area of occupancy of the species. Considering the current extent of all associated PCTs, its extent of occurrence would be less than 8,078.12 km^2.	TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of threat-defined locations	There are currently no recognised threat defined locations for *Persoonia hirsuta*. Surveys conducted between 2017–2019 confirmed 12 surviving populations and isolated individuals remained, down from 21 populations a decade prior. While most of these populations contained less than 10 individuals, a study in 2022 recorded 20 adult plants in Glenorie and another 18 adult plants in Parr SCA.	Emery & Offord (2022) TBDC (2025)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	Plants, and sometimes seedbanks, of *Persoonia hirsuta* are generally killed by all but the lowest intensity fire or partial burning. Recruitment events among populations are rare, but may be triggered by disturbance events such as fire or grading fire trails. This sensitivity to fire can likely result in extreme fluctuations and extinctions in subpopulations. This was seen in the 2019–2020 bushfires, which had severely affected several populations at the northern and southern limits of its known distribution.	Emery & Offord (2022) TBDC (2025)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The small and isolated populations may produce very few viable fruits in the absence of outcrossing (pollination from genetically different individuals). In *Persoonia* plants, seed dispersal beyond the maternal plant environment may be limited to fruit-drop from the maternal plant, but the fleshy fruits are also likely to be consumed and dispersed by birds and mammals. A recent case study (Andres et. al., 2022) has assessed the translocation management techniques for this species, with a significantly greater survival rate identified in seedlings over cutting grown plants.	Emery & Offord (2018) Andres et. al. (2022) Emery & Offord (2022)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable. *Persoonia hirsuta* is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagon Formation and on the upper Hawkesbury Sandstone.	TBDC (2025)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include inappropriate fire regimes, habitat loss from development, competition with native and exotic species, overgrazing from domestic stock, disturbance from road works and recreational use, and reduced pollination success due to feral honeybees. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Persoonia hirsuta* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.18 Impacts assessment – *Persoonia hirsuta* (Hairy Geebung)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat.	Data deficient	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat.	Data deficient	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey.	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Persoonia hirsuta* is approximately 1.46 ha. Within this area: — 1.46 ha is within disturbance area A.	Field survey and mapped species polygon based on areas of potential habitat.	Based on field survey and assumptions of potential habitat.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of the species' geographic range to be impacted by the project (ha) Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	There are no estimates of the extent of occurrence or area of occupancy of the species. Considering the current extent of all associated PCTs, its extent of occurrence would be less than 8,078.12 km^2. A total of 1.46 ha (0.0002%) of *Persoonia hirsuta* geographic range is assumed to be impacted.	Field survey and mapped species polygon. TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	Based on field surveys and assumptions of potential habitat.
Individuals impacted	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Viability of fragmented populations is considered low. A recent study (Emery & Offord, 2022) has indicated that small and isolated populations may produce very few viable fruits in the absence of outcrossing (pollination from genetically different individuals).	Emery & Offord (2022)	–

9.1.2.7 *Rhizanthella slateri* (Eastern Australian Underground Orchid)

Rhizanthella slateri (Eastern Australian Underground Orchid) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct because:

This assessment considers the following applicable SAII principle:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.19 with an impact assessment presented in Table 9.20.

Table 9.19 Current status – *Rhizanthella slateri* (Eastern Australian Underground Orchid)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Data deficient The number of individuals of *Rhizanthella slateri* is likely to undergo a reduction in the future, however there is insufficient information available to quantify this reduction.	Commonwealth Listing Advice on *Rhizanthella slateri* (Threatened Species Scientific Committee 2007)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2)			
Current population size in NSW	Data deficient *Rhizanthella slateri* is known from 14 populations, which have ranged from a few individuals to 75.	TBDC (2025) Approved Conservation Advice for *Rhizanthella slateri* (DoE 2014)	Low confidence in the current population size in NSW.
Decline in species' population size in 3 years or 1 generation	Data deficient The number of individuals of *Rhizanthella slateri* is likely to undergo a reduction in the future, however there is insufficient information available to quantify this reduction. The generation length of the species is not known.	Commonwealth Listing Advice on *Rhizanthella slateri* (Threatened Species Scientific Committee 2007)	Low confidence in the decline in species' population size in 3 years or 1 generation.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Data deficient This species is highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Given that this species is usually located only when the soil is disturbed, it's difficult to determine if there are any fluctuations in the species population.	TBDC (2025)	Low confidence in the number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence Area of occupancy	Data deficient There are no estimates of the extent of occurrence or area of occupancy of the species, likely due to the species being highly cryptic. Considering the current extent of all PCTs potentially associated with *Rhizanthella slateri*, extent of occurrence is likely less than 17,050.95 km^2.	Commonwealth Listing Advice for *Rhizanthella slateri* (DoE 2014) TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	There are currently no recognised threat defined locations for *Rhizanthella slateri.*	–	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	Data deficient This species is highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Given that this species is usually located only when the soil is disturbed, it's difficult to determine if there are any fluctuations in the species population.	TBDC (2025)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Little is known about this species reproductive characteristics. The biology of another member of the genus, *Rhizanthella gardneri* is better understood. *R. gardneri* is pollinated by small insects such as flies, beetles and termites, and live in a symbiotic relationship with *Melaleuca uncinata*. The pollinators of *R. slateri* are unknown, though self-pollination has been ruled out. The mechanism for seed dispersal for the species is also not well understood, though one theory is that small animals (bandicoots or lyrebirds) may dig up and eat fleshy fruits, thereby dispersing seeds.	Commonwealth Listing Advice on *Rhizanthella slateri* (Threatened Species Scientific Committee 2007)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Not applicable Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forests.	Commonwealth Listing Advice on *Rhizanthella slateri* (Threatened Species Scientific Committee 2007) TBDC (2025)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include land clearing, stochastic events, illegal collection, inappropriate fire regimes and road maintenance. These threats can be managed on biodiversity stewardship sites.	TBDC (2025)	*Rhizanthella slateri* is not listed as a SAII entity due to Principle 4. As such, there is no evidence that the species is unlikely to respond to management.

Impacts assessment

Table 9.20 Impacts assessment – *Rhizanthella slateri* (Eastern Australian Underground Orchid)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat.	Data deficient	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain due to lack of survey in associated habitat.	Data deficient	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey.	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for Rhizanthella slateri is approximately 9.45 ha. Within this area: — 9.45 ha is within disturbance area A.	Field survey and mapped species polygon based on areas of potential habitat.	Based on field survey and assumptions of potential habitat.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of the species' geographic range to be impacted by the project (ha)	There are no estimates of the extent of occurrence or area of occupancy of the species, likely due to the species being highly cryptic. Considering the current extent of all PCTs potentially associated with *Rhizanthella slateri*, extent of occurrence is likely less than 17,050.95 km^2. A total of 9.45 ha (0.001%) of *Rhizanthella slateri* geographic range is expected to be impacted.	Field survey and mapped species polygon. Commonwealth Listing Advice for *Rhizanthella slateri* (DoE 2014) TBDC (2025) NSW BioNet Vegetation Classification Database (2025)	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			
Individuals impacted	The number of individuals expected to be impacted by the project is uncertain due to lack of survey in associated habitat. The species is assumed to occur based on the presence of potential habitat and absence of survey.	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.8 *Rhodamnia rubescens* (Scrub Turpentine)

Rhodamnia rubescens (Scrub Turpentine) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.21 with an impact assessment presented in Table 9.22.

Table 9.21 Current status – *Rhodamnia rubescens* (Scrub Turpentine)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	It is estimated that the *Rhodamnia rubescens* population in NSW has undergone or likely to undergo a reduction of >=80% in 10 years or 3 generations. The basis for this population reduction is the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites. Evidence of rapid decline in the *Rhodamnia rubescens* population is because of myrtle rust infection. Rates of infection are reported as severe across the species entire range. All age classes of the species have been documented to be affected by myrtle rust which severely reduces the capacity of infected populations to recover through time. Populations of *Rhodamnia rubescens* are projected to continue to decline rapidly because of infection by myrtle rust. Within 3 generations, assuming a generation time of 30–40 years, a quantitative estimate of decline of 96–99% has been made based on documented rates of mortality across the range.	Gallagher (2018) NSW Scientific Committee (2019) TBDC (2025)	The change in population size is attributed to that fact that flowering and fruiting has been severely affected by myrtle rust infection. The species is still known to flower and set fruit although production of viable seed is very limited or non-existent. Infected plants may resprout and survive. Seedling recruitment does not appear to be happening due to the extremely high susceptibility of germinating seedling to myrtle rust infection. High confidence in the change in population size in NSW in the past 10 years or 3 generations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	Data deficient The number of distinct populations of *Rhodamnia rubescens* is unknown but is expected to be large given the wide distribution of the species. The occurrence of the species is contiguous over its entire range with no significant disjunctions. There are a total of 24,300 individuals recorded from 10,487 BioNet Atlas records. These records likely only represent a fraction of the current NSW population and likely significantly higher than this number.	Gallagher (2018) BioNet (2025)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	Population decline is considered possible but unlikely over a 3 year or 1 generation timeframe. Most individuals are no longer flowering or setting seeds since being affected by myrtle rust (*Austropuccina psidii*) infection.	TBDC (2025)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Most individuals are no longer flowering or setting seeds since being affected by myrtle rust (*Austropuccina psidii*) infection. Infected plants may resprout and survive. Defoliated plants may be hard to identify. Seedling recruitment does not appear to be happening due to the extremely high susceptibility of germinating seedling to myrtle rust infection.	TBDC (2025)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence	147,340 km^2	Gallagher (2018) NSW Scientific Committee, (2019) Threatened Species Scientific Committee (2020)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	3,360 km^2	Gallagher (2018) NSW Scientific Committee, (2019) Threatened Species Scientific Committee (2020)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	There are currently no recognised threat defined locations for *Rhodamnia rubescens.*	–	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	There is no evidence to suggest the species will undergo extreme fluctuations.	NSW Scientific Committee, (2019) TBDC (2025)	*Rhodamnia rubescens* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Flowering and fruiting has been severely affected by myrtle rust (*Austropuccina psidii*) infection. This species is still known to flower and set fruit although production of viable seed is very limited or non-existent. Recent surveys suggest that seedling recruitment is not occurring due to the extremely high susceptibility of germinating seedlings to myrtle rust infection.	NSW Scientific Committee, (2019) TBDC (2025)	High confidence in knowledge of reproductive characteristics that severely limit the ability to increase the existing population on, or occupy new habitat. Therefore, meets criteria for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	*Rhodamnia rubescens* isn't known to be reliant on abiotic habitats which cannot be restored on a biodiversity stewardship site. The species is found in littoral, warm temperate and subtropical rainforest, and wet sclerophyll forests usually on volcanic and sedimentary soils.	NSW Scientific Committee, (2019) TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, *Rhodamnia rubescens* doesn't meet this criterion for Principle 4.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include myrtle rust infection, invasive weeds, direct loss of individuals from fire, habitat loss from development, and disturbance from forestry and recreational activities. Some of these threats can be managed on biodiversity stewardship sites. However, some threats such as myrtle rust infection cannot be effectively managed.	NSW Scientific Committee, (2019) TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.22 Impacts assessment – *Rhodamnia rubescens* (Scrub Turpentine)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	A total of 2,511 recorded individuals within the biodiversity study area.	Field survey and mapped species polygon.	–
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals (mature and immature) present as a percentage of total NSW population (%) is currently unknown. The total population of *Rhodamnia rubescens* in NSW is also unknown. There are currently 24,300 individuals recorded in BioNet Atlas. These records likely only represent a fraction of the current NSW population.	BioNet (2025)	–

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) to be impacted by the project	A total of 1,164 recorded individuals and 1,230 assumed individuals are expected to be impacted by the project, with: — 1267 individuals in disturbance area A — 1123 individuals in disturbance area B — 4 individuals in disturbance area HZ.	Field survey and mapped species polygon.	Assumed.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	Considering the 24,300 individuals recorded in BioNet Atlas, the number of individuals present and assumed make up 8.97% of the recorded NSW population. The % for the total NSW population is likely significantly lower considering this only accounts for all recorded individuals in NSW.	BioNet (2025)	–
Area of habitat to be impacted (ha) (for species measured by area only)	Not applicable, *Rhodamnia rubescens* is a count species.	TBDC (2025)	–
Area of the species' geographic range to be impacted by the project (ha)	Not applicable, *Rhodamnia rubescens* is a count species.	TBDC (2025)	–
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	Not applicable, *Rhodamnia rubescens* is a count species.	TBDC (2025)	–
Individuals impacted	Some individuals of the subpopulation and habitat will be impacted	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.2.9 *Rhodomyrtus psidioides* (Native Guava)

Rhodomyrtus psidioides (Native Guava) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.23 with an impact assessment presented in Table 9.24.

Table 9.23 Current status – *Rhodomyrtus psidioides* (Native Guava)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	The species is projected to experience a population reduction of >80% over 3 generations.	NSW Threatened Species Scientific Committee (2019)	High confidence in the change in population size in NSW in the past 10 years or 3 generations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	Assuming that occurrence records document individuals stands a conservative measure of abundance would be approximately >20,000 across the range of the species prior to the introduction of key threats affecting current populations.	Threatened Species Scientific Committee (2018)	This is a highly conservative estimate, the actual population count could be as high as >100,000 (Threatened Species Scientific Committee 2018). Any estimates of population for this species are seemingly speculative. *Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	Populations are projected to continue to decline rapidly due to infection by *Austropuccini psidii.* A 57% mortality across the species range since infection from *A. psidii* have been documented over 3–3.5 years.	Threatened Species Scientific Committee (2018)	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	The species is expected to decline rapidly – a 99% reduction in population size across its range in 3 generations. Fluctuations are not likely.	Threatened Species Scientific Committee (2018)	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	13,442,800 ha	Threatened Species Scientific Committee (2018)	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	88,400 ha	Threatened Species Scientific Committee (2018)	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of threat-defined locations	There are currently no recognised threat defined locations for *Rhodomyrtus psidioides.*	–	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	There is no evidence to suggest the species will undergo extreme fluctuations.	Threatened Species Scientific Committee (2018)	*Rhodomyrtus psidioides* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Flowering and fruiting have been severely affected by myrtle rust (*Austropuccina psidii*) infection. This species is still known to flower and set fruit although production of viable seed is very limited or non-existent. Recent surveys suggest that seedling recruitment is not occurring due to the extremely high susceptibility of germinating seedlings to myrtle rust infection. Most small plants found in the wild are root suckers, not seedlings.	Threatened Species Scientific Committee (2018) TBDC (2025)	High confidence in knowledge of reproductive characteristics that severely limit the ability to increase the existing population on, or occupy new habitat. Therefore, meets criteria for Principle 4.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	This species isn't known to be reliant on abiotic habitats which cannot be restored on a biodiversity stewardship site.	TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, *Rhodomyrtus psidiodies* doesn't meet this criterion for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include myrtle rust infection, invasive weeds, direct loss of individuals from fire, habitat loss from development, and disturbance from forestry and recreational activities. Some of these threats can be managed on biodiversity stewardship sites. However, some threats such as myrtle rust infection cannot be effectively managed.	Threatened Species Scientific Committee (2018) TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.24 Impacts assessment – *Rhodomyrtus psidioides* (Native Guava)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	14 individuals are present in the locality of the subject land.	BioNet (2025) Field Survey	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present in the subpopulation on the subject land to be known and not assumed.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	<0.07% of the total NSW population is present in the locality of the subject land.	BioNet (2025) Field Survey	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) present as a percentage of total NSW population (%) to be known and not assumed.
Number of individuals (mature and immature) to be impacted by the project	A total of 4 recorded individuals are expected to be impacted by the project	Field survey.	Survey has not been undertaken to an extent that would allow for the number of individuals (mature and immature) to be impacted by the project to be known and not assumed.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	<0.02% of the total NSW population is expected to be impacted by the project	Field survey and mapped species polygon.	Survey has not been undertaken to an extent that would allow for the individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%) to be known and not assumed.
Area of habitat to be impacted (ha) (for species measured by area only)	A total of 19.99 ha of *Rhodomyrtus psidioides* habitat is expected to be impacted, with 18.30 ha assumed habitat. This area includes: — 7.39 ha within disturbance area A — 12.42 ha within disturbance area B — 0.18 ha within disturbance area HZ.	Field survey and mapped species polygon.	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted by the project (ha)	A total of 19.99 ha of *Rhodomyrtus psidioides* geographic range is expected to be impacted. Less than 0.0001% of its extent of occurrence and 0.023% of its area of occupancy is expected to be impacted.	Field survey and mapped species polygon.	Based on field surveys and assumptions of potential habitat.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)			
Individuals impacted	Some individuals of the subpopulation and habitat will be impacted	Field survey and mapped species polygon.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown	–	–

9.1.3 *Additional impact assessment provisions for threatened fauna species at risk of an SAII*

Figure 14.14 shows the extent of threatened fauna species at risk of Serious and Irreversible Impacts within the subject land.

9.1.3.1 *Anthochaera phrygia* (Regent honeyeater)

Anthochaera phrygia (Regent honeyeater) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2).

The following SAII principles are not applicable to this threatened species:

- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

The specific habitat for Regent Honeyeater within the subject land totals 93.59 ha of mapped important habitat. In terms of locating the project to avoid habitat for this species, the design has been successful in that a large proportion of the alignment follows the valley floors that are dominated by a landscape of active coal mines and existing power transmission lines and avoids most large heavily vegetated habitats that are within the mapped important habitat for the Regent Honeyeater.

The main area of impact to mapped important habitat for the Regent Honeyeater is within the Singleton Military Area lands. Within this portion of the subject land 3 alignment options were explored:

- Western option
- Eastern option
- Central option.

The 3 options share a common alignment to the north of Cessnock Road (see Figure 14.23 and Figure 14.24).

Important habitat mapping for the Regent Honeyeater occurs on all alignment options and there is very little variation in impact between options. The western option has a slightly less impact on Regent Honeyeater mapped important habitat with avoidance of about 3 hectares compared to the central option. A summary of impacts for all 3 options are presented in Table 9.25.

Table 9.25 Summary of impact on Regent Honeyeater important habitat mapped areas for each alignment option

Common name	Scientific name	EPBC Act status[1]	BC Act Status[2]	SAII[3]	Potential impact (ha)		
					Western	Eastern	Central
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	29.06	32.14	32.63

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

The options selection has prioritised avoidance and minimising impacts on biodiversity values within the SMA through maximising alignment on the western boundary of the SMA associated with existing disturbances from adjoining open cut mining, maximising collocation with existing transmission lines, roads and infrastructure to minimise fragmentation and minimising distance through mapped areas of important habitat for the Regent Honeyeater.

Alternative technologies, routes, locations, and sites have been considered. As outlined in section 8.4, mitigation measures have been prepared for the project that will be implemented as part of the construction and operational environmental management procedures by the Network Operator. The specific mitigation measures targeted to Regent Honeyeater involve:

- the micro-siting process (with a focus on avoiding any direct impacts to mapped important habitat) (see section 7.2 and section 8.4.5)
- pre-clearing surveys (see section 8.4.5)
- delineation of ‘no go’ zones and project clearing boundaries (see section 8.4.5)
- monitoring to enable compliance with the approved impact as presented in this BDAR so impact budgets are not exceeded (see section 8.4.5).

Combined, these measures will allow for small site based changes to design in the detailed design phase that may minimise impacts to the Regent Honeyeater.

Current status

A summary of the current status of this SAII entity in presented in Table 9.26 with an impact assessment presented in Table 9.27.

Table 9.26 Current status – *Anthochaera phrygia* (Regent honeyeater)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	From the period of 2000 – 2010, Regent Honeyeater underwent a population reduction and continued decline, with the apparent loss of some of its minor breeding populations (e.g. Warrumbungle National Park, Pilliga forests), as well as declines at its 2 major breeding sites; Capertee Valley and Bundarra-Barraba (Threatened Species Scientific Committee 2011). Population numbers are difficult to assess due to the species mobile nature and irregular movements, though expert opinion suggests that there are currently 350–400 mature individuals in southeast Australia, and declining numbers seen evident in both NSW and Victoria. In the 19th century, the species was recorded in large numbers i.e., 'thousands' during influxes but they are now usually seen singly, in twos, or in small groups. Population estimates for the Regent Honeyeater were in the late 1980s were approximately 1500 individuals across southeast Australia. Given this information, and additional monitoring, the species is thought to have undergone a past population decline of >80% over 3 generations (24 years).	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015) Regent honeyeater (*Anthochaera phrygia*) – critically endangered species listing. NSW Scientific Committee – final determination (Threatened Species Scientific Committee 2011) National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)	Current sources include data up to 2015, more recent data on population decline is lacking. Population estimates are difficult to determine given the mobile nature and irregular movements of the species. Low confidence in the change in population size in NSW in the past 10 years or 3 generations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2)			
Current population size in NSW	The population in NSW was estimated at maximum of 1000 birds in 1997, but there have been many fewer seen subsequently, with a maximum count of just 40 in 2009. It is estimated that the NSW population of Regent Honeyeaters is fewer than 250 mature individuals.	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015) Regent honeyeater (*Anthochaera phrygia*) – critically endangered species listing. NSW Scientific Committee – final determination (Threatened Species Scientific Committee 2011)	Current sources include data up to 2015, more recent data on population numbers are lacking. Population estimates are difficult to determine given the mobile nature and irregular movements of the species. Low confidence in the current population size in NSW.
Decline in species' population size in 3 years or 1 generation	The number of mature individuals in southeast Australia is estimated at 350-400 and there is an inferred continuing decline although there is no estimate as to the ongoing rate of decline. More than 95% of mature individuals occur in a single subpopulation (DoE 2015).	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Lack of data on population and evidence of the rate of decline for this species (DoE 2015). Low confidence in the decline in species' population size in 3 years or 1 generation.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	The number of mature individuals in southeast Australia is estimated at 350–400 and there is an inferred continuing decline although there is no estimate as to the ongoing rate of decline. More than 95% of mature individuals occur in a single subpopulation. Consequently, the number of mature individuals of this species is low, and the geographic distribution is precarious (due to most individuals forming part of single subpopulation (DoE 2015).	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Current sources include data up to 2015, more recent data on population numbers are lacking. Population estimates are difficult to determine given the mobile nature and irregular movements of the species. Low confidence in the number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence	600,000 km^2	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Current sources include data up to 2015, more recent data on population numbers are lacking. Regent Honeyeater is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy	300 km^2	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Current sources include data up to 2015, more recent data on population numbers are lacking. Regent Honeyeater is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	Geographically or ecologically distinct areas are identified and mapped for Regent Honeyeater in the Important Habitat Maps for this species. Areas identified in The National Recovery Plan (DoE 2016) as critical to the survival of the species formed the basis of the mapping for use in the BAM. These were refined to only include areas of suitable habitat based on expert opinion and Plant Community Types (PCTs) associated with the species. Records of breeding occurrence were added with buffers to create the data set. In the absence of a published threat-defined location map or other information, we assume the Regent Honeyeater Important Habitat Map applies here.	BAM – Important Areas Viewer. National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)	Current sources include data up to 2015, more recent data on population numbers are lacking. Population estimates are difficult to determine given the mobile nature and irregular movements of the species. Regent Honeyeater is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Whether the species' population is likely to undergo extreme fluctuations	Both extent of occurrence and area of occupancy are considered to be decreasing, and the number of mature individuals is continuing to decline. However, the population is not severely fragmented, and the species occurs at >10 locations. No extreme fluctuations in the population, extent of occurrence or area of occupancy have been recorded.	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Lack of data on population and evidence of the rate of decline for this species (DoE 2015). Regent Honeyeater is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The effort, location and timing of breeding events varies annually, appearing to correspond with the flowering of key eucalypt and mistletoe species. The species shows some fidelity to nest sites but can change breeding sites between seasons. Nest locations favoured by the species tend to have a mature canopy of trees with rough bark usually on fertile soils in riparian areas. Known reproductive characteristics do not severely limit the ability to increase the existing population.	National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)	High confidence that threatening processes are the main issue rather than reproductive characteristics.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Based on information available, the species is not reliant on abiotic habitats. The species is reliant on eucalypt and mistletoe species that supply reliable nectar flows.	TBDC (2025) Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015) National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	The national recovery plan for the species identifies the primary threats to the species as small population size, habitat loss and fragmentation, competition and degradation of remnant habitat. Threats associated with the species small population size (for example stochastic events like wildfire and prolonged drought) and competition from larger aggressive nectar feeding species cannot be effectively managed on a biodiversity stewardship site.	National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.27 Impacts assessment – *Anthochaera phrygia* (Regent honeyeater)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Area of habitat to be impacted (ha) (for species measured by area only)	93.77 ha of mapped important habitat area.	TBDC Regent Honeyeater mapped important habitat area within the subject land.	Regent Honeyeater mapped important habitat area data assumed to be correct.
Area of the species' geographic range to be impacted by the project (ha)	93.77 ha of mapped important habitat area	TBDC Regent Honeyeater mapped important habitat area within the subject land.	Regent Honeyeater mapped important habitat area data assumed to be correct.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	The extent of occurrence is estimated at 600,000 km^2 and the area of occupancy at 300 km^2. Impact of 93.77 ha = 0.938 km^2. Approximately 0.31% of the species' geographic range would be impacted (based on area of occupancy).	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Data in the Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015) is assumed to be correct.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Individuals impacted	No individuals will be directly impacted, some habitat will be impacted	–	Assuming impact is to habitat.
Viability of a fragmented population	There would be localised fragmentation of habitat due to the linear nature of the project. However, the population is not currently considered to be severely fragmented based on Criterion 2 of the EPBC Act criteria and regulations (see (DoE 2015). There is no evidence to suggest that the population would become unviable.	Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015)	Data in the Conservation Advice, *Anthochaera phrygia*, Regent Honeyeater (DoE 2015) is assumed to be correct.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in Chapter 8 (Impact assessment).		

9.1.3.2 *Chalinolobus dwyeri* (Large-eared pied bat)

Chalinolobus dwyeri (Large-eared pied bat) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct:

This assessment considers the following applicable SAII principle:

- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.28 with an impact assessment presented in Table 9.29.

Table 9.28 Current status – *Chalinolobus dwyeri* (Large-eared pied bat)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	There is insufficient data on total population numbers, however the species is known to occur in small populations (around 50 individuals) and is presumed to have undergone large declines in numbers based on known loss of available habitat	Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	Population numbers for this species are poorly known, as the species is poorly recorded across its range (DAWE 2021) Large-eared Pied Bat is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	The population structure and number of locations for this species are poorly known, and total numbers within NSW cannot be determined. The species' total population size (over both NSW and Queensland) is estimated to be less than 20,000 individuals	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021)	Population numbers for this species are poorly known, as the species is poorly recorded across its range (DAWE 2021) Large-eared Pied Bat is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	There is currently insufficient data on population numbers for this species, however it is presumed to have undergone large declines based on the loss of available habitat. Records indicate the habitat requirements of this species are far more restricted within the species' range than previously understood and known threats to this species have been identified (i.e., destruction of, and interference with maternity and other roosts).	Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012) Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021)	Population numbers for this species are poorly known, as the species is poorly recorded across its range (DAWE 2021) Large-eared Pied Bat is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	As stated, the number and structure of populations for this species are not currently known. However, there are insufficient data to indicate that future reductions in numbers would be substantial, or that extreme population fluctuations are likely.	Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	Mature individuals and population numbers for this species are poorly known, as the species is poorly recorded across its range (DAWE 2021) Large-eared Pied Bat is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	280,000 km²	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021)	This species is broad-ranging and there is a paucity of information available on the exact extent of occurrence. Large-eared Pied Bat is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	1500 km²	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021)	There is a general paucity of information available on this species in regard to population size or dynamics, and occupied area. Large-eared Pied Bat is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	Not identified in TBDC. Assume that identified maternity roost sites would be considered as threat-defined locations.	TBDC (2025)	Large-eared Pied Bat is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Whether the species' population is likely to undergo extreme fluctuations	As stated, the number and structure of populations for this species are not currently known. However, there are insufficient data to indicate that future reductions in numbers would be substantial, or that extreme population fluctuations are likely.	Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	There is a general paucity of information available on this species in regard to population size or structure. Large-eared Pied Bat is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Little is known about the species breeding requirements. It has however been recorded roosting in caves, disused mine shafts, overhangs and disused Fairy Martin nests. Caves and rocky areas within 2 km of caves, overhangs, escarpments, outcrops, crevices, boulder piles, old mines et cetera are identified as habitat constraints for the species in the TBDC. Most records are within several kilometres of these areas indicating that they are important for the species. Habitat constraints linked to the species reproductive characteristics cannot be readily re-created limiting opportunities to increase breeding habitat.	TBDC (2025) Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	Moderate confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced limiting opportunities to increase roosting and breeding habitat. Therefore, meets criteria for Principle 4.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Abiotic habitat such as caves, old mine workings, overhang crevices, cliffs, escarpments, tunnels, old buildings and sheds are a habitat constraint for the species. They rely on such features for roosting and breeding. These features cannot be readily re-created.	TBDC (2025) Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, meets criteria for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include loss or damage of roosting/maternity/foraging habitat especially near its habitat constraints, predation from foxes and cats, pesticides and herbicides and vegetation clearing. Some of these threats can be managed on biodiversity stewardships sites. Some threats such as fox and cat predation cannot be effectively managed.	Commonwealth Listing Advice on *Chalinolobus dwyeri* (Large-eared Pied Bat) (Threatened Species Scientific Committee 2012)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.29 Impacts assessment – *Chalinolobus dwyeri* (Large-eared pied bat)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain since counts of the entire population that may use the subject land have not been done.	–	–
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain since counts of the entire population that may use the subject land have not been done.	–	–
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain since counts of the entire population that may use the subject land have not been done.	–	–
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain since counts of the entire population that may use the subject land have not been done.	–	–

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of habitat to be impacted (ha) (for species measured by area only)	506.36 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the project (ha)	506.36 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	The area of occupancy is approximately 1,500 km^2. 506.36 ha = 5.0636 km^2. Area of the species' geographic range to be impacted is approximately 0.3%.	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021)	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (DAWE 2021) is assumed to be accurate.
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	Surveys undertaken for the BDAR.	Representative samples undertaken.
Viability of a fragmented population	There is no evidence to suggest that the population would become unviable due to the project. The landscape is already fragmented and this species is considered likely to be able to utilise the habitat in a similar manner to current usage.	–	Published data on species population dynamics and response to fragmentation required.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in Chapter 8 (Impact assessment).		

9.1.3.3 *Lathamus discolor* (Swift Parrot)

Lathamus discolor (Swift Parrot) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1).

The following SAII principles are not applicable to this threatened species:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.30 with an impact assessment presented in Table 9.31.

Table 9.30 Current status – *Lathamus discolor* (Swift Parrot)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	The most recent population estimate for the Swift Parrot is 2000 birds, which is considered low. It is also considered that the population is likely declining and that all individuals are contained in a single subpopulation. The estimate was made in 2010, and the population was thought to be declining then, the population is now likely to be less than 2000 birds.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee, 2016). The Action Plan for Australian Birds (Garnett ST. 2011).	The estimate is considered to have a medium reliability (Garnett ST. 2011). Moderate confidence in the change in population size in NSW in the past 10 years or 3 generations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	Current population size in NSW is unknown. In NSW its range includes much of the east coast including forested areas. Garnett et al. derived an estimate of approximately 2000 mature individuals in 2010 (Garnett ST. 2011). However, this doesn't pertain to only the population of the species based in NSW.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016). The Action Plan for Australian Birds (Garnett ST. 2011).	The population estimate is over a decade old, and the estimate is of a national scale, there are likely to be less inhabiting NSW and likely to have declined in population since. Swift Parrot is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	Models project that Swift Parrots are likely to decline very severely in the near future due to sugar glider predation. The average rate of decline over 1 generation for the Swift Parrot using the modelled data was approximately 50%.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016)	There is a general paucity of information available on this species regarding population size or structure. Swift Parrot is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	There is good evidence to support a restricted distribution and infer ongoing declines in the number of mature individuals and to suggest extreme fluctuations in their area of occupancy. However, the exact percentage of mature individuals in each subpopulation is unknown.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) (Webb MH. 2014)	No known deficiency in data regarding the species declining population and the likely causes. Swift Parrot is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	The non-breeding range of this species includes much of the east coast of mainland Australia, primarily forested areas of Vicotria and NSW but ranging up to southeast QLD. The full extent of occurrence for this species was estimated at 5,700,000 hectares.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) The Action Plan for Australian Birds (Garnett ST. 2011).	Swift Parrot is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	1,850–35,500 ha	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016)	Swift Parrot is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	Not specified	–	Swift Parrot is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	It is considered that Swift Parrots are likely to undergo a future very severe reduction in population size. There is no evidence to suggest that population will undergo severe fluctuations.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016)	No known deficiency in data in regard to the species declining population and the likely causes. Swift Parrot is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4) – Note that this principle is not applicable to this species			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Swift Parrots don't breed in mainland Australia. The species breeds in Tasmania during spring and summer, migrating to mainland Australia during autumn and winter.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) TBDC (2025)	High confidence that threatening processes are the main issue rather than reproductive characteristics

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Based on information available, the species is not reliant on abiotic habitats. The species is reliant on eucalypt species that supply reliable nectar flows.	TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include habitat fragmentation, disease, inappropriate fire regime, predation by feral cats, competition with native species and alteration of habitat due to climate change. Threats associated with the species competition from larger aggressive nectar feeding species cannot be effectively managed on a biodiversity stewardship site.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.31 Impacts assessment – *Lathamus discolor* (Swift Parrot)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	The number of individuals present in the subject land is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The number of individuals present in the subject land is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) to be impacted by the project	The number of individuals expected to be impacted by the project is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The number of individuals expected to be impacted by the project is uncertain since survey wasn't required for this species.	TBDC (2025)	No surveys for this species were required since the species is assessed for species credits via the Important Habitat Map in BOAMS.
Area of habitat to be impacted (ha) (for species measured by area only)	42.76 ha of mapped important habitat area.	TBDC Swift Parrot mapped important habitat area within the subject land.	Swift Parrot mapped important habitat area data assumed to be correct.
Area of the species' geographic range to be impacted by the project (ha)	42.76 ha of mapped important habitat area.	TBDC Swift Parrot mapped important habitat area within the subject land.	Swift Parrot mapped important habitat area data assumed to be correct.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	The area of occupancy is approximately 18.5 km^2 to 355 km^2. 42.76 ha = 0.4276 km^2. Area of the species' geographic range to be impacted is approximately between 0.12% – 2.31%.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016)	The data in the Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) is assumed to be accurate.
Individuals impacted	No individuals will be directly impacted, some habitat will be impacted	–	Assuming impact is to habitat.
Viability of a fragmented population	There would be localised fragmentation of habitat due to the linear nature of the project. There is no evidence to suggest that the population would become unviable.	Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016)	The data in the Conservation advice on *Lathamus discolor* Swift parrot. (Threatened Species Scientific Committee 2016) is assumed to be accurate.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds/	Identified in Chapter 8 (Impact assessment).		

9.1.3.4 *Mixophyes balbus* (Stuttering Frog)

Mixophyes balbus (Stuttering Frog) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.32 with an impact assessment presented in Table 9.33.

Table 9.32 Current status – *Mixophyes balbus* (Stuttering Frog)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1) – Note that this principle is not applicable to this species			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	The species has undergone widespread decline across much of its range, particularly south of Sydney, where it has only been recorded 8 times since 2000 and not since 2011.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	None specified in referenced material DAWE 2021). Stuttering Frog is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of recent rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	In 2009, the estimated population size of the Stuttering Frog was fewer than 10,000 mature individuals.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Current sources include data up to 2009, more recent data lacking. Stuttering Frog is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Decline in species' population size in 3 years or 1 generation	In 2020, the Bushfire Expert Panel indicated that the Stuttering Frog population was increasing in size due to the 2019-20 bushfires.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Data relatively recent, however acquired under extreme circumstances. Recent data required for accurate depiction of population changes for this species. Stuttering Frog is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	No subpopulations are estimated to contain more than 1000 mature individuals, low abundance has been recorded in most subpopulations.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Stuttering Frog is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	Unknown	–	Stuttering Frog is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	There is an absence of confirmed occupancy for this species	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Stuttering Frog is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	In view of the extent and rapid nature of the recent population declines of the Stuttering Frog throughout its entire distribution, all extant populations are considered critical for the long-term survival of this taxon at this stage.	National Recovery Plan for the Stuttering Frog *Mixophyes balbus* (Hunter 2011)	Stuttering Frog is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Whether the species' population is likely to undergo extreme fluctuations	Unknown	–	Unknown - further surveys of known subpopulations are required to monitor the impacts of the bushfires and ascertain the increase/decline in their abundance. Stuttering Frog is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The Stuttering Frog is an obligate stream breeder and breeds during the spring and summer months, usually after rainfall. Eggs are deposited in shallow, slow-flowing riffle sections of the main channel of streams, in shallow nests dug into gravel or leaf litter substrates of pasted directly onto bedrock. Known reproductive characteristics do not severely limit the ability to increase the existing population.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	High confidence that threatening processes are the main issue rather than reproductive characteristics.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	The Stuttering Frog lay their eggs on rock shelves and shallow riffles in small, flowing streams, with nearby deep permanent pools necessary for them to further grow and metamorphose in. These abiotic habitats cannot be readily re-created.	Conservation advice for *Mixophyes balbus* (DAWE 2021) TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, meets criteria for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include habitat loss from vegetation clearing, disturbances from forestry activities, feral/domestic herbivores and changes to hydrology, spread of chytrid fungus (*Chytridiomycosis*), and predation of eggs and tadpoles by introduced fish. Some of these threats can be managed on biodiversity stewardships sites. Some threats such as chytrid fungus cannot be effectively managed. The species is comprised of two genetic lineages. The populations from the southern lineage that are located south of the Hunter River generally appear to have been severely impacted by chytrid fungus and any impact to them could be considered potentially serious and irreversible. The populations north of the Hunter River are more robust and impacts on them are currently unlikely to be considered potentially serious or irreversible.	TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.33 Impacts assessment – *Mixophyes balbus* (Stuttering Frog)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	At least 271 individuals have been recorded in the locality of the subject land.	BioNet (2025)	–
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Based on the 2009 estimate of less than 10000 individuals (Gillespie et al. 2009), these local records make up 2.71% of the NSW population.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Conservation advice for *Mixophyes balbus* (DAWE 2021) is assumed to be correct.
Number of individuals (mature and immature) to be impacted by the project	To date, recent surveys have identified a total of 416 individuals within or near the subject land. These include mature and immature individuals. It is unknown how many individuals are likely to be impacted.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	In the case where all 416 individuals are impacted, 4.16% of the total NSW population would be impacted.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Conservation advice for *Mixophyes balbus* (DAWE 2021) is assumed to be correct.
Area of habitat to be impacted (ha) (for species measured by area only)	180.09 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the project (ha)	180.09 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	Area of occupancy is unknown.	Unavailable.	Published data on area of occupancy is required.
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	Surveys undertaken for the BDAR.	Representative samples undertaken.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Viability of a fragmented population	There would be localised fragmentation of habitat due to the linear nature of the project.	Conservation advice for *Mixophyes balbus* (DAWE 2021)	Conservation advice for *Mixophyes balbus* (DAWE 2021) is assumed to be correct.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds/	Identified in Chapter 8 (Impact assessment).		

9.1.3.5 *Petrogale penicillata* (Brush-tailed Rock-wallaby)

Petrogale penicillata (Brush-tailed Rock-wallaby) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.34 with an impact assessment presented in Table 9.35.

Table 9.34 Current status – *Petrogale penicillata* (Brush-tailed Rock-wallaby)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Over the past 3 generations, the species' populations have become extinct in 17% of reserves, have declined in 28.5% of reserves, and have increased in 11% of reserves. There are no data available to determine presence or absence at 20% of reserves and the remaining 23% the species is listed as extant but with no information on population trends.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010)	With significant knowledge gaps, it is difficult to discern clear trends in occupancy across the species' range. Moderate confidence in the change in population size in NSW in the past 10 years or 3 generations.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	The population in NSW is conservatively estimated to be approximately 13,610 individuals.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010)	Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	Over the past 3 generations, the species' populations have become extinct in 17% of reserves, have declined in 28.5% of reserves, and have increased in 11% of reserves. There are no data available to determine presence or absence at 20% of reserves and the remaining 23% of the species is listed as extant but with no information on population trends.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010)	With significant knowledge gaps, it is difficult to discern clear trends in population across the species' range. Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Unknown	–	Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	Unknown for NSW, however the national extent of occurrence is estimated to be 832,563 km^2.	Conservation Advice for Brush-tailed Rock-wallaby (Commonwealth DCCEEW 2025)	Published data on extent of occurrence for NSW is required. Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Area of occupancy (ha)	Unknown for NSW, however the national area of occupancy is estimated to be 100,000 km^2.	Conservation Advice for Brush-tailed Rock-wallaby (Commonwealth DCCEEW 2025)	Published data on area of occupancy for NSW is required. Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	Unknown	–	Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	Unknown	–	Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The brush-tailed rock-wallaby produces an average of 1.1 young per year. Embryonic diapause occurs in this species and females can carry a pouch young while simultaneously suckling a young-at-foot. There is high mortality in the first year of life when juveniles are most vulnerable to predation, suggesting that predation from introduced and native species is the strongest extrinsic factor limiting population growth. Rocky habitat with an abundant supply of ledges, caves and potential pathways, plus a northerly aspect are known to be important for rock-wallabies to breed. Habitat constraints linked to the species reproductive characteristics cannot be readily re-created limiting opportunities to increase breeding habitat.	Conservation Advice for Brush-tailed Rock-wallaby (Commonwealth DCCEEW 2025)	Moderate confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced limiting opportunities to increase breeding habitat. Therefore, meets criteria for Principle 4.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Abiotic habitat such as rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines are a habitat constraint for the species. They rely on such features for habitat. These features cannot be readily re-created.	TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, meets criteria for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include predation/competition with native and pest animals, habitat loss and degradation, invasive weeds, and road mortality/injury Any impacts on rocky habitat used by this species could be considered potentially serious and irreversible. Additionally, significant amounts of apparently suitable habitat remain unoccupied. Some of these threats can be managed on biodiversity stewardships sites. Some threats such as fox and cat predation cannot be effectively managed.	TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.35 Impacts assessment – *Petrogale penicillata* (Brush-tailed Rock-wallaby)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	142 individuals have been recorded in the locality of the subject land.	BioNet (2025)	–
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	The local population makes up 1.04% of the estimated NSW population.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010) BioNet (2025)	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010) is assumed to be correct.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) to be impacted by the project	Recent surveys have identified 35 individuals near or within the subject land. It is unknown how many individuals are likely to be impacted.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	The individuals identified during the survey make up 0.26% of the total NSW population. It is unknown how many individuals are likely to be impacted.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010)	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010) is assumed to be correct.
Area of habitat to be impacted (ha) (for species measured by area only)	145.64 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the project (ha)	145.64 ha	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	Area of occupancy is unknown, however the national area of occupancy is estimated to be 100,000 km^2. 0.001% of the estimated national area of occupancy is expected to be impacted.	Conservation Advice for Brush-tailed Rock-wallaby (Commonwealth DCCEEW 2025)	Published data on area of occupancy for NSW is required.
Individuals impacted	Some individuals of subpopulation and habitat will be impacted	Surveys undertaken for the BDAR.	Representative samples undertaken.
Viability of a fragmented population	There would be localised fragmentation of habitat due to the linear nature of the project.	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010)	National Recovery Plan for the Brush-tailed Rock-wallaby (Menkhorst and Hynes 2010) is assumed to be correct.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds/	Identified in Chapter 8 (Impact assessment).		

9.1.3.6 *Tyto tenebricosa* (Sooty Owl)

Tyto tenebricosa (Sooty Owl) is listed as a SAII entity because an impact to this threatened species may be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species becoming extinct.

This assessment considers the following applicable SAII principle:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (known as SAII Principle 1)
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable (known as SAII Principle 4).

The following SAII principles are not applicable to this threatened species:

- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size (known as SAII Principle 2)
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (known as SAII Principle 3).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this threatened species at risk of a SAII is provided in Chapter 7 (Avoid and minimise impacts). This includes aspects of project location and design.

Current status

A summary of the current status of this SAII entity in presented in Table 9.36 with an impact assessment presented in Table 9.37.

Table 9.36 Current status – *Tyto tenebricosa* (Sooty Owl)

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	The species is inferred to have declined due to forest clearing, however there's no evidence that the species is continuing to decline in public forest lands, and it is believed (with medium reliability) that Sooty Owl populations in NSW may now be stable.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Too few records are available to identify any State or national trend in reporting rate and the baseline for its historical decline is uncertain. Low confidence in the change in population size in NSW in the past 10 years or 3 generations.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	There is a paucity of information regarding the population size for this species. The most recent estimate of approximately 5000 individuals is from 2000 and is assigned a low level of reliability (Garnett 2000).	The Action Plan for Australian Birds (Garnett, 2000) Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	The NSW population estimate is regarded as having a low level of reliability (NSW Scientific Committee 2008) Sooty Owl is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Decline in species' population size in 3 years or 1 generation	The species is inferred to have declined due to forest clearing, however there's no evidence that the species is continuing to decline in public forest lands, and it is believed (with medium reliability) that Sooty Owl populations in NSW may now be stable.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Too few records are available to identify any State or national trend in reporting rate and the baseline for its historical decline is uncertain. Sooty Owl is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	There is no evidence of extreme fluctuations in the population size or habitat of this species.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Current sources include reports up to 2008, more recent data is lacking. Sooty Owl is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of a small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	23,000,000 ha	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Current sources include reports up to 2008, more recent data is lacking. Sooty Owl is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of occupancy (ha)	5,000,000 ha	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Current sources include reports up to 2008, more recent data is lacking. Sooty Owl is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Number of threat-defined locations	Not specified	–	Sooty Owl is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	There is no evidence of extreme fluctuations in the population size or habitat of this species.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Current sources include reports up to 2008, more recent data is lacking. Sooty Owl is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of a limited geographic range.
Evidence that the species is unlikely to respond to management (Principle 4)			
Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	The Sooty Owl nests in large hollow bearing trees (typically smooth gums) or caves in gullies. Breeding pairs are known to be faithful to their traditional nesting habitat. Resident breeding pairs of Sooty Owls defend exclusive nesting territories within larger, defended home ranges of 400–3,000 ha, depending on habitat quality and prey densities. Habitat constraints linked to the species reproductive characteristics cannot be readily re-created limiting opportunities to increase breeding habitat.	Approved Recovery Plan for Large Forest Owls (NSW DEC 2008) Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced limiting opportunities to increase roosting and breeding habitat. Therefore, meets criteria for Principle 4.

Criteria	Data/information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Abiotic habitat such as caves, clifflines and ledges are a habitat constraint for the species. They may rely on such features for roosting and breeding. These features cannot be readily re-created. Pairs may also utilise a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008) TBDC (2025)	High confidence in knowledge of habitat requirements and reliance on abiotic habitats which cannot be restored or replaced. Therefore, meets criteria for Principle 4.
Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).	Threatening processes that effect the species include clearing and fragmentation of key habitat, high frequency of fire in key habitat, and secondary poisoning from rodenticides. Some of these threats can be managed on biodiversity stewardships sites. Some threats such poisoning from rodenticides cannot be effectively managed.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008) TBDC (2025)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impacts assessment

Table 9.37 Impacts assessment – *Tyto tenebricosa* (Sooty Owl)

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	A total of 171 individuals have been historically recorded in the locality of the subject land. The Sooty Owl was recorded on 49 occasions during the surveys for this project within the Watagan, Corrabare and Pokolbin State forests (Wyong and Yengo IBRA subregions). Within Corrabare State Forest the species was observed within a cave indicating a likely breeding site. Design changes and easement realignment in this area has avoided all impact (direct and indirect) to this cave. Other caves were also observed within and outside the biodiversity study area and were considered to be likely owl caves, with glider bones, bone fragments, whitewash and owl pellets. No owls were actually recorded in these other caves. Potential breeding use of these caves is unknown although was not recorded.	BioNet (2025)	–
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	These Bionet records make up 1.71% of the estimate NSW population of 10000. Records obtained during project surveys make up 0.5% of the total estimated population (although some project records would be of repeat individuals).	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008) is assumed to be correct.
Number of individuals (mature and immature) to be impacted by the project	Recent surveys have identified at least 49 records near or within the subject land. Some of these may have been repeat occurrences. Breeding habitat is likely to remain unaffected due to the avoidance measures implemented.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Individuals (mature and immature) to be impacted by the project as a percentage of total NSW population (%)	In the case of all of these individuals being impacted, 0.50% of the total NSW population would be impacted. However breeding habitat is likely to remain unaffected due to the avoidance measures implemented.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008) is assumed to be correct.

Impact	Data/information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Area of habitat to be impacted (ha) (for species measured by area only)	207.82 ha of foraging habitat (no breeding habitat).	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the project (ha)	207.82 ha of foraging habitat (no breeding habitat).	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	The extent of occurrence is estimated at 23,000,000 ha and the area of occupancy at 5,000,000 ha. Impact of 207.82 ha = 2.08 km^2. Less than 0.01% of the species' geographic range would be impacted (based on area of occupancy). No known breeding habitat will be impacted.	Surveys undertaken for the BDAR. Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Representative samples undertaken.
Individuals impacted	Some individuals of subpopulation and habitat may be impacted by loss of foraging habitat, however no known breeding habitat will be impacted and loss of foraging habitat is not substantial in context to the surrounding available forested habitat.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Viability of a fragmented population	There would be localised fragmentation of habitat due to the linear nature of the project. However Sooty Owls are known to disperse up to 50 km, including across partly cleared areas, so population fragmentation is unlikely except where forest is broadly dissected by heavily cleared areas.	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008)	Sooty Owl *Tyto tenebricosa*. A review of current information in NSW (NSW Scientific Committee 2008) is assumed to be correct.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds/	Identified in Chapter 8 (Impact assessment).		

10 Impact summary

10.1 Determine an offset requirement for impacts

The project is expected to require 17,087 ecosystem credits and 209,996 species credits to offset its impacts.

- Wyong: 5043 ecosystem credits and 86,170 species credits
- Yengo: 5515 ecosystem credits and 80,804 species credits
- Hunter: 6529 ecosystem credits and 43,022 species credits.

Additional offsets are also required for scattered trees along with indirect and prescribed impacts.

10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

Table 10.1 to Table 10.3 outline the impacts that require an offset. The impacts that do not require an offset (identified with a number 0 in the Ecosystem credits column) are also shown here. These vegetation zones that do not require an offset are all assigned to the Disturbed Grassland condition class, which have VI scores below the offset threshold necessary to generate ecosystem credits. No offset was required if the vegetation zone VI scores were:

- <15 for a PCT representative of a critically endangered ecological community (CEEC) or an endangered ecological community (EEC)
- <17 for a PCT that provides habitat for threatened species or is representative of a vulnerable ecological community (VEC)
- <20 for a PCT that is not representative of a TEC or associated with threatened species habitat.

Figure 14.16 illustrates the areas that require offsetting of impacts.

Table 10.1 Impacts that require an offset – ecosystem credits for the Wyong IBRA subregion

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3029 - Lower North Wet Gully Palm Rainforest									
11	3029_Mod-good	65.3	4.8 hectares	Low Sensitivity to Loss	PCT Cleared - 6%	High Sensitivity to Gain	1.5	No	118
Subtotal: 118									
PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest									
1	3150_Mod-good	54.2	34 hectares	Low Sensitivity to Loss	PCT Cleared - 10%	High Sensitivity to Gain	1.5	No	689
8	3150_Plantation	47.7	2.1 hectares	Low Sensitivity to Loss	PCT Cleared - 10%	High Sensitivity to Gain	1.5	No	37
Subtotal: 723									
PCT 3230 - Central Coast Escarpment Moist Forest									
2	3230_Mod-good	69	43.5 hectares	Low Sensitivity to Loss	PCT Cleared - 25%	High Sensitivity to Gain	1.5	No	1127
9	3230_Plantation	61.5	11.6 hectares	Low Sensitivity to Loss	PCT Cleared - 25%	High Sensitivity to Gain	1.5	No	268
Subtotal: 1,395									
PCT 3239 - Hunter Range Sheltered Grey Gum Forest									
3	3239_Mod-good	54.4	4.9 hectares	Low Sensitivity to Loss	PCT Cleared - 1%	High Sensitivity to Gain	1.5	No	100
Subtotal: 100									
PCT 3242 - Lower North Ranges Turpentine Moist Forest									
4	3242_Mod-good	64.9	25.9 hectares	Low Sensitivity to Loss	PCT Cleared - 13%	High Sensitivity to Gain	1.5	No	624
Subtotal: 624									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest									
14	3244_Mod-good	65.1	1.3 hectares	Low Sensitivity to Loss	PCT Cleared - 39%	High Sensitivity to Gain	1.5	No	32
Subtotal: 32									
PCT 3250 - Northern Foothills Blackbutt Grassy Forest									
10	3250_Mod-good	62.6	2 hectares	Low Sensitivity to Loss	PCT Cleared - 30%	High Sensitivity to Gain	1.5	No	47
Subtotal: 47									
PCT 3263- Watagan Range Turpentine-Mahogany Grassy Forest									
5	3263_Mod-good	67.6	39.1 hectares	Low Sensitivity to Loss	PCT Cleared - 10%	High Sensitivity to Gain	1.5	No	987
Subtotal: 987									
PCT 3581 - Hunter Coast Foothills Apple Forest									
12	3581_Mod-good	65	0.67 hectares	Low Sensitivity to Loss	PCT Cleared - 26%	High Sensitivity to Gain	1.5	No	16
Subtotal: 16									
PCT 3617 - Sydney Hinterland Peppermint-Apple Forest									
6	3617_Mod-good	71.1	33.7 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	897
Subtotal: 897									
PCT 3621 - Sydney Hinterland Turpentine-Apple Gully Forest									
7	3621_Mod-good	57.3	4.9 hectares	Low Sensitivity to Loss	PCT Cleared - 3%	High Sensitivity to Gain	1.5	No	104
Subtotal: 104									
Total									**5043**

(1) Area rounding has been applied as per BAM-C case 00048775/BAAS17046/24/00048776 refer Appendix E (BAM-C credit reports).

Table 10.2 Impacts that require an offset – ecosystem credits for the Yengo IBRA subregion

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3086 - Lower North Hinterland Riparian Dry Rainforest									
24	3086_Mod-good	56.9	1.9 hectares	Low Sensitivity to Loss	PCT Cleared - 46%	High Sensitivity to Gain	1.5	No	41
Subtotal: 35									
PCT 3087 - Lower North Ranges Riparian Turpentine Forest									
1	3087_Mod-good	60.4	2.8 hectares	Low Sensitivity to Loss	PCT Cleared - 27%	High Sensitivity to Gain	1.5	No	64
Subtotal: 64									
PCT 3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest									
18	3151_Mod-good	48.9	1.9 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	34
Subtotal: 34									
PCT 3152 - Hunter Range Turpentine-Grey Myrtle Gully Forest									
2	3152_Mod-good	61.3	0.92 hectares	Low Sensitivity to Loss	PCT Cleared - 1%	High Sensitivity to Gain	1.5	No	21
Subtotal: 21									
PCT 3230 - Central Coast Escarpment Moist Forest									
3	3230_Mod-good	67.9	15.3 hectares	Low Sensitivity to Loss	PCT Cleared - 25%	High Sensitivity to Gain	1.5	No	390
Subtotal: 390									
PCT 3237 - Hunter Range Blue Gum Gully Forest									
4	3237_Mod-good	56.7	5.5 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	116
Subtotal: 116									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3238 - Hunter Range Colluvial Apple-Gum Forest									
14	3238_Mod-good	57.5	0.05 hectares	Low Sensitivity to Loss	PCT Cleared - 4%	High Sensitivity to Gain	1.5	No	1
Subtotal: 1									
PCT 3239 - Hunter Range Sheltered Grey Gum Forest									
5	3239_Mod-good	65.3	96.4 hectares	Low Sensitivity to Loss	PCT Cleared - 1%	High Sensitivity to Gain	1.5	No	2363
22	3239_Plantation	47.8	2.8 hectares	Low Sensitivity to Loss	PCT Cleared - 1%	High Sensitivity to Gain	1.5	No	51
Subtotal: 2414									
PCT 3241 - Lower North White Mahogany-Spotted Gum Moist Forest									
19	3241_Mod-good	82.6	10.2 hectares	Low Sensitivity to Loss	PCT Cleared - 31%	High Sensitivity to Gain	1.5	No	316
Subtotal: 316									
PCT 3242 - Lower North Ranges Turpentine Moist Forest									
6	3242_Mod-good	53.3	10.6 hectares	Low Sensitivity to Loss	PCT Cleared - 13%	High Sensitivity to Gain	1.5	No	212
Subtotal: 212									
PCT 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest									
7	3244_Mod-good	64	0.31 hectares	Low Sensitivity to Loss	PCT Cleared - 39%	High Sensitivity to Gain	1.5	No	7
Subtotal: 7									
PCT 3328 - Lower Hunter Red Gum-Paperbark Riverflat Forest									
15	3328_Mod-good	30.4	0.45 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	7
Subtotal: 7									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3438 - Hunter Escarpment Footslopes Ironbark Forest									
8	3438_Mod-good	69	2 hectares	Low Sensitivity to Loss	PCT Cleared - 24%	High Sensitivity to Gain	1.5	No	51
Subtotal: 51									
PCT 3439 - Hunter Escarpment Grey Gum Sheltered Forest									
9	3439_Mod-good	59.3	1.6 hectares	Moderate Sensitivity to Loss	PCT Cleared - 58%	High Sensitivity to Gain	1.75	No	42
Subtotal: 42									
PCT 3444 - Lower Hunter Spotted Gum-Ironbark Forest									
16	3444_Mod-good	90.6	0.92 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	46
23	3444_Derived	100	0.29 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	15
Subtotal: 57									
PCT 3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest									
17	3446_Mod-good	47.5	1.4 hectares	High Sensitivity to Loss	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	2.5	No	40
Subtotal: 40									
PCT 3489 - Hunter Escarpment Grey Box Forest									
10	3489_Mod-good	79.1	5.7 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	168
Subtotal: 168									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3599 - Blue Mountains Peppermint Shrub Forest									
11	3599_Mod-good	68.1	7.2 hectares	Low Sensitivity to Loss	PCT Cleared - 0%	High Sensitivity to Gain	1.5	No	185
Subtotal: 185									
PCT 3605 - Hunter Range Ironbark Forest									
12	3605_Mod-good	60.1	57.1 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	1288
Subtotal: 1288									
PCT 3617 - Sydney Hinterland Peppermint-Apple Forest									
13	3617_Mod-good	70.2	1.9 hectares	Low Sensitivity to Loss	PCT Cleared - 2%	High Sensitivity to Gain	1.5	No	50
Subtotal: 50									
PCT 4039 - Hunter Range Creekflat Apple-Red Gum Forest									
20	4039_Mod-good	100	0.07 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	4
Subtotal: 4									
PCT 4072 - Hunter River Oak Mesic Forest									
21	4072_Mod-good	100	0.07 hectares	Moderate Sensitivity to Loss	PCT Cleared - 66%	High Sensitivity to Gain	1.75	No	3
Subtotal: 3									
Total									**5515**

(1) Area rounding has been applied as per BAM-C case 00048830/BAAS17046/24/00048832 refer Appendix E (BAM-C credit reports)

Table 10.3 Impacts that require an offset – ecosystem credits for the Hunter IBRA subregion

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3086 - Lower North Hinterland Riparian Dry Rainforest									
20	3086_Mod-good	100	4.1 hectares	Low Sensitivity to Loss	PCT Cleared - 46%	High Sensitivity to Gain	1.5	No	152
Subtotal: 152									
PCT 3087 - Lower North Ranges Riparian Turpentine Forest									
21	3087_Mod-good	100	0.31 hectares	Low Sensitivity to Loss	PCT Cleared - 27%	High Sensitivity to Gain	1.5	No	12
Subtotal: 12									
PCT 3239 - Hunter Range Sheltered Grey Gum Forest									
22	3239_Mod-good	100	5.8 hectares	Low Sensitivity to Loss	PCT Cleared - 1%	High Sensitivity to Gain	1.5	No	218
Subtotal: 218									
PCT 3241 - Lower North White Mahogany-Spotted Gum Moist Forest									
23	3241_Mod-good	70.5	2.1 hectares	Low Sensitivity to Loss	PCT Cleared - 31%	High Sensitivity to Gain	1.5	No	55
Subtotal: 55									
PCT 3314 - Central Hunter Slopes Grey Box Forest									
1	3314_Thinned	59.5	38.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	1145
2	3314_Poor	34.5	19.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	335
3	3314_Disturbed_Grassland	9.5	20 hectares	High Sensitivity to Loss	PCT Cleared - 71%	High Sensitivity to Gain	2	No	0
Subtotal: 1480									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3315 - Central Hunter Ironbark-Spotted Gum Forest									
4	3315_Thinned	54.8	8.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	242
5	3315_Derived	18.1	17.4 hectares	High Sensitivity to Loss	PCT Cleared - 78%	High Sensitivity to Gain	2	No	157
Subtotal: 399									
PCT 3431 - Central Hunter Ironbark Grassy Woodland									
6	3431_Thinned	59.6	63.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	1888
7	3431_Plantation	38.9	14.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	290
9	3431_Poor	41.7	5.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	108
15	3431_Disturbed_Grassland	10.9	35.3 hectares	High Sensitivity to Loss	PCT Cleared - 86%	High Sensitivity to Gain	2	No	0
Subtotal: 2286									
PCT 3438 - Hunter Escarpment Footslopes Ironbark Forest									
8	3438_Mod-good	71.5	10.2 hectares	Low Sensitivity to Loss	PCT Cleared - 24%	High Sensitivity to Gain	1.5	No	274
Subtotal: 274									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 3444 - Lower Hunter Spotted Gum-Ironbark Forest									
10	3444_Mod-good	58.8	36.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	1077
24	3444_Derived	39.2	0.02 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	1
Subtotal: 1078									
PCT 3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest									
18	3446_Mod-good	46	0.02 hectares	High Sensitivity to Loss	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	2.5	No	1
Subtotal: 1									
PCT 3636 - Warkworth Sands Woodland									
11	3636_Thinned	44.2	7.5 hectares	High Sensitivity to Loss	Geographic Distribution	High Sensitivity to Gain	2	Yes	166
12	3636_Disturbed_Grassland	8.7	14.6 hectares	Moderate Sensitivity to Loss	PCT Cleared - 61%	High Sensitivity to Gain	1.75	No	0
Subtotal: 166									
PCT 4015 - Central Hunter Swamp Oak Riparian Forest									
13	4015_Thinned	58.9	7.6 hectares	High Sensitivity to Loss	PCT Cleared - 88%	High Sensitivity to Gain	2	No	224
14	4015_Derived	29.6	2.2 hectares	High Sensitivity to Loss	PCT Cleared - 88%	High Sensitivity to Gain	2	No	33
Subtotal: 257									

Zone BAM-C #	Vegetation zone name	Vegetation integrity loss	Area[1]	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
PCT 4039 - Hunter Range Creekflat Apple-Red Gum Forest									
16	4039_Mod-good	74.4	0.84 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2	No	31
Subtotal: 31									
PCT 4072 - Hunter River Oak Mesic Forest									
17	4072_Mod-good	65.3	0.14 hectares	Moderate Sensitivity to Loss	PCT Cleared - 66%	High Sensitivity to Gain	1.75	No	4
Subtotal: 4									
PCT 4089 - Namoi-Upper Hunter River Red Gum Forest									
19	4089_Poor	16	4.2 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2	Yes	34
25	4089_Derived	23.8	6.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2	Yes	82
Subtotal: 116									
Total									**6529**

(1) Area rounding has been applied as per BAM-C case 00048860/BAAS17046/24/00048861 refer Appendix E (BAM-C credit reports).

10.1.2 Impacts on threatened species and their habitat (species credits)

The impacts to threatened species and their habitats for species credit species for each IBRA subregion are presented in Table 10.4 to Table 10.6.

Table 10.4 Impacts that require an offset – species credits for the Wyong IBRA subregion

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Angophora inopina	Charmhaven Apple	V	V	No	0.90	2	28
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	0.51	3	26
Asperula asthenes	Trailing Woodruff	V	V	No	1.98	2	63
Callistemon linearifolius[3]	Netted Bottle Brush	V	-	No	205 individuals	1.5	308
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	44.99	2	1813
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	16.18	2	657
Cercartetus nanus	Eastern Pygmy-possum	V	-	No	155.55	2	5017
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	203.63	3	9644
Corybas dowlingii	Red Helmet Orchid	E	-	No	9.28	2	253
Cynanchum elegans	White-flowered Wax Plant	E	E	No	1.82	2	58
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	3.21	2	93
Heleioporus australiacus	Giant Burrowing Frog	V	E	No	26.75	1.5	663
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	No	2.02	2	63
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	145.71	2	4716
Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	63.53	2	2217
Melaleuca biconvexa	Biconvex Paperbark	V	V	No	9.35	2	280
Mixophyes balbus	Stuttering Frog	E	V	Yes	180.09	3	8737

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Mixophyes iteratus	Giant Barred Frog	V	V	No	3.81	1.5	93
Ninox connivens	Barking Owl	V	-	No	15.55	2	611
Ninox strenua	Powerful Owl	V	-	No	29.94	2	1169
Notamacropus parma	Parma Wallaby	V	V	No	208.44	2	6727
Petauroides volans	Southern Greater Glider	E	E	No	208.44	2	8089
Petaurus norfolkensis	Squirrel Glider	V	-	No	208.44	2	8089
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	70.91	3	3427
Phascolarctos cinereus	Koala	E	E	No	52.90	2	2078
Potorous tridactylus	Long-nosed Potoroo	V	V	No	135.10	2	4370
Pseudophryne australis	Red-crowned Toadlet	V	-	No	29.68	1.5	754
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	7.66	3	363
Rhodamnia rubescens[4]	Scrub Turpentine	CE	CE	Yes	1354 individuals	3	4062
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	18.47	3	834
Rutidosis heterogama	Heath Wrinklewort	V	V	No	0.90	2	28
Senna acclinis	Rainforest Cassia	E	-	No	5.95	2	177
Syzygium paniculatum[5]	Magenta Lilly Pilly	V	V	No	468 individuals	2	936
Tetratheca juncea	Black-eyed Susan	V	V	No	2.85	2	91
Tyto novaehollandiae	Masked Owl	V	-	No	4.75	2	182

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Tyto tenebricosa	Sooty Owl	V	-	Yes	75.46	3	4440
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	109.78	3	5014
Total species credits							**86,170**

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Callistemon linearifolius* is a count of individuals. Given *Callistemon linearifolius* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied.

(5) Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

Table 10.5 Impacts that require an offset – species credits for the Yengo IBRA subregion

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	42.55	3	2363
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	41.13	2	1500
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	46.40	2	1666
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	224.35	3	10,808
Cynanchum elegans	White-flowered Wax Plant	E	E	No	4.55	2	176
Dillwynia tenuifolia	-	V	-	No	1.46	2	44
Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	20.68	3	1072
Eucalyptus glaucina[3]	Slaty Red Gum	V	V	No	288 individuals	2	576
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	5.77	3	314
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	2.55	2	83
Lathamus discolor	Swift Parrot	E	CE	Yes	1.67	3	104
Melaleuca groveana[4]	Grove's Paperbark	V	-	No	2923 individuals	2	5846
Myotis macropus	Southern Myotis	V	-	No	2.56	2	85
Ninox connivens	Barking Owl	V	-	No	7.34	2	252
Ninox strenua	Powerful Owl	V	-	No	68.83	2	2579
Notamacropus parma	Parma Wallaby	V	V	No	96.54	2	2991
Olearia cordata	-	V	V	No	4.03	2	129
Persoonia hirsuta	Hairy Geebung	E	E	Yes	1.46	3	66
Petauroides volans	Southern Greater Glider	E	E	No	227.02	2	8321
Petaurus norfolkensis	Squirrel Glider	V	-	No	221.30	2	8118
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	72.51	3	3507

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Phascolarctos cinereus	Koala	E	E	No	223.61	2	8233
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	39.46	2	1247
Pseudophryne australis	Red-crowned Toadlet	V	-	No	13.86	1.5	319
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	1.79	3	83
Rhodamnia rubescens[5]	Scrub Turpentine	CE	CE	Yes	852 individuals	3	2556
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	1.21	3	79
Rutidosis heterogama	Heath Wrinklewort	V	V	No	1.46	2	44
Syzygium paniculatum[6]	Magenta Lilly Pilly	V	V	No	30 individuals	2	60
Tyto novaehollandiae	Masked Owl	V	-	No	24.97	2	929
Tyto tenebricosa	Sooty Owl	V	-	Yes	126.93	3	6950
Velleia perfoliata	-	V	V	No	4.02	2	128
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	198.27	3	9447
Zieria involucrata	-	E	V	No	4.03	2	129
Total species credits							**80,804**

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Eucalyptus glaucina* is a count of individuals. Given *Eucalyptus glaucina* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Melaleuca groveana* is a count of individuals. For assumed habitat an average of recorded counts of 124 plants per hectare has been applied.

(5) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied for the Yengo IBRA subregion.

Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

Table 10.6 Impacts that require an offset – species credits for the Hunter IBRA subregion

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Acacia bynoeana	Bynoe's Wattle	E	V	No	9.77	2	104
Acacia pendula – endangered population	*Acacia pendula* population in the Hunter catchment	EP	-	Yes	16.92	3	774
Angophora inopina	Charmhaven Apple	V	V	No	0.84	2	23
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	50.71	3	2924
Asperula asthenes	Trailing Woodruff	V	V	No	0.31	2	16
Callistemon linearifolius[3]	Netted Bottle Brush	V	-	No	241 individuals	1.5	362
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	7.11	2	302
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	6.92	2	293
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	78.38	3	3934
Corybas dowlingii	Red Helmet Orchid	E	-	No	2.09	2	74
Cymbidium canaliculatum – endangered population[4]	*Cymbidium canaliculatum* population in the Hunter Catchment	EP	-	No	23 individuals	2	46
Cynanchum elegans	White-flowered Wax Plant	E	E	No	3.38	2	169
Delma vescolineata	Hunter Valley Delma	E	E	No	223.04	1.5	3340
Diuris tricolor	Pine Donkey Orchid	V	-	No	26.56	1.5	416
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis population in the Hunter catchment	EP	-	No	3.30	2	14
Eucalyptus castrensis	Singleton Mallee	E	-	Yes	0.21	3	16
Eucalyptus glaucina[5]	Slaty Red Gum	V	V	No	888 individuals	2	1636
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	11.91	3	623

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	V	No	3.55	2	104
Lathamus discolor	Swift Parrot	E	CE	Yes	41.09	3	2265
Melaleuca groveana[6]	Grove's Paperbark	V	-	No	419 individuals	2	838
Myotis macropus	Southern Myotis	V	-	No	117.69	2	2406
Ninox connivens	Barking Owl	V	-	No	13.75	2	543
Ninox strenua	Powerful Owl	V	-	No	26.06	2	1059
Ozothamnus tesselatus	-	V	V	No	7.69	1.5	155
Petauroides volans	Southern Greater Glider	E	E	No	41.66	2	1812
Petaurus norfolkensis	Squirrel Glider	V	-	No	217.88	2	7300
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	12.60	3	505
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	No	90.41	2	2235
Phascolarctos cinereus	Koala	E	E	No	8.23	2	382
Planigale maculata	Common Planigale	V	-	No	18.21	2	335
Pomaderris queenslandica	Scant Pomaderris	E	-	No	6.85	2	182
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	30.99	2	688
Prasophyllum sp. Wybong	-	-	CE	No	30.99	3	1032
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	18.26	2	679
Pterostylis chaetophora	-	V	-	No	30.99	2	681
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	2.18	2	67
Rhodamnia rubescens[7]	Scrub Turpentine	CE	CE	Yes	188 individuals	3	564
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	0.31	3	23

Scientific name	Common name	BC Act status [1]	EPBC Act status [2]	Potential SAII	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Rutidosis heterogama	Heath Wrinklewort	V	V	No	13.32	2	149
Syzygium paniculatum[8]	Magenta Lilly Pilly	V	V	No	15 individuals	2	30
Tyto novaehollandiae	Masked Owl	V	-	No	12.36	2	487
Tyto tenebricosa	Sooty Owl	V	-	Yes	5.43	3	407
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	75.72	3	3028
Total species credits							**43,022**

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

(3) Within BAM-C the unit of measure for *Callistemon linearifolius* is a count of individuals. Given *Callistemon linearifolius* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(4) Within BAM-C the unit of measure for *Cymbidium canaliculatum* – endangered population is a count of individuals. For assumed habitat an average of recorded counts of 1 plant per hectare has been applied.

(5) Within BAM-C the unit of measure for *Eucalyptus glaucina* is a count of individuals. Given *Eucalyptus glaucina* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

(6) Within BAM-C the unit of measure for Melaleuca groveana is a count of individuals. For assumed habitat an average of recorded counts of 124 plants per hectare from the Yengo IBRA subregion has been applied.

(7) Within BAM-C the unit of measure for *Rhodamnia rubescens* is a count of individuals. For assumed habitat an average of recorded counts of 29 plants per hectare has been applied based on recorded densities in the adjacent Yengo IBRA subregion.

(8) Within BAM-C the unit of measure for *Syzygium paniculatum* is a count of individuals. Given *Syzygium paniculatum* is being assumed, count densities per hectare for this species is currently unknown and as such an estimate of 50 plants per hectares has been applied. To ensure accuracy for assumed impacts to this species, a BOS helpdesk request has been lodged to further refine count densities and final BAM-C calculations will be adjusted prior to any project approval.

10.1.3 Impacts on scattered trees

A total of 25 scattered trees were recorded within the subject land of which 4 occur within the Yengo IBRA subregion and 21 within the Hunter IBRA subregion. Impacts that require an offset for scattered trees in the Yengo IBRA subregion are 2 ecosystem credits as outlined in Table 10.7.

Table 10.7 Impacts that require an offset – scattered tree credits for the Yengo IBRA subregion

Class	Species	Number of trees	Contain hollows	Ecosystem credits required per tree	Credits required
3489 – Hunter Escarpment Grey Box Forest					
2	*Eucalyptus sparsifolia*	4	No (visual assessment)	0.50	2

Impacts that require an offset for scattered trees in the Hunter IBRA subregion are 2 ecosystem credits as outlined in Table 10.8.

Table 10.8 Impacts that require an offset – scattered tree credits for the Hunter IBRA subregion

Class	Species	Number of trees	Contain hollows	Ecosystem credits required per tree	Credits required
3314 – Central Hunter Slopes Grey Box Forest					
1	*Eucalyptus moluccana*	1	No (visual assessment)	0.00	0
3	*Eucalyptus moluccana*	1	Yes (visual assessment)	1.00	1
3431 – Central Hunter Ironbark Grassy Woodland					
3	*Eucalyptus crebra*	6	Yes (estimated)	1.00	6
3	*Eucalyptus moluccana*	6	Yes (estimated)	1.00	6
3	*Eucalyptus tereticornis*	3	Yes (estimated)	1.00	3
4015 – Central Hunter Riparian Forest					
2	*Eucalyptus tereticornis*	1	Yes (visual assessment)	0.75	1
3	*Eucalyptus tereticornis*	1	Yes (estimated)	1.00	1
4089 – Namoi-Upper Hunter River Red Gum Forest					
3	*Eucalyptus tereticornis*	2	Yes (estimated)	1.00	2

10.1.4 Impacts on indirect and prescribed impacts

According to the NSW Biodiversity Assessment Method 2020 (BAM), indirect and prescribed impacts that remain after measures to avoid, minimise and mitigate have been applied, may be offset using additional biodiversity credits (above the credit requirement generated by the Biodiversity Assessment Method Calculator (BAM-C) for direct impacts) and/or other conservation measures.

The approach to determine the additional offset measures is outlined for indirect impacts in section 8.2 and for indirect impacts is described in section 8.3. While detailed explanations are provided previously, essentially the approach is to provide an extra 10% of credits within the appropriate subregions for the species identified as being at higher risk of either line-strike and electrical and magnetic fields (EMF) (indirect impacts) and habitat connectivity impacts (prescribed impacts). The resultant additional biodiversity credit requirements are outlined in Table 10.9 and Table 10.10. It is noted that these are not contained within the BAM calculations as they are calculated as additional credits in addition to those contained within the BAM calculator for this report.

Table 10.9 Proposed additional species credits for impacts to indirectly impacted species

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Callocephalon fimbriatum	Gang-gang Cockatoo	93.23	9.32	40	373
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	69.50	6.95	40	278
Ninox strenua	Powerful Owl	124.83	12.48	40	499
Tyto tenebricosa	Sooty Owl	207.82	20.78	60	1,247
Total proposed additional species credits for indirect impacts					**2,397**

Table 10.10 Proposed additional species credits for impacts to prescribed impact species connectivity

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Cercartetus nanus	Eastern Pygmy-possum	155.55	15.56	33	513
Petauroides volans	Southern Greater Glider	477.12	47.71	40	1,908
Petaurus norfolkensis	Squirrel Glider	647.62	64.76	40	2,590
Phascogale tapoatafa	Brush-tailed Phascogale	90.41	9.04	29	262
Total proposed additional species credits for indirect impacts					**5,273**

10.2 Impacts that do not need further assessment

In accordance with BAM section 9.3(1), areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits.

BAM section 9.3(2) states that areas of land that do not contain native vegetation must still be assessed for threatened species habitat in accordance with Chapter 5 of the BAM and prescribed biodiversity impacts in accordance with Chapter 6 of the BAM. There were no areas of land that do not contain native vegetation that were considered suitable as threatened species habitat.

As outlined in Appendix D of the BAM, if native vegetation (including individuals of a threatened flora species) have been planted for functional, aesthetic, horticultural or plantation forestry purposes (e.g. windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea tree farms)) then only an assessment of planted native vegetation for threatened species habitat is required. The use of Chapters 4 and 5 of the BAM are not required to be applied. As outlined in Appendix D.2 of the BAM, If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply section 8.4 of the BAM to mitigate and manage impacts on these species. Impacts to planted native vegetation must be mitigated but biodiversity credits are not required to offset the proposed impacts on planted native vegetation.

11 Biodiversity credit report

11.1 Overall summary of credits required

The ecosystem credits and species credits required for the project are provided by IBRA subregion. A total of 17,087 ecosystem credits and 209,996 species credits (29,671 flora and 180,325 fauna) are required. Of these credits:

- 5043 ecosystem credits and 86,170 species credits (7574 flora and 78,596 fauna) are from the Wyong IBRA subregion (Table 11.6 and Table 11.10)
- 5515 ecosystem credits and 80,804species credits (12,632 flora and 68,172 fauna) are from the Yengo IBRA subregion (Table 11.7 and Table 11.11)
- 6529 ecosystem credits and 43,022 species credits (9465 flora and 33,557 fauna) are from the Hunter IBRA subregion (Table 11.8 and Table 11.12).

In addition to these credits there are:

- 22 ecosystem credits for impacts to scattered trees (Table 11.13 and Table 11.14)
- 5273 proposed additional species credits for prescribed impacts to habitat connectivity (Table 11.15)
- 2397 proposed additional species credits for indirect impacts due to bird strike and EMF (Table 11.16).

Full details of attributes associated with each ecosystem credit including sensitivity to loss, sensitivity to gain class, biodiversity risk weighting, potential SAII, like for like options, credit trading groups and IBRA regions is provided in Appendix E.

Table 11.1 and Table 11.2 provide a summary of the total biodiversity credits required for the project.

An update to the BAM-C occurred on 4 August and resulted in revisions within the Hunter IBRA subregion for the *Delma impar* (Striped legless lizard) and also resulted in the introduction of the *Delma vescolineata* (Hunter Valley delma). Due to the timing of this BAM-C update, the credit liability changes associated with Delma spp. has not been incorporated into this version of the BDAR. These revisions and changes will be incorporated into the Response to Submission phase for the project.

Table 11.1 Summary of the total ecosystem credits required

Plant Community Type	Area (ha)	Credits required
3029-Lower North Wet Gully Palm Rainforest	4.81	118
3086-Lower North Hinterland Riparian Dry Rainforest	5.96	193
3087-Lower North Ranges Riparian Turpentine Forest	3.13	76
3150-Hunter Coast Ranges Turpentine Wet Forest	36.03	723
3151-Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	1.85	34
3152-Hunter Range Turpentine-Grey Myrtle Gully Forest	0.92	21
3230-Central Coast Escarpment Moist Forest	70.46	1785
3237-Hunter Range Blue Gum Gully Forest	5.46	116
3238-Hunter Range Colluvial Apple-Gum Forest	0.05	1
3239-Hunter Range Sheltered Grey Gum Forest	109.97	2732
3241-Lower North White Mahogany-Spotted Gum Moist Forest	12.30	371

Plant Community Type	Area (ha)	Credits required
3242-Lower North Ranges Turpentine Moist Forest	36.50	836
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	1.62	39
3250-Northern Foothills Blackbutt Grassy Forest	2.02	47
3263-Watagan Range Turpentine-Mahogany Grassy Forest	39.10	987
3314-Central Hunter Slopes Grey Box Forest	77.88	1480
3315-Central Hunter Ironbark-Spotted Gum Forest	26.30	399
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	0.45	7
3431-Central Hunter Ironbark Grassy Woodland	118.86	2286
3438-Hunter Escarpment Footslopes Ironbark Forest	12.19	325
3439-Hunter Escarpment Grey Gum Sheltered Forest	1.62	42
3444-Lower Hunter Spotted Gum-Ironbark Forest	37.87	1139
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	1.37	41
3489-Hunter Escarpment Grey Box Forest	5.67	168
3581-Hunter Coast Foothills Apple Forest	0.67	16
3599-Blue Mountains Peppermint Shrub Forest	7.24	185
3605-Hunter Range Ironbark Forest	57.10	1288
3617-Sydney Hinterland Peppermint-Apple Forest	35.56	947
3621-Sydney Hinterland Turpentine-Apple Gully Forest	4.86	104
3636-Warkworth Sands Woodland	22.08	166
4015-Central Hunter Riparian Forest	9.82	257
4039-Hunter Range Creekflat Apple-Red Gum Forest	0.91	35
4072-Hunter River Oak Mesic Forest	0.21	7
4089-Namoi-Upper Hunter River Red Gum Forest	11.14	116
Total ecosystem credits	**761.98**	**17,087**

Table 11.2 Summary of the total threatened flora species credits required

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Subject land (ha / count)	Credits required
Acacia bynoeana	Bynoe's Wattle	E	V	No	9.77	104
Acacia pendula – endangered population	Acacia pendula population in the Hunter catchment	EP	-	Yes	16.92	774
Angophora inopina	Charmhaven Apple	V	V	No	1.74	51
Asperula asthenes	Trailing Woodruff	V	V	No	2.29	79
Callistemon linearifolius	Netted Bottle Brush	V	-	No	446 (count)	670
Corybas dowlingii	Red Helmet Orchid	E	-	No	11.37	327
Cymbidium canaliculatum – endangered population	Cymbidium canaliculatum population in the Hunter Catchment	EP	-	No	23 (count)	46
Cynanchum elegans	White-flowered Wax Plant	E	E	No	9.75	403
Dillwynia tenuifolia	-	V	-	No	1.46	44
Diuris tricolor	Pine Donkey Orchid	V	-	No	26.56	416
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis population in the Hunter catchment	EP	-	No	3.3	14
Eucalyptus castrensis	Singleton Mallee	E	-	Yes	0.21	16
Eucalyptus fracta	Broken Back Ironbark	E	-	Yes	20.68	1072
Eucalyptus glaucina	Slaty Red Gum	V	V	No	1176 (count)	2212
Eucalyptus pumila	Pokolbin Mallee	V	V	Yes	17.68	937
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	No	5.76	176
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	-	No	3.55	104
Melaleuca biconvexa	Biconvex Paperbark	V	V	No	9.35	280
Melaleuca groveana	Grove's Paperbark	V	-	No	3342 (count)	6684
Olearia cordata	-	V	V	No	4.03	129
Ozothamnus tesselatus	-	V	V	No	7.69	155
Persoonia hirsuta	Hairy Geebung	E	E	Yes	1.46	66
Pomaderris queenslandica	Scant Pomaderris	E	-	No	6.85	182
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	30.99	688
Prasophyllum sp. Wybong	-	-	CE	No	30.99	1032

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Subject land (ha / count)	Credits required
Prostanthera cineolifera	Singleton Mint Bush	V	V	No	57.72	1926
Pterostylis chaetophora	-	V	-	No	30.99	681
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	2.18	67
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	Yes	9.45	446
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	2394 (count)	7182
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	19.99	936
Rutidosis heterogama	Heath Wrinklewort	V	V	No	15.68	221
Senna acclinis	Rainforest Cassia	E	-	No	5.95	177
Syzygium paniculatum	Magenta Lilly Pilly	V	V	No	513 (count)	1026
Tetratheca juncea	Black-eyed Susan	V	V	No	2.85	91
Velleia perfoliata	-	V	V	No	4.02	128
Zieria involucrata	-	E	V	No	4.03	129
Total threatened flora species credits						**29,671**

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

Table 11.3 Summary of the total threatened fauna species credits required

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Area (ha)	Credits required
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	93.77	5313
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	No	93.23	3615
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	69.50	2616
Cercartetus nanus	Eastern Pygmy-possum	V	-	No	155.55	5017
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	Yes	506.36	24386
Delma vescolineata	Hunter Valley Delma	E	E	No	223.04	3340
Heleioporus australiacus	Giant Burrowing Frog	V	E	No	26.75	663
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	No	2.02	63
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	145.71	4716
Lathamus discolor	Swift Parrot	E	CE	Yes	42.76	2369
Litoria littlejohni	Littlejohn's Tree Frog	E	E	No	63.53	2217
Mixophyes balbus	Stuttering Frog	E	V	Yes	180.09	8737
Mixophyes iteratus	Giant Barred Frog	V	V	No	3.81	93
Myotis macropus	Southern Myotis	V	-	No	120.25	2491
Ninox connivens	Barking Owl	V	-	No	36.64	1406
Ninox strenua	Powerful Owl	V	-	No	124.83	4807
Notamacropus parma	Parma Wallaby	V	V	No	304.98	9718
Petauroides volans	Southern Greater Glider	E	E	No	477.12	18222
Petaurus norfolkensis	Squirrel Glider	V	-	No	647.62	23507
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	156.02	7439
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	No	90.41	2235
Phascolarctos cinereus	Koala	E	E	No	284.74	10693
Planigale maculata	Common Planigale	V	-	No	18.21	335
Potorous tridactylus	Long-nosed Potoroo	V	V	No	135.10	4370
Pseudophryne australis	Red-crowned Toadlet	V	-	No	43.54	1073
Tyto novaehollandiae	Masked Owl	V	-	No	42.08	1598
Tyto tenebricosa	Sooty Owl	V	-	Yes	207.82	11797
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	383.77	17489
Total threatened fauna species credits						**180,325**

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the BC Act

(2) M = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endangered under the EPBC Act

11.2 Ecosystem credits

11.2.1 Ecosystem credit requirement for the Wyong IBRA subregion

The ecosystem credit requirements, including offset trading group and hollow bearing tree credit profile, for impact to native vegetation within the Wyong IBRA subregion are summarised in Table 11.4 with the like for like trading options presented in Table 11.5. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.4 Ecosystem credit class and matching credit profile summary for the Wyong IBRA subregion

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3029-Lower North Wet Gully Palm Rainforest	Northern Warm Temperate Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	4.81	118	0	118
3150-Hunter Coast Ranges Turpentine Wet Forest	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	36.03	686	37	723
3230-Central Coast Escarpment Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	55.16	1127	268	1395
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	4.90	100	0	100
3242-Lower North Ranges Turpentine Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	25.93	624	0	624
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	1.31	32	0	32
3250-Northern Foothills Blackbutt Grassy Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	2.02	0	47	47
3263-Watagan Range Turpentine-Mahogany Grassy Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	39.10	987	0	987

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3581-Hunter Coast Foothills Apple Forest	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	0.67	0	16	16
3617-Sydney Hinterland Peppermint-Apple Forest	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	33.65	897	0	897
3621-Sydney Hinterland Turpentine-Apple Gully Forest	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	4.86	0	104	104
Totals		**208.44**	**4571**	**472**	**5043**

Table 11.5 Ecosystem credit like for like trading options for the Wyong IBRA subregion

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3029-Lower North Wet Gully Palm Rainforest	Northern Warm Temperate Rainforests This includes PCT's: 615, 1523, 1529, 1531, 1532, 2101, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 4107	Northern Warm Temperate Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	118	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometres (km) of the outer edge of the impacted site.
3150-Hunter Coast Ranges Turpentine Wet Forest	North Coast Wet Sclerophyll Forests This includes PCT's: 487, 613, 1563, 1575, 3058, 3060, 3067, 3073, 3078, 3084, 3087, 3088, 3102, 3125, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3145, 3147, 3148, 3149, 3150, 3153, 3154, 3156, 3157, 3158, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3168, 3169, 3171, 3172, 3173, 3174, 3176, 3177, 3178, 3180, 4043, 4115	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	686	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	37	
3230-Central Coast Escarpment Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	1127	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	268	
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	100	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3242-Lower North Ranges Turpentine Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	624	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	32	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3250-Northern Foothills Blackbutt Grassy Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	47	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3263-Watagan Range Turpentine-Mahogany Grassy Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	987	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3581-Hunter Coast Foothills Apple Forest	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	16	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3617-Sydney Hinterland Peppermint-Apple Forest	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	897	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3621-Sydney Hinterland Turpentine-Apple Gully Forest	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	No	104	Wyong, Hunter, Pittwater and Yengo or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

11.2.2 Ecosystem credit requirement for the Yengo IBRA subregion

The ecosystem credit requirements, including offset trading group and hollow bearing tree credit profile, for impact to native vegetation within the Yengo IBRA subregion are summarised in Table 11.6 with the like for like trading options presented in Table 11.7. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.6 Ecosystem credit class and matching credit profile summary for the Yengo IBRA subregion

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3086-Lower North Hinterland Riparian Dry Rainforest	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	1.90	0	41	41
3087-Lower North Ranges Riparian Turpentine Forest	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	2.82	64	0	64
3151-Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	1.85	0	34	34
3152-Hunter Range Turpentine-Grey Myrtle Gully Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	0.92	21	0	21
3230-Central Coast Escarpment Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	15.30	0	390	390
3237-Hunter Range Blue Gum Gully Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	5.46	116	0	116
3238-Hunter Range Colluvial Apple-Gum Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	0.05	1	0	1
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	99.26	2363	51	2414
3241-Lower North White Mahogany-Spotted Gum Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	10.21	316	0	316
3242-Lower North Ranges Turpentine Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	10.57	0	212	212

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	0.31	7	0	7
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.45	0	7	7
3438-Hunter Escarpment Footslopes Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	1.97	51	0	51
3439-Hunter Escarpment Grey Gum Sheltered Forest	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	1.62	42	0	42
3444-Lower Hunter Spotted Gum-Ironbark Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	1.21	46	15	61
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland	1.35	0	40	40
3489-Hunter Escarpment Grey Box Forest	Central Gorge Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	5.67	168	0	168
3599-Blue Mountains Peppermint Shrub Forest	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	7.24	185	0	185
3605-Hunter Range Ironbark Forest	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	57.10	1288	0	1288
3617-Sydney Hinterland Peppermint-Apple Forest	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	1.91	0	50	50
4039-Hunter Range Creekflat Apple-Red Gum Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.07	4	0	4
4072-Hunter River Oak Mesic Forest	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	0.07	3	0	3
Totals		**227.31**	**4675**	**840**	**5515**

Table 11.7 Ecosystem credit like for like trading options for the Yengo IBRA subregion

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3086-Lower North Hinterland Riparian Dry Rainforest	Dry Rainforests This includes PCT's: 388, 547, 616, 627, 1124, 1539, 1540, 1543, 2068, 2079, 3010, 3014, 3055, 3056, 3057, 3059, 3061, 3062, 3064, 3065, 3066, 3068, 3070, 3072, 3074, 3075, 3076, 3077, 3079, 3080, 3082, 3083, 3086, 3089, 3091, 3092, 3093, 3095, 3096, 3097, 3098, 3099, 3101, 3103, 3104, 3105, 3106, 3109, 3110, 3111, 3112, 3113, 3114, 3116, 3117, 3118, 3120, 3151, 3469, 4110, 4111, 4112, 4143, 4144	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	No	41	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometres (km) of the outer edge of the impacted site
3087-Lower North Ranges Riparian Turpentine Forest	North Coast Wet Sclerophyll Forests This includes PCT's: 487, 613, 1563, 1575, 3058, 3060, 3067, 3073, 3078, 3084, 3087, 3088, 3102, 3125, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3145, 3147, 3148, 3149, 3150, 3153, 3154, 3156, 3157, 3158, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3168, 3169, 3171, 3172, 3173, 3174, 3176, 3177, 3178, 3180, 4043, 4115	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	64	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3151-Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	Dry Rainforests This includes PCT's: 388, 547, 616, 627, 1124, 1539, 1540, 1543, 2068, 2079, 3010, 3014, 3055, 3056, 3057, 3059, 3061, 3062, 3064, 3065, 3066, 3068, 3070, 3072, 3074, 3075, 3076, 3077, 3079, 3080, 3082, 3083, 3086, 3089, 3091, 3092, 3093, 3095, 3096, 3097, 3098, 3099, 3101, 3103, 3104, 3105, 3106, 3109, 3110, 3111, 3112, 3113, 3114, 3116, 3117, 3118, 3120, 3151, 3469, 4110, 4111, 4112, 4143, 4144	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	No	34	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3152-Hunter Range Turpentine-Grey Myrtle Gully Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	21	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3230-Central Coast Escarpment Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	No	390	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3237-Hunter Range Blue Gum Gully Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	116	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3238-Hunter Range Colluvial Apple-Gum Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	1	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	2363	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
			No	51	
3241- North White Mahogany-Spotted Gum Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	316	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3242-Lower North Ranges Turpentine Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	No	212	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3244-Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	7	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	No	7	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3438-Hunter Escarpment Footslopes Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 1612, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 4157, 4158	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	51	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3439-Hunter Escarpment Grey Gum Sheltered Forest	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 1612, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 4157, 4158	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	42	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3444-Lower Hunter Spotted Gum-Ironbark Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	Yes	46	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
			No	15	

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland This includes PCT's: 1176, 3314, 3315, 3431, 3438, 3446, 3485, 3490, 3497	Central Hunter Valley eucalypt forest and woodland	No	40	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3489-Hunter Escarpment Grey Box Forest	Central Gorge Dry Sclerophyll Forests This includes PCT's: 3081, 3472, 3473, 3474, 3475, 3476, 3477, 3478, 3479, 3480, 3481, 3482, 3483, 3484, 3486, 3487, 3488, 3489, 3490, 3491, 3493, 3494, 3495, 3496, 3497, 3498, 3499, 3509	Central Gorge Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	168	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3599-Blue Mountains Peppermint Shrub Forest	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	185	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3605-Hunter Range Ironbark Forest	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	1288	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
3617-Sydney Hinterland Peppermint-Apple Forest	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	No	50	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site
4039-Hunter Range Creekflat Apple-Red Gum Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Yes	4	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
4072-Hunter River Oak Mesic Forest	Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	No	3	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site

11.2.3 Ecosystem credit requirement for the Hunter IBRA subregion

The ecosystem credit requirements, including offset trading group and hollow bearing tree credit profile, for impact to native vegetation within the Hunter IBRA subregion are summarised in Table 11.8 with the like for like trading options presented in Table 11.9. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.8 Ecosystem credit class and matching credit profile summary for the Hunter IBRA subregion

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3086-Lower North Hinterland Riparian Dry Rainforest	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	4.06	152	0	152
3087-Lower North Ranges Riparian Turpentine Forest	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	0.31	12	0	12
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	5.81	218	0	218
3241-Lower North White Mahogany-Spotted Gum Moist Forest	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	2.09	55	0	55
3314-Central Hunter Slopes Grey Box Forest	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	57.86	0	1480	1480
3314-Central Hunter Slopes Grey Box Forest	Coastal Valley Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	20.02	0	0	0
3315-Central Hunter Ironbark-Spotted Gum Forest	Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	8.86	0	242	242
3315-Central Hunter Ironbark-Spotted Gum Forest	Coastal Valley Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	17.44	0	157	157
3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	83.52	1888	398	2286
3431-Central Hunter Ironbark Grassy Woodland	Hunter-Macleay Dry Sclerophyll Forests - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	35.34	0	0	0

PCT	Offset trading group	Area (ha)	HBT credits	No HBT credits	Credits
3438-Hunter Escarpment Footslopes Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	10.22	274	0	274
3444-Lower Hunter Spotted Gum-Ironbark Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	36.66	0	1078	1078
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland	0.02	1	0	1
3636-Warkworth Sands Woodland	Warkworth Sands Woodland in the Sydney Basin Bioregion	7.51	166	0	166
3636-Warkworth Sands Woodland	Sydney Sand Flats Dry Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	14.57	0	0	0
4015-Central Hunter Riparian Forest	Coastal Floodplain Wetlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	9.82	224	33	257
4039-Hunter Range Creekflat Apple-Red Gum Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.84	31	0	31
4072-Hunter River Oak Mesic Forest	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	0.14	0	4	4
4089-Namoi-Upper Hunter River Red Gum Forest	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	11.14	34	82	116
Totals		**318.72**	**3055**	**3474**	**6529**

Table 11.9 Ecosystem credit like for like trading options for the Hunter IBRA subregion

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3086-Lower North Hinterland Riparian Dry Rainforest	Dry Rainforests This includes PCT's: 388, 547, 616, 627, 1124, 1539, 1540, 1543, 2068, 2079, 3010, 3014, 3055, 3056, 3057, 3059, 3061, 3062, 3064, 3065, 3066, 3068, 3070, 3072, 3074, 3075, 3076, 3077, 3079, 3080, 3082, 3083, 3086, 3089, 3091, 3092, 3093, 3095, 3096, 3097, 3098, 3099, 3101, 3103, 3104, 3105, 3106, 3109, 3110, 3111, 3112, 3113, 3114, 3116, 3117, 3118, 3120, 3151, 3469, 4110, 4111, 4112, 4143, 4144	Dry Rainforests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	152	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometres (km) of the outer edge of the impacted site.
3087-Lower North Ranges Riparian Turpentine Forest	North Coast Wet Sclerophyll Forests This includes PCT's: 487, 613, 1563, 1575, 3058, 3060, 3067, 3073, 3078, 3084, 3087, 3088, 3102, 3125, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3145, 3147, 3148, 3149, 3150, 3153, 3154, 3156, 3157, 3158, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3168, 3169, 3171, 3172, 3173, 3174, 3176, 3177, 3178, 3180, 4043, 4115	North Coast Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	12	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3239-Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	218	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3241-Lower North White Mahogany-Spotted Gum Moist Forest	Northern Hinterland Wet Sclerophyll Forests This includes PCT's: 3063, 3069, 3094, 3115, 3144, 3152, 3155, 3167, 3170, 3179, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3285, 4109	Northern Hinterland Wet Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	55	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3314-Central Hunter Slopes Grey Box Forest	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	No	1145	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	335	
3314-Central Hunter Slopes Grey Box Forest	Coastal Valley Grassy Woodlands This includes PCT's: 618, 1603, 1604, 1691, 3312, 3314, 3315, 3318, 3319, 3320, 3323, 3325, 3327, 3328, 3329, 3330, 3332, 4052	Coastal Valley Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3315-Central Hunter Ironbark-Spotted Gum Forest	Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1604, 3315	Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	No	242	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3315-Central Hunter Ironbark-Spotted Gum Forest	Coastal Valley Grassy Woodlands This includes PCT's: 618, 1603, 1604, 1691, 3312, 3314, 3315, 3318, 3319, 3320, 3323, 3325, 3327, 3328, 3329, 3330, 3332, 4052	Coastal Valley Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	No	157	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Yes	1888	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	290	
			No	108	
3431-Central Hunter Ironbark Grassy Woodland	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 3431, 3442, 3446	Hunter-Macleay Dry Sclerophyll Forests - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3438-Hunter Escarpment Footslopes Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 1612, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 4157, 4158	Hunter-Macleay Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher threat status)	Yes	274	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
3444-Lower Hunter Spotted Gum-Ironbark Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	No	1077	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or
			No	1	Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland This includes PCT's: 1176, 3314, 3315, 3431, 3438, 3446, 3485, 3490, 3497	Central Hunter Valley eucalypt forest and woodland	Yes	1	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3636-Warkworth Sands Woodland	Warkworth Sands Woodland in the Sydney Basin Bioregion This includes PCT's: 3636	Warkworth Sands Woodland in the Sydney Basin Bioregion	Yes	166	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
3636-Warkworth Sands Woodland	Sydney Sand Flats Dry Sclerophyll Forests This includes PCT's: 3628, 3629, 3630, 3631, 3634, 3636, 4122, 4162	Sydney Sand Flats Dry Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Ecosystem credit (PCT)	Like for like option for vegetation class and PCT	Trading group	HBT	Credits	IBRA region
4015-Central Hunter Riparian Forest	Coastal Floodplain Wetlands This includes PCT's: 4015, 4023, 4024, 4025, 4026, 4027, 4029, 4034, 4035, 4036, 4037, 4041, 4042, 4044, 4046, 4049, 4050, 4051, 4055, 4059	Coastal Floodplain Wetlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status)	Yes	224	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	33	
4039-Hunter Range Creekflat Apple-Red Gum Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 3145, 3181, 3185, 3188, 3192, 3258, 3328, 4024, 4025, 4039, 4041, 4058, 4138	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Yes	31	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
4072-Hunter River Oak Mesic Forest	Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status)	No	4	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
4089-Namoi-Upper Hunter River Red Gum Forest	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions This includes PCT's: 42, 1698, 4089	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	Yes	34	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
			No	82	

11.3 Species credits

11.3.1 Species credit requirement for the Wyong IBRA subregion

The species credit requirements, for impact to native vegetation within the Wyong IBRA subregion are summarised in Table 11.10. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.10 Species credit classes and summary for the Wyong IBRA subregion

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Angophora inopina / Charmhaven Apple	3250_Mod-good	0.9	28	Any in NSW
Anthochaera phrygia / Regent Honeyeater	3263_Mod-good	0.5	26	Any in NSW
Asperula asthenes / Trailing Woodruff	3242_Mod-good, 3250_Mod-good	2	63	Any in NSW
Callistemon linearifolius / Netted Bottle Brush	3230_Mod-good, 3230_Plantation	205	308	Any in NSW
Callocephalon fimbriatum / Gang-gang Cockatoo	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3029_Mod-good, 3244_Mod-good	45	1813	Any in NSW
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3029_Mod-good	16.2	657	Any in NSW
Cercartetus nanus / Eastern Pygmy-possum	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	155.6	5017	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3581_Mod-good, 3244_Mod-good	203.6	9644	Any in NSW
Corybas dowlingii / Red Helmet Orchid	3150_Mod-good, 3150_Plantation, 3250_Mod-good, 3244_Mod-good	9.3	253	Any in NSW
Cynanchum elegans / White-flowered Wax Plant	3250_Mod-good, 3029_Mod-good	1.8	58	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Grammitis stenophylla / Narrow-leaf Finger Fern	3150_Mod-good, 3242_Mod-good, 3150_Plantation, 3029_Mod-good	3.2	93	Any in NSW
Heleioporus australiacus / Giant Burrowing Frog	3150_Mod-good, 3230_Mod-good, 3617_Mod-good, 3621_Mod-good	26.8	663	Any in NSW
Hoplocephalus bitorquatus / Pale-headed Snake	3250_Mod-good	2	63	Any in NSW
Hoplocephalus stephensii / Stephens' Banded Snake	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	145.7	4716	Any in NSW
Litoria littlejohni / Littlejohn's Tree Frog	3150_Mod-good, 3230_Mod-good, 3617_Mod-good, 3621_Mod-good, 3230_Plantation	63.5	2217	Any in NSW
Melaleuca biconvexa / Biconvex Paperbark	3150_Mod-good, 3242_Mod-good, 3250_Mod-good, 3029_Mod-good	9.4	280	Any in NSW
Mixophyes balbus / Stuttering Frog	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	180.1	8737	Any in NSW
Mixophyes iteratus / Giant Barred Frog	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3029_Mod-good	3.8	93	Any in NSW
Ninox connivens / Barking Owl	3150_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good	15.6	611	Any in NSW
Ninox strenua / Powerful Owl	3150_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good	29.9	1169	Any in NSW
Notamacropus parma / Parma Wallaby	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	208.4	6727	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Petauroides volans / Southern Greater Glider	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	208.4	8089	Any in NSW
Petaurus norfolcensis / Squirrel Glider	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	208.4	8089	Any in NSW
Petrogale penicillata / Brush-tailed Rock-wallaby	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3250_Mod-good, 3029_Mod-good, 3581_Mod-good, 3244_Mod-good	70.9	3427	Any in NSW
Phascolarctos cinereus / Koala	3150_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3029_Mod-good	52.9	2078	Any in NSW
Potorous tridactylus / Long-nosed Potoroo	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3617_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3581_Mod-good, 3244_Mod-good	135.1	4370	Any in NSW
Pseudophryne australis / Red-crowned Toadlet	3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3617_Mod-good, 3621_Mod-good, 3230_Plantation, 3029_Mod-good	29.7	754	Any in NSW
Rhizanthella slateri / Eastern Australian Underground Orchid	3150_Mod-good, 3230_Mod-good, 3242_Mod-good, 3263_Mod-good, 3150_Plantation, 3230_Plantation, 3250_Mod-good, 3029_Mod-good	7.7	363	Any in NSW
Rhodamnia rubescens / Scrub Turpentine	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3150_Plantation, 3230_Plantation, 3029_Mod-good	1354	4062	Any in NSW
Rhodomyrtus psidioides / Native Guava	3150_Mod-good, 3242_Mod-good, 3263_Mod-good, 3150_Plantation, 3029_Mod-good	18.5	834	Any in NSW
Rutidosis heterogama / Heath Wrinklewort	3250_Mod-good	0.9	28	Any in NSW
Senna acclinis / Rainforest Cassia	3150_Mod-good, 3242_Mod-good, 3150_Plantation, 3029_Mod-good	6	177	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Syzygium paniculatum / Magenta Lilly Pilly	3029_Mod-good, 3150_Mod-good, 3242_Mod-good, 3150_Plantation	468	936	Any in NSW
Tetratheca juncea / Black-eyed Susan	3242_Mod-good, 3250_Mod-good	2.9	91	Any in NSW
Tyto novaehollandiae / Masked Owl	3150_Mod-good, 3230_Mod-good, 3263_Mod-good	4.8	182	Any in NSW
Tyto tenebricosa / Sooty Owl	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3263_Mod-good, 3029_Mod-good, 3244_Mod-good	75.4	4440	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	3150_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3617_Mod-good, 3621_Mod-good, 3150_Plantation, 3581_Mod-good, 3244_Mod-good	109.8	5014	Any in NSW

(1) Area (ha) rounding as per BAM-C case 00048775/BAAS17046/24/00048776 output

11.3.2 Species credit requirement for the Yengo IBRA subregion

The species credit requirements, for impact to native vegetation within the Yengo IBRA subregion are summarised in Table 11.11. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.11 Species credit classes and summary for the Yengo IBRA subregion

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Anthochaera phrygia / Regent Honeyeater	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3239_Mod-good, 3489_Mod-good, 3605_Mod-good, 3444_Mod-good, 3241_Mod-good, 3328_Mod-good, 3151_Mod-good, 3238_Mod-good, 3086_Mod-good	42.6	2363	Any in NSW
Callocephalon fimbriatum / Gang-gang Cockatoo	3087_Mod-good, 3152_Mod-good, 3239_Mod-good, 3242_Mod-good, 3439_Mod-good, 3489_Mod-good, 3605_Mod-good, 3238_Mod-good, 3151_Mod-good, 3086_Mod-good	41.1	1500	Any in NSW
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	3152_Mod-good, 3237_Mod-good, 3239_Mod-good, 3489_Mod-good, 3605_Mod-good, 3238_Mod-good, 3151_Mod-good, 3086_Mod-good	46.4	1666	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3489_Mod-good, 3599_Mod-good, 3605_Mod-good, 3617_Mod-good, 3238_Mod-good, 3328_Mod-good, 3444_Mod-good, 3446_Mod-good, 3151_Mod-good, 3241_Mod-good, 3239_Plantation, 3444_Derived, 3086_Mod-good	224.4	10,808	Any in NSW
Cynanchum elegans / White-flowered Wax Plant	3087_Mod-good, 3152_Mod-good, 3239_Mod-good, 3489_Mod-good	4.6	176	Any in NSW
Dillwynia tenuifolia / Dillwynia tenuifolia	3605_Mod-good	1.5	44	Any in NSW
Eucalyptus fracta / Broken Back Ironbark	3489_Mod-good, 3605_Mod-good	20.7	1072	Any in NSW
Eucalyptus glaucina / Slaty Red Gum	3152_Mod-good, 3239_Mod-good, 3605_Mod-good	288	576	Any in NSW
Eucalyptus pumila / Pokolbin Mallee	3152_Mod-good, 3239_Mod-good, 3605_Mod-good	5.8	314	Any in NSW
Grammitis stenophylla / Narrow-leaf Finger Fern	3239_Mod-good	2.6	83	Any in NSW
Lathamus discolor / Swift Parrot	3239_Mod-good, 3489_Mod-good, 3605_Mod-good, 3444_Mod-good	1.7	104	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Melaleuca groveana / Grove's Paperbark	3087_Mod-good, 3239_Mod-good, 3605_Mod-good	2923	5846	Any in NSW
Myotis macropus / Southern Myotis	3239_Mod-good, 3605_Mod-good, 3238_Mod-good, 3328_Mod-good, 3444_Mod-good, 3151_Mod-good, 3444_Derived	2.6	85	Any in NSW
Ninox connivens / Barking Owl	3239_Mod-good, 3605_Mod-good	7.3	252	Any in NSW
Ninox strenua / Powerful Owl	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3605_Mod-good, 3444_Mod-good, 3446_Mod-good	68.8	2579	Any in NSW
Notamacropus parma / Parma Wallaby	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3239_Mod-good, 3242_Mod-good, 3605_Mod-good, 3617_Mod-good, 3151_Mod-good, 3086_Mod-good	96.5	2991	Any in NSW
Olearia cordata / Olearia cordata	3152_Mod-good, 3239_Mod-good, 3605_Mod-good, 3151_Mod-good	4.1	129	Any in NSW
Persoonia hirsuta / Hairy Geebung	3605_Mod-good	1.5	66	Any in NSW
Petauroides volans / Southern Greater Glider	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3489_Mod-good, 3599_Mod-good, 3605_Mod-good, 3617_Mod-good, 3238_Mod-good, 3328_Mod-good, 3444_Mod-good, 3446_Mod-good, 3151_Mod-good, 3241_Mod-good, 4039_Mod-good, 4072_Mod-good, 3239_Plantation, 3086_Mod-good	227	8321	Any in NSW
Petaurus norfolcensis / Squirrel Glider	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3599_Mod-good, 3605_Mod-good, 3617_Mod-good, 3328_Mod-good, 3444_Mod-good, 3446_Mod-good, 3151_Mod-good, 3241_Mod-good, 4039_Mod-good, 4072_Mod-good, 3239_Plantation, 3086_Mod-good	221.3	8118	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Petrogale penicillata / Brush-tailed Rock-wallaby	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3605_Mod-good, 3444_Mod-good, 3446_Mod-good, 3241_Mod-good	72.5	3507	Any in NSW
Phascolarctos cinereus / Koala	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3489_Mod-good, 3599_Mod-good, 3605_Mod-good, 3617_Mod-good, 3238_Mod-good, 3446_Mod-good, 3151_Mod-good, 3241_Mod-good, 3239_Plantation	223.6	8233	Any in NSW
Prostanthera cineolifera / Singleton Mint Bush	3237_Mod-good, 3239_Mod-good, 3605_Mod-good	39.5	1247	Any in NSW
Pseudophryne australis / Red-crowned Toadlet	3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3605_Mod-good, 3239_Plantation	13.9	319	Any in NSW
Rhizanthella slateri / Eastern Australian Underground Orchid	3087_Mod-good, 3237_Mod-good, 3599_Mod-good	1.8	83	Any in NSW
Rhodamnia rubescens / Scrub Turpentine	3087_Mod-good, 3152_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3605_Mod-good, 3151_Mod-good, 3241_Mod-good, 3086_Mod-good	852	2556	Any in NSW
Rhodomyrtus psidioides / Native Guava	3087_Mod-good, 3152_Mod-good, 3151_Mod-good	1.2	79	Any in NSW
Rutidosis heterogama / Heath Wrinklewort	3605_Mod-good	1.5	44	Any in NSW
Syzygium paniculatum / Magenta Lilly Pilly	3087_Mod-good	30	60	Any in NSW
Tyto novaehollandiae / Masked Owl	3152_Mod-good, 3237_Mod-good, 3239_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3605_Mod-good	25	929	Any in NSW
Tyto tenebricosa / Sooty Owl	3087_Mod-good, 3230_Mod-good, 3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3605_Mod-good, 3617_Mod-good	126.9	6950	Any in NSW
Velleia perfoliata / Velleia perfoliata	3152_Mod-good, 3239_Mod-good, 3605_Mod-good	4	128	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Vespadelus troughtoni / Eastern Cave Bat	3237_Mod-good, 3239_Mod-good, 3242_Mod-good, 3244_Mod-good, 3438_Mod-good, 3439_Mod-good, 3599_Mod-good, 3605_Mod-good, 3617_Mod-good, 3444_Mod-good, 3241_Mod-good, 4039_Mod-good, 3239_Plantation, 3444_Derived	198.3	9447	Any in NSW
Zieria involucrata / Zieria involucrata	3152_Mod-good, 3239_Mod-good, 3605_Mod-good, 3151_Mod-good	4	129	Any in NSW

(1) Area (ha) rounding as per BAM-C case 00048830/BAAS17046/24/00048832 output

11.3.3 Species credit requirement for the Hunter IBRA subregion

The species credit requirements, for impact to native vegetation within the Hunter IBRA subregion are summarised in Table 11.12. The full BAM calculator credit report is provided in Appendix E (BAM-C credit reports).

Table 11.12 Species credit classes and summary for the Hunter IBRA subregion

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Acacia bynoeana / Bynoe's Wattle	3315_Thinned, 3315_Derived	9.8	104	Any in NSW
Acacia pendula - endangered population / Acacia pendula population in the Hunter catchment	3314_Thinned, 3314_Poor, 3315_Thinned, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3431_Poor	16.9	774	Any in NSW
Angophora inopina / Charmhaven Apple	3315_Thinned	0.8	23	Any in NSW
Anthochaera phrygia / Regent Honeyeater	3444_Mod-good, 4039_Mod-good, 3431_Disturbed_Grassland, 3239_Mod-good, 3444_Derived, 3315_Thinned, 3431_Thinned, 3241_Mod-good, 3314_Thinned, 3086_Mod-good, 3087_Mod-good	50.7	2924	Any in NSW
Asperula asthenes / Trailing Woodruff	3087_Mod-good	0.3	16	Any in NSW
Callistemon linearifolius / Netted Bottle Brush	3315_Thinned, 3444_Mod-good	241	362	Any in NSW
Callocephalon fimbriatum / Gang-gang Cockatoo	3315_Thinned, 3438_Mod-good, 3444_Mod-good, 4039_Mod-good, 3239_Mod-good	7.1	302	Any in NSW
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	3444_Mod-good, 4039_Mod-good, 3239_Mod-good	6.9	293	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	3314_Thinned, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3444_Mod-good, 3431_Disturbed_Grassland, 3446_Mod-good, 3086_Mod-good, 3239_Mod-good, 3241_Mod-good, 3444_Derived	78.25	3934	Any in NSW
Corybas dowlingii / Red Helmet Orchid	3241_Mod-good	2.1	74	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Cymbidium canaliculatum - endangered population / *Cymbidium canaliculatum* population in the Hunter Catchment	3314_Thinned, 3314_Poor, 3315_Thinned, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3431_Poor, 3636_Thinned	23	46	Any in NSW
Cynanchum elegans / White-flowered Wax Plant	3239_Mod-good	3.4	169	Any in NSW
Delma impar / Striped Legless Lizard	3314_Thinned, 3314_Poor, 3314_Disturbed_Grassland, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3431_Poor, 3431_Disturbed_Grassland	223	3340	Any in NSW
Diuris tricolor / Pine Donkey Orchid	3314_Thinned, 3314_Poor, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3431_Poor	26.6	416	Any in NSW
Eucalyptus camaldulensis - endangered population / *Eucalyptus camaldulensis* population in the Hunter catchment	4089_Poor	3.3	14	Any in NSW
Eucalyptus castrensis / Singleton Mallee	3438_Mod-good	0.2	16	Any in NSW
Eucalyptus glaucina / Slaty Red Gum	3314_Thinned, 3314_Poor, 3315_Thinned, 3431_Thinned, 3431_Poor, 3239_Mod-good	888	1636	Any in NSW
Eucalyptus pumila / Pokolbin Mallee	3314_Thinned, 3314_Poor, 3315_Thinned, 3444_Mod-good, 3239_Mod-good	11.9	623	Any in NSW
Grevillea parviflora subsp. parviflora / Small-flower Grevillea	3444_Mod-good	3.6	104	Any in NSW
Lathamus discolor / Swift Parrot	3444_Mod-good, 3431_Disturbed_Grassland, 3444_Derived, 3315_Thinned, 3431_Thinned, 3314_Thinned	41.1	2265	Any in NSW
Melaleuca groveana / Grove's Paperbark	3239_Mod-good	419	838	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Myotis macropus / Southern Myotis	3314_Thinned, 3314_Poor, 3314_Disturbed_Grassland, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3431_Poor, 3444_Mod-good, 3636_Thinned, 3636_Disturbed_Grassland, 4015_Thinned, 4015_Derived, 3431_Disturbed_Grassland, 4039_Mod-good, 4072_Mod-good, 4089_Poor, 3086_Mod-good, 3239_Mod-good, 3241_Mod-good, 3444_Derived, 4089_Derived	117.7	2406	Any in NSW
Ninox connivens / Barking Owl	3431_Thinned, 3431_Poor, 3444_Mod-good, 4015_Thinned, 3087_Mod-good, 3239_Mod-good	13.8	543	Any in NSW
Ninox strenua / Powerful Owl	3315_Thinned, 3431_Thinned, 3438_Mod-good, 3431_Poor, 3444_Mod-good, 4015_Thinned, 4039_Mod-good, 4072_Mod-good, 3446_Mod-good, 3239_Mod-good, 3087_Mod-good	26.1	1059	Any in NSW
Ozothamnus tesselatus / Ozothamnus tesselatus	3315_Thinned, 3431_Thinned, 3431_Plantation, 3431_Poor	7.7	155	Any in NSW
Petauroides volans / Southern Greater Glider	3315_Thinned, 3431_Thinned, 3438_Mod-good, 3444_Mod-good, 4039_Mod-good, 4072_Mod-good, 3446_Mod-good, 3239_Mod-good, 3241_Mod-good, 3086_Mod-good, 3087_Mod-good	41.7	1812	Any in NSW
Petaurus norfolcensis / Squirrel Glider	3314_Poor, 3431_Plantation, 3438_Mod-good, 3431_Poor, 3444_Mod-good, 4039_Mod-good, 3239_Mod-good, 3315_Thinned, 3431_Thinned, 3241_Mod-good, 3314_Thinned, 3086_Mod-good, 3087_Mod-good	217.9	7300	Any in NSW
Petrogale penicillata / Brush-tailed Rock-wallaby	3315_Thinned, 3315_Derived, 3438_Mod-good, 3444_Mod-good, 4039_Mod-good, 3446_Mod-good, 3241_Mod-good	12.6	505	Any in NSW
Phascogale tapoatafa / Brush-tailed Phascogale	3314_Poor, 3431_Plantation, 3438_Mod-good, 3431_Poor, 4089_Poor, 3431_Thinned, 3636_Thinned, 4015_Thinned, 3314_Thinned	90.4	2235	Any in NSW
Phascolarctos cinereus / Koala	3446_Mod-good, 3239_Mod-good, 3241_Mod-good, 3087_Mod-good	8.2	382	Any in NSW
Planigale maculata / Common Planigale	3314_Poor, 3314_Disturbed_Grassland, 3315_Thinned, 3315_Derived, 3438_Mod-good, 3431_Disturbed_Grassland	18.2	335	Any in NSW
Pomaderris queenslandica / Scant Pomaderris	3431_Thinned, 3431_Plantation, 3431_Poor	6.9	182	Any in NSW

Species credit	Vegetation Zone/s names	Area (ha) / Count[1]	Credits	IBRA region
Prasophyllum petilum / Tarengo Leek Orchid	3314_Thinned, 3314_Poor, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3431_Poor, 3444_Mod-good	31	688	Any in NSW
Prasophyllum sp. Wybong / Prasophyllum sp. Wybong	3314_Thinned, 3314_Poor, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3431_Poor, 3444_Mod-good	31	1032	Any in NSW
Prostanthera cineolifera / Singleton Mint Bush	3315_Thinned, 3438_Mod-good, 3444_Mod-good, 3239_Mod-good	18.3	679	Any in NSW
Pterostylis chaetophora / Pterostylis chaetophora	3314_Thinned, 3314_Poor, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3444_Mod-good	31	681	Any in NSW
Pterostylis gibbosa / Illawarra Greenhood	3431_Thinned, 3438_Mod-good	2.2	67	Any in NSW
Rhodamnia rubescens / Scrub Turpentine	3239_Mod-good, 3241_Mod-good, 3087_Mod-good	188	564	Any in NSW
Rhodomyrtus psidioides / Native Guava	3087_Mod-good	0.3	23	Any in NSW
Rutidosis heterogama / Heath Wrinklewort	3315_Thinned, 3315_Derived, 3444_Mod-good	13.3	149	Any in NSW
Syzygium paniculatum / Magenta Lilly Pilly	3087_Mod-good	15	30	
Tyto novaehollandiae / Masked Owl	3431_Thinned, 3431_Poor, 3444_Mod-good, 3239_Mod-good	12.4	487	Any in NSW
Tyto tenebricosa / Sooty Owl	3239_Mod-good, 3087_Mod-good	5.4	407	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	3314_Thinned, 3315_Thinned, 3315_Derived, 3431_Thinned, 3431_Plantation, 3438_Mod-good, 3444_Mod-good, 4015_Thinned, 3431_Disturbed_Grassland, 4039_Mod-good, 3446_Mod-good, 3239_Mod-good, 3241_Mod-good, 3444_Derived	75.7	3028	Any in NSW

(1) Area (ha) rounding as per BAM-C case 00048860/BAAS17046/24/00048861 output

11.4 Scattered tree credits

This section provides a summary of the ecosystem credits required for scattered trees.

Full details of attributes associated with each ecosystem credit including sensitivity to loss, sensitivity to gain class, biodiversity risk weighting, potential SAII, like for like options, credit trading groups and IBRA regions is provided in Appendix E (BAM-C credit reports).

A total of 22 ecosystem credits are required to offset the impact to 25 scattered trees with 20 requiring hollow bearing tree credit offsets and 2 credits with no hollow bearing trees. A summary of ecosystem credit offset obligation for the Yengo and hunter IBRA subregions are presented in Table 11.13 and Table 11.14.

Table 11.13 Ecosystem credit summary for impacts to scattered trees in the Yengo IBRA subregion

PCT	TEC	HBT Cr	No HBT Cr	Credits
3489-Hunter Escarpment Grey Box Forest	Not a TEC	0	2	2
Total ecosystem credits		**0**	**2**	**2**

Table 11.14 Ecosystem credit summary for impacts to scattered trees in the Hunter IBRA subregion

PCT	TEC	HBT Cr	No HBT Cr	Credits
3314-Central Hunter Slopes Grey Box Forest	Not a TEC	1	0	1
3431-Central Hunter Ironbark Grassy Woodland	Not a TEC	15	0	15
4015-Central Hunter Riparian Forest	Not a TEC	2	0	2
4089-Namoi-Upper Hunter River Red Gum Forest	Not a TEC	2	0	2
Total ecosystem credits		**20**	**0**	**20**

11.5 Additional credit obligation for prescribed impacts to habitat connectivity

The proposed additional credit obligation for impacts to habitat connectivity are provided in Table 11.15. Additional credits are to be provided for areas at which species have been recorded via targeted surveys and where presence has been assumed.

Table 11.15 Proposed additional species credits for impacts to prescribed impact species connectivity

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Cercartetus nanus	Eastern Pygmy-possum	155.55	15.56	33	513
Petauroides volans	Southern Greater Glider	477.12	47.71	40	1,908
Petaurus norfolkensis	Squirrel Glider	647.62	64.76	40	2,590
Phascogale tapoatafa	Brush-tailed Phascogale	90.41	9.04	29	262
Total proposed additional species credits for indirect impacts					**5,273**

11.6 Additional credit obligation for indirect impacts due to bird strike and EMF

The proposed additional credit obligation for impacts to threatened bird species through indirect impacts due to line strike and EMF are provided in Table 11.16. An additional 2,397 ecosystem credits are proposed to be provided to account for indirect impacts to threatened bird species through indirect impacts due to line strike and EMF.

Table 11.16 Summary of indirect impacts on threatened fauna species for combined subregions

Scientific name	Common name	Total impact to habitat (ha)	10% habitat impact (ha)	Credits per ha based on project BAM-C calculations	Proposed additional species credits
Callocephalon fimbriatum	Gang-gang Cockatoo	93.23	9.32	40	373
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	69.50	6.95	40	278
Ninox strenua	Powerful Owl	124.83	12.48	40	499
Tyto tenebricosa	Sooty Owl	207.82	20.78	60	1,247
Total proposed additional species credits for indirect impacts					**2,397**

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