EnergyCo

September 2023

Central-West Orana Renewable Energy Zone Transmission project

Technical paper 4 – Biodiversity Development Assessment Report

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Central-West Orana Renewable Energy Zone Transmission project
Technical paper 4 – 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 NSW Government is leading the development of Renewable Energy Zones (REZ) across NSW to deliver renewable energy generation and storage, supported by high voltage transmission infrastructure. Energy Corporation of NSW (EnergyCo) is proposing the construction and operation of new electricity transmission infrastructure and new energy hubs and switching stations required to connect new renewable energy generation and storage projects within the Central-West Orana REZ to the existing electricity network (the project).

The project would enable at 4.5 gigawatts of new network capacity to be unlocked by the mid-2020s and enable renewable energy generators within the Central-West Orana REZ who are successful in their bids to access the new transmission infrastructure to export electricity to the rest of the network. Importantly, the development of renewable energy generation projects in the Central-West Orana REZ is the sole responsibility of private generators and subject to separate planning and environmental approvals.

The project requires approval from the NSW Minister for Planning under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). The project has been declared as Critical State significant infrastructure under Section 5.13 of the EP&A Act.

Location

The project is located in central-west NSW within the Warrumbungle, Mid-Western Regional, Dubbo and Upper Hunter Local Government Areas. It extends north to south from Coolah to Wollar and east to west from Cassilis to Goolma. The location of the project is shown in Figure 14-1 Site Map and Figure 14-2 Location Map, respectively.

Key components

The key components of the project include:

- a new 500 kV switching station (the New Wollar Switching Station), located at Wollar to connect the project to the existing 500 kV transmission network
- around 90 kilometres of twin double circuit 500 kV transmission lines and associated infrastructure to connect two energy hubs to the existing NSW transmission network via the New Wollar Switching Station
- energy hubs at Merotherie and Elong Elong (including potential battery storage at the Merotherie Energy Hub) to connect renewable energy generation projects within the Central-West Orana REZ to the 500 kV network infrastructure
- around 150 kilometres of single circuit, double circuit and twin double circuit 330 kV transmission lines, supported on towers, to connect renewable energy generation projects within the Central-West Orana REZ to the two energy hubs
- thirteen switching stations along the 330 kV network infrastructure at Cassilis, Coolah, Leadville, Merotherie, Tallawang, Dunedoo, Cobbora and Goolma, to transfer the energy generated from the renewable energy generation projects within the Central-West Orana REZ onto the project's 330 kV network infrastructure
- underground fibre optic communication cables along the 330 kV transmission lines between the energy hubs and switching stations
- a maintenance facility within the Merotherie Energy Hub to support the operational requirements of the project

- microwave repeater sites at locations along the alignment, as well as outside of the alignment at Botobolar, to provide a communications link between the project and the existing electricity transmission and distribution network. The Botobolar site would be subject to assessment at the submissions report stage
- establishment of new, and upgrade of existing access tracks for transmission lines, energy hubs, switching stations and other ancillary works areas within the construction area (such as temporary waterway crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake/winch sites, site offices and workforce accommodation camps)
- property adjustment works to facilitate access to the transmission lines and switching stations. These works include the relocation of existing infrastructure on properties that are impacted by the project
- utility adjustments required for the construction of the transmission network infrastructure, along with other adjustments to existing communications, water and wastewater utilities. This includes adjustments to Transgrid's 500 kV transmission lines 5A3 (Bayswater to Mount Piper) and 5A5 (Wollar to Mount Piper) to provide a connection to the existing NSW transmission network, including new transmission line towers along the Transgrid network along the frontage of the New Wollar Switching Station, and other locations where there is an interface with Transgrid’s network.

Construction staging

The project would be developed in stages as various renewable energy projects are brought on line as follows:

- CFG connection to Spicers Creek wind farm stage: Stretching from the proposed Elong Elong Energy Hub to Spicers Creek Wind Farm.
- CFG connection to Tallawang stage: Stretching from a 330 kV switching station on the RNI1 stage to a 330 kV switching station at Tallawang.
- RNI1 stage: Stretching from the proposed Elong Elong Energy Hub at Cobbora to the proposed Merotherie Energy Hub at Merotherie, then southeast to the new switching station at Wollar, and east to the start of the Valley of the Winds stage and the Liverpool Range stage at Bungaba.
- Stubbo stage: Stretching from the RNI1 stage at Merotherie to 330 kV switching station at Stubbo.
- Valley of the Winds stage: Stretching from the RNI1 stage at Bungaba north along two arms, a western arm to a 330 kV switching station Leadville and an eastern arm to a 330 kV switching station at Coolah.
- Liverpool Range stage: Stretching from the RNI1 stage at Bungaba through Turill to a 330 kV switching station at Cassilis. Includes an accommodation camp (Neeleys Lane satellite camp).

The stages are illustrated in Figure 14-5.

Disturbance area

The disturbance area is the area that would be directly impacted by construction and operation of the project. The construction area is the area that would be used for the construction of the project (a 220 metre wide corridor). The parts of the construction area that would be disturbed through vegetation clearing during construction of the project are referred to as the disturbance area. The disturbance area is identified based on realistic project component locations and areas however it is indicative at this stage. The area would be confirmed during finalisation of design and construction methodology and would be developed as part of the consideration of avoidance and impact minimisation.

Disturbance area has the same meaning as ‘Development site’ as defined in the BAM.

The disturbance area would have varying degrees of physical disturbance along the transmission line alignment to reflect construction and operational requirements, and these have been applied to the biodiversity assessment. For the purpose of this BDAR, disturbance area has been divided into the following areas consisting of:

- **Disturbance area A** – assumed for complete removal of vegetation. This includes the disturbance area A category as outlined below.
- **Disturbance area B** – assumed to have no ground disturbance except in circumstances associated with the operational requirements for vegetation maintenance to meet the vegetation clearance heights. The assumed partial vegetation clearing is restricted to clearance of vegetation with growth height potential of 2 metres or above.
- **Disturbance area HZ** – a hazard tree zone where there would be impacts to selected trees that are within the risk category height range 20–30 m and have poor structural stability posing a risk of falling.

The width of the disturbance areas A, B and HZ areas for transmission line components vary for the 330 kV and 500 kV transmission lines based on their vegetation clearing requirements and construction methodologies. Figure 1-1 and Figure 1-2 identify the allocation of each area for each line type.

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).

The location of the subject land is shown in Figure 14-5. The subject land contains all areas impacted by construction and operation. Specifically, the subject land incorporates Disturbance areas A and B.

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 the Department of Planning and Environment and the environment agency head determine that the project is not likely to have a significant impact.

In this case, the BOS applies to the project.

Measures to avoid and minimise

Background

The project has undergone a process of developing and evaluating alternative transmission corridors from feasibility to early design development. Chapter 2 of the EIS discusses this process in detail.

In 2020, the NSW Government engaged Transgrid, as NSW's jurisdictional transmission planner at the time, to carry out early development work to guide the planning of new transmission infrastructure for the Central-West Orana REZ. In December 2020, Transgrid released a preliminary study corridor for the project that ran northwest from the existing network near Merriwa, passing south of Dunedoo before connecting to the existing network east of Wellington. The preliminary study corridor developed by Transgrid included an option to extend the new HV transmission infrastructure for the Central-West Orana REZ south of Wellington towards Lake Burrendong, including an upgrade of the existing substation at Wollar.

In November 2021, the Central-West Orana REZ was formally declared by the Minister for Energy and Environment and EnergyCo was appointed as the Infrastructure Planner to lead the delivery of REZs in NSW. At this time, EnergyCo assumed responsibility for planning and design of the transmission corridor and engaging local communities and stakeholders to inform the development of new transmission network infrastructure within the REZ.

Approach to study corridor development

Since EnergyCo's appointment as the Infrastructure Planner, the project development process included the following steps:

- reaffirming the project need
- developing the project objectives that meet the need
- identifying a revised study corridor based on technical, community and environmental constraints,

Iterative refinement of the study corridor to identify a preferred alignment based on preferred energy hub locations, proximity to renewable energy generators, landowner feedback and technical and environmental constraints.

EnergyCo's revised study corridor

The revised study corridor that was released in February 2022 was based on the most appropriate location for a connection to the NSW transmission system (as part of the NEM), indicative locations for energy hubs and proximity to proposed renewable energy generation projects.

When considering the most suitable connection points to the NSW transmission system EnergyCo determined that a connection point at Wollar was preferred as it provided a better connection to the existing 500 kV network.

The location and configuration of the revised study corridor was also developed in response to community and environmental constraints. In particular, in response to community feedback received by Transgrid the study corridor was realigned to minimise impacts on Biophysical Strategic Agricultural Land (BSAL) within the Merriwa Cassilis plateau, by relocating it in areas of existing disturbed land to the west of the Goulburn River National Park. Disturbed land in this area includes areas subject to mining activities and existing transmission line easements.

Importantly this section of the study corridor was intentionally narrow the due to the presence of Tier 1 constraints including Goulburn River National Park, Munghorn Gap Nature reserve, mapped Important Regent Honeyeater habitat, and highly sensitive Aboriginal cultural heritage sites. By locating the study corridor in disturbed mining areas and with existing transmission lines, this section of study corridor was able to avoid or minimise impacting these important constraints.

In addition, the revised study corridor more generally incorporated large areas of cleared land, to enable development of a transmission line alignment that avoided or minimised high-quality ecological values while further minimising impacts to private property.

The constraints that were used to develop the revised study corridor were categorised into three tiers as follows:

- Tier 1: Areas generally considered no-go zones, where locating transmission lines, substations and switching stations would result in a low likelihood of obtaining access, combined with the potential impacts to the environment, community and stakeholders at these locations, presenting a high risk for obtaining planning approval. Examples of potential tier 1 locations include town centres, areas of concentrated residential settlement, areas of high environmental value such as national parks, national heritage places and sensitive AHIMS sites. Although some sections of the study corridors included sections of tier 1 constraints, these have largely been avoided through the design development and refinement process.
- Tier 2: Areas which the project has aimed to avoid wherever possible because of the added complexity of obtaining site access, obtaining planning approval and the potential impact on community and stakeholder interests at these locations. Examples include areas containing listed threatened species and ecological communities, significant AHIMS sites, and high value agricultural land.

- Tier 3: Areas where impacts should be minimised and/or mitigated. In addition to the tier 2 constraints, examples include areas of key fish habitat, AHIMS sites, agricultural land and private properties.

This considered approach culminated in a revised study corridor that avoided areas moderate-good quality box gum woodland north of the Goulburn River National Park and has a narrower traverse of vegetated areas near Tuckland State Forest and avoidance of impact to Tuckland State Forest.

Identification of the energy hubs

The next step in the project development process was to identify the preferred locations of energy hubs, to enable the development of transmission line alignments that connected to the NSW transmission system.

As identified in the February 2022 revised study corridor, there were three indicative locations for the energy hubs based on their proximity to large approved or proposed renewable energy generation projects in the Central-West Orana REZ.

By positioning energy hubs close to these projects, and with EnergyCo taking a lead role in the development of streamlined connections, the potential cumulative environmental impacts were reduced.

A site identification and selection process was undertaken for the energy hubs having regard to the tiered constraints outlined above and the following selection criteria:

- availability of predominantly cleared and level land with sufficient space requirements for energy hub
- ability to secure land through negotiated agreement (acquisition)
- quality and extent of biodiversity values and heritage sites
- proximity to the existing road network
- ability to secure transmission line easements to proposed renewable energy generation projects
- visibility of the site from residential properties, and/or surrounding areas
- other site constraints that might affect constructability such as topography, slope and geotechnical conditions.

Plant community types (PCTs)

The project is located in an agricultural landscape that has been subject to vegetation removal for agricultural purposed and stock grazing since the 1800s. Native vegetation covers approximately 58% of the subject land and is largely restricted to road reserves, crown land, and areas of private land unsuitable for clearing (such as steep rocky areas).

The native vegetation recorded within the subject land has been assigned to four vegetation formations and eight vegetation classes that occur across the Brigalow Belt South (Talbragar Valley, Pilliga, Liverpool Ranges), NSW South Western Slopes (Inland Slopes), and Sydney Basin (Kerrabee) IBRA regions.

Twenty-two PCTs were recorded in the subject land. A summary of the extent of these PCTs within the subject land is provided below under the Offset requirements section.

Threatened ecological communities (TECs)

Four TECs listed under the BC Act were recorded in the subject land:

- Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- 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.

Ecological communities (ECs) listed under the Commonwealth Environment Protection Biodiversity Conservation Act 1999 (EPBC Act)

Three ecological communities (ECs) listed under the EPBC Act were recorded in the subject land:

- Central Hunter Valley eucalypt forest and woodland
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- White Box – Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Threatened species

The threatened species recorded during the surveys included:

- *Acacia ausfeldii*
- *Eucalyptus camaldulensis* – endangered population
- *Eucalyptus cannonii*
- *Dichanthium setosum*
- *Leucochrysum albicans* subsp. *tricolor*
- *Swainsona sericea* (potentially)
- Glossy Black-Cockatoo
- Little Eagle
- Masked Owl
- Barking Owl
- Squirrel Glider
- Large-eared Pied Bat
- Large Bent-winged Bat
- Eastern Cave Bat.

The subject land is within the mapped important habitat area for Regent Honeyeater.

A number of additional threatened species have been assumed to occur within the subject land and are outlined in the Offset requirements section in this summary.

Impacts, including direct, indirect, prescribed, and serious and irreversible impacts (SAII)

Residual direct impacts to PCTs

The overall direct impacts to PCTs and habitat for the various threatened species is estimated at approximately 1,031.63 ha.

For Derived Native Grasslands and Derived Native Shrublands 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 are not applicable to Derived Native Grasslands and Derived Native Shrublands as these areas do not contain vegetation over 2 m in height and would not be subject to ongoing operational maintenance impacts.

Residual direct impacts to TECs

The residual direct impact to BC Act listed TECs is outlined in Table ES-1. For the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC and the 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, a large proportion of the impact is to Derived Native Grassland and Derived Native Shrubland in Disturbance Area A.

Table ES-1 Summary of residual direct impacts to BC Act listed TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	Associated vegetation zones within the subject land	Impact within subject land (ha)	Impact in Disturbance Area A	Impact in Disturbance Area B	Impact in Disturbance Area HZ
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	20130	V	PCT 1176 (Thinned)	1.96 ha	0.53 ha	1.39 ha	0.04 ha
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	20072	E	PCT 81 (Derived Native Grassland, Mod_Good, Thinned)	20.26 ha 14.29 ha (71%) is impact to Derived Native Grasslands in Disturbance Area A.	17.17 ha	2.99 ha	0.10 ha
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	10335	E	PCT 202 (Mod_Good Thinned)	2.99 ha	0.58 ha	2.36 ha	0.05 ha
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	10837	CE	PCT 266, 277, 281, 483, 599 & 618 (all vegetation zones – Derived Native Grassland, Derived Native Shrubland, Mod_Good, Poor, Thinned)	575.95 ha 272.14 ha (47%) is impact to Derived Native Grassland & Derived Native Shrubland in Disturbance Area A.	389.20 ha	184.62 ha	2.13 ha

Residual direct impacts to ECs

The residual direct impact to EPBC Act listed ECs is outlined in Table ES-2.

For the ECs outlined below, the majority of the impact would be in Disturbance Area B which is the area between and adjacent to transmission towers in which it is assumed removal of trees with growth heights greater than 2 metres would be required to meet the vegetation clearance heights. The shrub layer and ground layer would not be removed (except for temporary minor changes to understorey composition in these areas due to the temporary ground disturbance activities).

Table ES-2 Summary of direct impacts to EPBC Act listed TECs within the subject land

TEC name	EPBC Act status	Associated vegetation zones within the subject land	Impact within subject land (ha)	Impact in Disturbance Area A	Impact in Disturbance Area B	Impact in Disturbance Area HZ
Central Hunter Valley eucalypt forest and woodland	CE	1176 (Thinned)	1.95 ha	0.53 ha	1.39 ha	0.03 ha
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	81 (Moderate/Good, Thinned)	5.98 ha	2.43 ha	3.45 ha	0.10 ha
White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland	CE	266 (Moderate/Good, Thinned) 277 (Moderate_Good) 281 (Moderate_Good, Thinned) 483 (Moderate_Good, Thinned) 599 (Moderate_Good, Thinned) 618 (Moderate_Good, Thinned	287.45 ha	110.34 ha	175.09 ha	2.02 ha

Residual direct impacts to species credit species

The residual direct impact to species credit species is outlined in Table ES-3.

Table ES-3 Summary of direct impacts to species credit species within the subject land

Species	Known impact (ha)	Assumed impact (ha)
Acacia ausfeldii / Ausfeld’s Wattle	4.35	4.26
Androcalva procumbens / Androcalva procumbens	0	15.9
Anthochaera phrygia / Regent Honeyeater	95.8	0
Aprasia parapulchella / Pink-tailed Legless Lizard	0	16.36
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	31.4

Species	**Known impact (ha)**	**Assumed impact (ha)**
Cercartetus nanus / Eastern Pygmy-possum	0	151.22
Chalinolobus dwyeri / Large-eared Pied Bat	130.03	0
Commersonia rosea / Commersonia rosea	0	3.25
Delma impar / Striped Legless Lizard	0	83.4
Dichanthium setosum / Bluegrass	3.8	124.74
Digitaria porrecta / Finger Panic Grass	0	2.2
Eucalyptus camaldulensis – endangered population / Eucalyptus camaldulensis population in the Hunter catchment	1.4	0
Eucalyptus cannonii / Capertee Stringybark	12 plants	0
Euphrasia arguta / Euphrasia arguta	0	7.54
Homoranthus darwinioides / Fairy Bells	0.12	9.39
Hoplocephalus bitorquatus / Pale-headed Snake	8.2	92.34
Hoplocephalus bungaroides / Broad-headed Snake	0	10.8
Leucochrysum albicans subsp. *tricolor* / Hoary Sunray	5 plants	0
Monotaxis macrophylla / Large-leafed Monotaxis	0	43.7
Ninox connivens / Barking Owl	0	23.6
Ozothamnus tesselatus / Ozothamnus tesselatus	0	3.3
Petaurus norfolcensis / Squirrel Glider	107.53	270.31
Petrogale penicillata / Brush-tailed Rock-wallaby	0	19.9
Phascolarctos cinereus / Koala	0	608.8
Polytelis swainsonii / Superb Parrot	0	2.63
Pomaderris cotoneaster / Cotoneaster Pomaderris	0	21.2
Pomaderris queenslandica / Scant Pomaderris	0	0.73
Swainsona recta / Small Purple-pea	0	3.9
Swainsona sericea / Silky Swainson Pea	0.14	15.61
Thesium australe / Austral Toadflax	0	2.2
Tylophora linearis	0	23.84
Tyto novaehollandiae / Masked Owl	0	6.63
Vespadelus troughtoni / Eastern Cave Bat	39.28	0

Residual direct impacts to scattered trees

One hundred and ninety four scattered trees were recorded within the subject land. The residual direct impact to species credit species is outlined in Table ES-4.

Table ES-4 Summary of impacts to scattered trees

Plant Community Type	Impact (No. trees)
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	6
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	92
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	22
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	3
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	12
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	1
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	4
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	24
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	30
Total	**194**

Indirect impacts

Table ES-5 provides a summary of residual indirect impacts.

Table ES-5 Summary of residual indirect impacts

Indirect impact	Frequency	Duration (long-term/short-term/ medium-term)	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
Inadvertent impacts on adjacent habitat or vegetation	Frequent during the length of the construction phase where it is near the feature.	Short-term	Construction	**Moderate**
Reduced viability of adjacent habitat due to edge effects	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**
Reduced viability of adjacent habitat due to noise, dust or light spill	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 the new Wollar switching station and energy hubs at Merotherie and Elong Elong.	Short-term	Construction/operational	**Negligible**
Transport of weeds, pests and pathogens from the site to adjacent vegetation	Ongoing. Impacts are likely to be higher during construction.	Long-term	Construction/operational	**Negligible**
Increased risk of starvation, exposure and loss of shade or shelter	Impacts of potential starvation, exposure and loss of shade or shelter would occur following clearing activities. 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**
Loss of breeding habitats	Impacts to breeding habitat (incl. hollow-bearing trees, nests, dreys, burrows and fallen timber) would occur following clearing/earth work activities. 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**

Indirect impact	Frequency	Duration (long-term/short-term/ medium-term)	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
Trampling of threatened flora species	Likely maintenance activities would include regular inspection and maintenance of all network infrastructure (ground and aerial), including transmission lines, 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. — Six yearly ground based asset inspection including foundation inspections. This would typically involve two to three maintenance crews driving light vehicles along the easement (accessed from public roads and access tracks), inspecting each transmission line tower from the ground and by personnel climbing the tower. — Three to six yearly maintenance of transmission lines to address defects identified from inspections, using a light vehicle(s), an elevated work platform and a 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).	Construction – Short-term Operation – long-term	Construction/operation	**Low**
Increased risk of fire	Ongoing	Long-term	Construction/operation	**Low**
Increased risk of collision with lines and EMF impacts with new infrastructure	Daily	Long-term	Operation	**Moderate**

Prescribed impacts

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

In the Kerrabee IBRA subregion, a small amount of potential breeding habitat for threatened bat species (Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat) occurs in the form of small, forested rocky cliff lines and caves north of Cope State Forest and at the southern end of Goulburn River National Park. It is important to note that these breeding habitat features are not in the subject land and will not be directly impacted. Known habitat (caves and cliff lines) where Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat were recorded occurs within 150 m of the subject land but is unlikely to be directly impacted by the project.

In the Valley of the Winds stage in the Kerrabee subregion, a small amount of potential breeding habitat for threatened bat species (Eastern Cave Bat and Large-eared Pied Bat) in the form of PCTs is likely to be impacted by the project northeast of Melrose Road. It is important to note that caves are not in the subject land and will not be directly impacted.

Impacts would be negligible; the rocky environment would be minimally impacted, and these habitats would remain post-construction. The consequence of the impacts would be minor and non-significant as a result of the pro-active design process and the residual impact would be appropriately offset.

Human-made structures

The project is located predominantly in agricultural land. Several old farm buildings were recorded within the subject land, however no evidence of potential use by threatened species was recorded. However, it is noted that, the project is likely to require removal of these structures, along with wooden fence posts. Wooden posts can be used by microbats including threatened species. Mitigation measures are recommended to minimise the risk of mortality of bats during vegetation clearing and the removal of all human-made structures.

The consequence of the impacts would be minor and non-significant as a result of the micro-siting process

Non-native vegetation

Areas of non-native vegetation are present in the subject land and includes cropping land and improved pastures dominated by exotic species. Areas of cropped and exotic-dominated vegetation would be impacted, however this area is of comparatively minimal value for the native species and communities along the alignment.

Impacts would be negligible; the extensive cropped and exotic vegetation habitats would remain post-construction. The consequence of the impacts would be minor and non-significant as a result of the micro-siting process.

Habitat connectivity

The Liverpool Range stage has impacts on habitat connectivity where the alignment bisects vegetation associated with Durridgere State Conservation Area east of Ulan Road. Fragmentation impacts to Squirrel Glider habitat may occur where the alignment bisects this vegetation.

The RNI1 stage has impacts on habitat connectivity where the alignment bisects vegetation that is contiguous with Tuckland State Forest to the north and south of the alignment. Habitat fragmentation impacts may also be associated with any vegetation removal associated with the Spring Range Road corridor and nearby riparian corridor. A number of threatened species were recorded and have habitat along these corridors including threatened woodland birds and Squirrel Glider. This stage also has impacts on habitat connectivity where the project runs between vegetation in Goulburn River National Park and Cope State Forest. The alignment also runs between larger patches of woodland in the locality including Goulburn River National Park and Munghorn Gap Nature Reserve. Threatened bat species and threatened woodland birds that occur within this area have potential to be impacted by further habitat fragmentation. It should however be noted that the project traverses a relatively disturbed landscape that contains three working coal mines and existing power lines that cut through areas of vegetation. Functional connectivity for bird and bat species remains despite these developments having occurred and it is likely that a similar level of functional habitat connectivity would remain after the project is built.

The project would result in a highly permeable structure for biodiversity and connectivity is expected to remain largely unaffected for all species. The impacts to connectivity are expected to be permanent, though minor. They are likely to reduce over time as biodiversity acclimatises to the presence of the towers and powerlines. The consequence of the impacts would be minor and non-significant as a result of the design development process.

Waterbodies, water quality and hydrological processes

The project crosses a number of waterways. 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. Transmission line towers would be located 50 m away from waterways. No direct impacts are expected to occur to these aquatic values of reliant threatened species. 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.

Vehicle strike

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. The most vehicular movements would be generated during construction. 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. Thus, it is unlikely that the subject land would result in significant levels of roadkill mortality of threatened species. Minimising vehicle strike will be delivered in the concept and detailed design processes of the roads.

Serious and irreversible impacts (SAII)

The following SAII threatened ecological communities are affected by the project:

- Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- White Box Yellow Box Blakely’s Red Gum Woodland.

In addition, the project would impact on mapped ‘important habitat’ for the SAII species Regent honeyeater (*Anthochaera phrygia*). The other SAII species known to occur within the subject land include:

- Eastern Cave Bat (*Vespadelus troughtoni*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*).

Additionally, there are four SAII species that are assumed to occur in the subject land including:

- Brush-tailed Rock-wallaby (*Petrogale penicillata*)
- Broad-headed Snake (*Hoplocephalus bungaroides*)
- *Euphrasia arguta*
- *Commersonia rosea*.

For the SAII TECs, the data suggests that the predicted impact on the geographic extent of each TEC is negligible. For the White Box Yellow Box Blakely’s Red Gum Woodland TEC it is important to note that a large proportion of the impact is to agricultural paddocks where there is an impact to 272.14 ha (47% of the impact to this TEC) of Derived Native Grassland & Derived Native Shrubland in Disturbance Area A.

The impacts to mapped Regent honeyeater important habitat area are clear at 95.8 ha.

For the SAII bat species, the project is not anticipated to have any direct impacts on irreplaceable habitat features like karst, caves, cliffs, crevices, and other formations that are essential for the cave dependent SAII bat species. No confirmed breeding habitat for these species has been recorded within the subject land (there are no caves in the subject land).

Brush-tailed Rock-wallaby has been retained for assessment in parts of the subject land where habitat constraints are met. This species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low. Importantly for this species there will be no direct impact on irreplaceable habitat features such as rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.

Broad-headed Snake has been retained for assessment in parts of the subject land where habitat constraints are met. Broad-headed Snake is reliant on habitat components that cannot readily be re-created (exposed rocky sites on sandstone outcrops and benching). This species requires shelter sites in rock crevices and under flat sandstone rocks on exposed cliff edges, especially in areas with a west to north-west aspect and large hollow-bearing trees. Importantly for this species there will be no direct impact on irreplaceable habitat features.

Euphrasia arguta and *Commersonia rosa* have been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to lack of access. These species are assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a population of either species being present in the subject land is low.

Table ES-6 and Table ES-7 outline the species at risk of an SAII relevant to the project.

Table ES-6 Summary of impacts to TECs at risk of an SAII

TEC/Species name	Impact within subject land (ha)	Impact in Disturbance Area A	Impact in Disturbance Area B	Impact in Disturbance Area HZ
Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	2.98 ha	0.52 ha	2.42 ha	0.04 ha
White Box Yellow Box Blakely's Red Gum Woodland	575.93 ha 272.14 ha (47%) is impact to Derived Native Grassland & Derived Native Shrubland in Disturbance Area A.	389.17 ha	184.61 ha	2.15 ha

Table ES-7 Summary of impacts to species at risk of an SAII

TEC/Species name	Impact within subject land (ha)
Regent honeyeater (*Anthochaera phrygia*)	95.8 ha
Large-eared pied bat (*Chalinolobus dwyeri*)	130.03 ha
Eastern cave bat (*Vespadelus troughtoni*)	39.28 ha
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	19.9 ha (assumed habitat)
Broad-headed Snake (*Hoplocephalus bungaroides*)	10.8 ha (assumed habitat)
Euphrasia arguta	7.54 ha (assumed habitat)
Commersonia rosea	3.25 ha (assumed habitat)

Recommended mitigation measures

The recommended mitigation measures are outlined below in Table ES-8.

Table ES-8 Summary of mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure	Method/technique	Timing
B1. Sensitive areas to be avoided during detailed design and micro siting of transmission line infrastructure	Sensitive areas (incl. species polygons, buffered threatened species locations (including off site features adjacent to the subject land) and TEC areas) in disturbance area B are to be identified on sensitive area plans using spatial data. Refining the design to avoid and minimise impacts on sensitive areas and prioritise areas with a VI <17 as per section 9 of the BAM (2020). These areas will be mapped on sensitive area plans.	Pre-construction. Potentially noise and vibration intensive construction activities will not be carried out within the Little Eagle nest tree buffer during the breeding season (from Spring until after young have fledged in early Summer), unless the nest is deemed unoccupied during the breeding season following inspection by an ecologist. Potentially noise and vibration intensive construction activities will not be carried out within 100 metres of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments during the breeding season for the Large-eared Pied Bat, Eastern Cave Bat, Large Bent-winged Bat (November to February), unless applicable areas are deemed unoccupied during the relevant breeding season following inspection by an ecologist.

Mitigation measure	Method/technique	Timing
B2. Develop and implement vegetation management procedures and protocols for operation and maintenance of the project as part of the OEMP or EMS	These procedures and protocols will cover the following: — vegetation clearing and maintenance commitments in the BDAR and EIS — avoiding access and disturbance in any biodiversity exclusion zones outside of the areas required for construction — avoiding access and disturbance in areas of high biodiversity conservation significance outside of the areas required for construction; and — avoiding maintenance of vegetation that does not need to be maintained during operation.	To be drafted prior to construction and updated as required.
B3. Micro-siting of associated works and access tracks	Locating of site offices, compounds, ancillary facilities and access tracks in areas of low biodiversity value. Access tracks should utilise existing tracks, where feasible and waterway crossings should be located at narrow width locations. All micro-siting should select topography to minimise requirements for any significant earth works (i.e. cut and fill).	Pre-construction. This may also occur during site setup at the beginning of the construction works.
B4. Connectivity corridors	Connectivity corridors are to be established in the form of installation of under-transmission line glider poles (in accordance with clearance requirements for transmission line and infrastructure) where the construction area will impact habitat connectivity for arboreal species (see Appendix J for an examination of regional and terrestrial habitat connectivity and target species for mitigation). The exact location and design of under-transmission line glider poles 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.	To be completed prior to commencement of construction/ vegetation clearing.
B5. Installation of nest boxes or other hollow creation methods as part of a Supplementary Hollow and Nest Strategy.	Nest boxes provide an alternative roosting and/or nesting habitat for threatened fauna displaced during clearing in accordance with a Supplementary Hollow and Nest Strategy. A suggested ratio is three artificial hollows / nest boxes for every occupied hollow removed.	To be completed at least 3 months prior to commencement of construction/ vegetation clearing.
B6. Controls of weed and pathogen transport from the site to adjacent vegetation	Implementation of biosecurity protocols. This may include the cleaning of vehicles and machinery (incl. floor pans), boots and clothing to kill pathogens and remove weed seed &/or plant bodies. All trucks containing loads of weed contaminated material will be covered. Mechanical and chemical weed control will be done in consultation with landowners.	All personnel entering and exiting the site each day must adhere to biosecurity protocols

Mitigation measure	Method/technique	Timing
B7. Demarcation of vegetation clearing areas and habitats.	This will include marking of hollow-bearing trees, nests, burrows and other habitat features within or in close proximity to the clearing areas. Installation of 'no go area' fencing to clearly mark the extent of clearing.	Pre-construction
B8. Installation of tree protection measures	In accordance with AS 4970-2009 – Protection of Trees in Development Sites.	Prior to vegetation clearing.
B9. Sediment and erosion controls	A Sediment and Erosion Control Plan is to be prepared, detailing the location and types of controls required to reduce potential impacts from erosion, sedimentation and enriched run-off on waterways and adjoining habitats.	Sediment and erosion controls must be installed prior to commencement of construction.
B10. Pre-clearing surveys.	Pre-clearing surveys are to be completed prior to clearing at each location by a suitability qualified ecologist. The proposed clearing extents would be marked out on site prior to the pre-clearing surveys. During the surveys, the ecologist would: — survey the proposed clearing extent — identify any fauna that would require relocation prior to clearing, including inspection of any built structures and wooden fence posts to be demolished — confirm the location and mark out the extents of any biodiversity exclusion zones — 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.	Pre-construction
B11. Ecology inductions, toolbox talks, targeted training.	All relevant project personnel, including relevant sub-contractors are to be trained on biodiversity management protocols and requirements for the project, through inductions, toolbox talks and targeted training, and provided with sensitive area maps (showing clearing boundaries and exclusion zones) and updates as required.	Inductions and training must be completed prior to commencement of work for all relevant personnel.

Mitigation measure	Method/technique	Timing
B12. Retention of understorey vegetation in riparian areas.	Understorey vegetation is to be protected within vegetated riparian zones (within the definition of *Water Management Act 2000*). Vegetation clearing will be limited to the tree stratum and shrubs above 2 metres in height only, with trunk bases being retained in-situ.	N/A
B13. Rehabilitation of riparian areas	Activities within vegetated riparian zones would be managed to minimise impacts to aquatic environments. Riparian areas subject to disturbance would be progressively stabilised and rehabilitated.	Implementation of an approved Riparian Vegetation Management Plan (RVMP) is commenced within 3 months of any disturbance to a riparian area.
B14. Installation of bird diverters	Located on the transmission line where it is within 1 km (at a minimum) of wetland/riverine habitats to reduce impacts on aerial fauna species from collision with transmission lines and infrastructure. The exact position and diverter model is to be finalised during design refinement.	To be installed within two weeks of transmission line installation or as soon as practical.
B15. Exact clearing extent provided for offset requirements	The predicted clearing of native vegetation by the proposal would be monitored against the recorded clearing. A revised BAM-C calculation on the project's final project disturbance post construction would be completed and any additional credit liability identified would be met as part of the biodiversity offset requirements within the biodiversity offset package.	Construction
B16. Minimise direct impacts to threatened species or ecological communities	A species unexpected finds protocol would be implemented if threatened ecological communities or flora and fauna species, not assessed in the biodiversity assessment, are identified in the disturbance area.	Construction
B17. Minimise direct impacts to threatened aquatic species and endangered populations listed under the FM Act	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)* (Department of Primary Industries, 2013).	Construction
B18. Minimise indirect impacts from light spill	Lighting designs to be in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023a).	Construction

Offset requirements

The ecosystem impacts that require an offset (as per BAM Subsection 9.2.2(2.)) are outlined below in Table ES-9.

Table ES-9 Impacts that require an offset – ecosystem credits

Plant Community Type	Credits required
1176-Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	20
1177-Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	887
1610-White Box – Black Cypress Pine shrubby woodland of the Western Slopes	1276
1661-Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	475
1674-Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	104
1696-Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	33
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	60
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	526
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1133
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	7050
42-River Red Gum/River Oak riparian woodland wetland in the Hunter Valley	24
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	1469
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	800
468-Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	3
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	330
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	124
479-Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	1802
481-Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	549
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	3050

Plant Community Type	Credits required
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	261
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	1290
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	168
Total	**21434**

The threatened species impacts that require an offset (as per BAM Subsection 9.2.2(2.)) are outlined below in Table ES-10.

Table ES-10 Impacts that require an offset – species credits

Species name	Credits required
Acacia ausfeldii / Ausfeld's Wattle	217
Androcalva procumbens / Androcalva procumbens	475
Anthochaera phrygia / Regent Honeyeater	3288
Aprasia parapulchella / Pink-tailed Legless Lizard	475
Calyptorhynchus lathami / Glossy Black-Cockatoo	740
Cercartetus nanus / Eastern Pygmy-possum	3861
Chalinolobus dwyeri / Large-eared Pied Bat	4851
Commersonia rosea / Commersonia rosea	63
Delma impar / Striped Legless Lizard	676
Dichanthium setosum / Bluegrass	2290
Digitaria porrecta / Finger Panic Grass	27
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment	26
Eucalyptus cannonii / Capertee Stringybark	20
Euphrasia arguta / Euphrasia arguta	343
Homoranthus darwinioides / Fairy Bells	201
Hoplocephalus bitorquatus / Pale-headed Snake	2522
Hoplocephalus bungaroides / Broad-headed Snake	208
Leucochrysum albicans subsp. tricolor / Hoary Sunray	10
Monotaxis macrophylla / Large-leafed Monotaxis	1137
Ninox connivens / Barking Owl	518
Ozothamnus tesselatus / Ozothamnus tesselatus	31
Petaurus norfolcensis / Squirrel Glider	9929
Petrogale penicillata / Brush-tailed Rock-wallaby	852
Phascolarctos cinereus / Koala	15685

Species name	Credits required
Polytelis swainsonii / Superb Parrot	52
Pomaderris cotoneaster / Cotoneaster Pomaderris	500
Pomaderris queenslandica / Scant Pomaderris	17
Swainsona recta / Small Purple-pea	84
Swainsona sericea / Silky Swainson-pea	497
Thesium australe / Austral Toadflax	20
Tylophora linearis / Tylophora linearis	752
Tyto novaehollandiae / Masked Owl	566
Vespadelus troughtoni / Eastern Cave Bat	1156
Total	**52089**

The scattered tree impacts that require and offset are outlined below in Table ES-11.

Table ES-11 Impacts that require an offset – ecosystem credits (scattered trees)

Plant Community Type	Credits required
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	6
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	89
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	22
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	3
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	12
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	1
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	4
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	23
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	30
Total	**190**

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Glossary

Affected species	A species that is likely to be affected through by direct and/or indirect impacts as a result of the project.
Assessment area	The assessment area includes the subject land and the area of land within the 1500 m buffer zone surrounding the subject land (or 500 m buffer zone for linear proposals) that is determined as per Subsection 3.1.2 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 three 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 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 two 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 TEC identified on the subject land, or if the vegetation is not a TEC, the sensitivity to loss for the 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 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 BC Act.
Candidate species	A species credit species that is likely to have suitable habitat on the subject land. Referred to as 'candidate species credit species' in the BAM-C and require further assessment in accordance with subsection 5.2.3 of the BAM.
Construction area	The area that would be directly impacted by construction of the project including (but not limited to) transmission towers and lines, brake and winch sites, access roads to switching stations and energy hubs, access tracks, energy hubs, switching stations, communications infrastructure, workforce accommodation camps, construction compounds and laydown and staging areas.
Disturbance area	The parts of the construction area that would be disturbed during construction of the project.

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.
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 one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground. Trees must be examined from all angles.
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.
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.
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	Measures used to reduce, eliminate or compensate for adverse environmental effects.
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.
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.
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.
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 two 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 Biodiversity Assessment Method. 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 Biodiversity Assessment Method. It provides for an impact assessment on biodiversity values on land subject to the project.
Study area	A minimum 220 m wide corridor focussed on the planned infrastructure that was surveyed. Where impacts were likely to be larger, the study area was widened to accommodate the larger area. The study area incorporates the Subject Land and is within the Assessment area as defined in the BAM.

Subject land	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 proposals).
Threatened Biodiversity Data Collection (TBDC)	Part of the BioNet database, published by EES 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.
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

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
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
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)
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
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: 11 September 2023 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.

ii. Details and experience of author/s and contributors

This section provides the details of the persons responsible for preparing the BDAR plus any surveys and/or investigations on which the BDAR relies.

Authors and contributors

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Alicia Palmer		Ecologist	Report preparation, targeted threatened flora surveys, targeted threatened fauna surveys	Bachelor of Science (Honours)
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Name	BAM Assessor Accreditation no. (if relevant)	Position/role	Tasks performed	Relevant qualifications
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Coby Cole Stegman		Ecologist	Targeted threatened fauna surveys	Bachelor of Science, University of Queensland Masters of Conservation Biology, University of Queensland
Orienne Glover		Undergraduate Environment	Targeted threatened flora surveys, targeted threatened fauna surveys	Currently studying
Kristen Prescott		Graduate Environmental Scientist	Targeted threatened flora surveys	Bachelor of Environmental Science and Management
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Sub-contractors				
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iii. Conflict of interest

I 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: 11 September 2023   BAM Assessor Accreditation no: BAAS17020

Stage 1: Biodiversity assessment

1 Introduction

1.1 Proposed project

1.1.1 Project overview

EnergyCo is proposing the construction and operation of new electricity transmission infrastructure and new energy hubs and switching stations required to connect new renewable energy generation and storage projects within the Central-West Orana REZ to the existing electricity network (the project). The project is located within the Warrumbungle, Mid-Western Regional, Dubbo Regional and Upper Hunter local government areas (LGAs) and extends generally north to south from Cassilis to Wollar and east to west from Cassilis to Goolma.

The project would enable 4.5 gigawatts of new network capacity to be unlocked by the mid-2020s and enable renewable energy generators within the Central-West Orana REZ who are successful in their bids to access the new transmission infrastructure to export electricity to the rest of the network. Importantly, the development of renewable energy generation projects in the Central-West Orana REZ is the sole responsibility of private generators and subject to separate planning and environmental approvals.

The project requires approval from the NSW Minister for Planning under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). The project has been declared as Critical State significant infrastructure under Section 5.13 of the EP&A Act. The NSW Planning Secretary's environmental assessment requirements (SEARs) for the project were issued on 7 October 2022. Supplementary SEARs for the project were issued on 23 March 2023. The SEARs that relate to biodiversity are outlined in Appendix K.

On 2 March 2023, a delegate of the Federal Minister for the Environment determined that the project was a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act controlling provisions for the proposed actions are:

- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

The project will be assessed in accordance with the bilateral assessment agreement Amending Agreement No. 1. The NSW Government and Australian Government have now finalised amendments to the Assessment Bilateral Agreement after changes to NSW legislation. The Australian Government has also formally endorsed the NSW Biodiversity Offsets Scheme through the Environment Protection and Biodiversity Conservation Act Condition-setting Policy. Under the Agreement, the NSW Government assesses development applications on behalf of the Australian Government. The Australian Government remains the decision-maker for the EPBC Act approval, considering the assessment report prepared by NSW's Department of Planning and Environment (DPE).

The Central-West Orana REZ (CWOREZ) transmission project, 'the project' is the NSW government's first Renewable Energy Zone (REZ) in the Central-West Orana region. CWOREZ encompasses approximately 20,000 square kilometres centred by Dubbo and Dunedoo, on the land of the Wiradjuri and Gamilaroi people.

1.1.2 Location

The project is located in central-west NSW within the Warrumbungle, Mid-Western Regional, Dubbo and Upper Hunter Local Government Areas. It extends generally north to south from Coolah to Wollar and east to west from Cassilis to Goolma. The location of the project is shown in Figure 14-1 Site Map and Figure 14-2 Location Map, respectively.

1.1.3 Proposed development and the subject land

1.1.3.1 Key components

The key components of the project (which would be confirmed during detailed design) include:

- a new 500 kV switching station (the New Wollar Switching Station), located at Wollar to connect the project to the existing 500 kV transmission network
- around 90 kilometres of twin double circuit 500 kV transmission lines and associated infrastructure to connect two energy hubs to the existing NSW transmission network via the New Wollar Switching Station
- energy hubs at Merotherie and Elong Elong (including potential battery storage at the Merotherie Energy Hub) to connect renewable energy generation projects within the Central-West Orana REZ to the 500 kV infrastructure
- around 150 kilometres of single circuit, double circuit and twin double circuit 330 kV transmission lines, supported on towers, to connect renewable energy generation projects within the Central-West Orana REZ to the two energy hubs
- thirteen switching stations along the 330 kV network infrastructure at Cassilis, Coolah, Leadville, Merotherie, Tallawang, Dunedoo, Cobbora and Goolma, to transfer the energy generated from the renewable energy generation projects within the Central-West Orana REZ onto the project's 330 kV network infrastructure
- underground fibre optic communication cables along the 330 kV and 500 kV transmission lines between the energy hubs and switching stations
- a maintenance facility within the Merotherie Energy Hub to support the operational requirements of the project
- microwave repeater sites at locations along the alignment, as well as outside of the alignment at Botobolar, to provide a communications link between the project and the existing electricity transmission and distribution network. The Botobolar site would be subject to assessment at the submissions report stage
- establishment of new, and upgrade of existing access tracks for transmission lines, energy hubs, switching stations and other ancillary works areas within the construction area (such as temporary waterway crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake/winch sites, site offices and workforce accommodation camps)
- property adjustment works to facilitate access to the transmission lines and switching stations. These works include the relocation of existing infrastructure on properties that are impacted by the project
- utility adjustments required for the construction of the transmission network infrastructure, along with other adjustments to existing communications, water and wastewater utilities. This includes adjustments to Transgrid's 500 kV transmission lines 5A3 (Bayswater to Mount Piper) and 5A5 (Wollar to Mount Piper) to provide a connection to the existing NSW transmission network, including new transmission line towers along the Transgrid network along the frontage of the New Wollar Switching Station, and other locations where there is an interface with Transgrid's network.

1.1.3.2 Construction staging

The project would be developed in stages as various renewable energy projects are brought on line as follows:

- CFG connection to Spicers Creek wind farm stage: Stretching from the proposed Elong Elong Energy Hub to Spicers Creek Wind Farm.
- CFG connection to Tallawang stage: Stretching from a 330 kV switching station on the RNI1 stage to a 330 kV switching station at Tallawang.
- RNI1 stage: Stretching from the proposed Elong Elong Energy Hub at Cobbora to the proposed Merotherie Energy Hub at Merotherie, then southeast to the new switching station at Wollar, and east to the start of the Valley of the Winds stage and the Liverpool Range stage at Bungaba.
- Stubbo stage: Stretching from the RNI1 stage at Merotherie to 330 kV switching station at Stubbo.
- Valley of the Winds stage: Stretching from the RNI1 stage at Bungaba north along two arms, a western arm to a 330 kV switching station Leadville and an eastern arm to a 330 kV switching station at Coolah.
- Liverpool Range stage: Stretching from the RNI1 stage at Bungaba through Turill to a 330 kV switching station at Cassilis. Includes an accommodation camp (Neelys Lane satellite camp).

The stages are illustrated in Figure 14-5.

1.1.3.3 Construction

Key construction activities for the project would occur in the following stages:

- enabling works
- site establishment works including vegetation clearing and the establishment of construction compounds and workforce accommodation camps
- construction works associated with the transmission lines
- construction works associated with energy hubs and switching stations
- pre-commissioning and commissioning of the project
- demobilisation and rehabilitation of areas disturbed by construction activities.

Excavation and land forming works within the construction area would be required for transmission line tower construction, site preparation works at the energy hubs and switching station sites to provide level surfaces, to create trenches for drainage, earthing, communications infrastructure and electrical conduits, and to construct and upgrade access tracks.

Construction vehicle movements would comprise heavy and light vehicles transporting equipment and plant, construction materials, spoil and waste from construction facilities and workforce accommodation camp sites. There would also be additional vehicle movements associated with construction workers travelling to and from construction areas and accommodation camp sites. These movements would occur daily for the duration of construction.

To support the construction of the project a number of construction compounds would be required including staging and laydown facilities, concrete batching plants, workforce accommodation camps and construction support facilities. The main construction compounds would be established as enabling works and demobilised at the completion of construction. The size of the construction workforce would vary depending on the stage of construction and associated activities. During the peak construction period, an estimated workforce of up to around 1,800 people would be required.

1.1.3.4 Operation

The operation area of the project would be around 2,665 hectares consisting of:

- a transmission line easement of around 1,800 hectares which would provide a right of access to construct, maintain and operate the 500 kV and 330 kV transmission lines and other operational assets
- permanent operation area of the energy hubs of around 270 hectares
- permanent operation area of the New Wollar Switching Station of around 30 hectares
- permanent operation area of the 330 kV switching stations of around 40 hectares, including a permanent operation area of access roads of around 10 hectares
- permanent operation area of access tracks outside transmission line easements of around 15 hectares.

During operation, the project would transfer high voltage electricity from the Central West-Orana REZ to the NEM. Permanent project infrastructure would be inspected by field staff and contractors on a regular basis, with other operational activities occurring in the event of an emergency (as required). Regular inspection and maintenance activities are expected to include:

- regular inspection (ground and aerial) and maintenance of electrical equipment and easements
- fault and emergency response (unplanned maintenance)
- general building, asset protection zone and landscaping maintenance
- fire detection system inspection and maintenance
- stormwater maintenance
- remote asset condition monitoring
- network infrastructure performance monitoring.

Operation of the project would require the establishment of transmission line easements. These easements would be around 60 metres for each 330 kV transmission line and 70 metres for each 500 kV transmission lines. Where network infrastructure is collocated, easement widths would increase accordingly (for example, a twin double circuit 500 kV transmission line would have an easement about 140 metres wide). Vegetation clearing would be required to some extent for the full width of the transmission line easement, depending on the vegetation types present.

1.1.3.5 Disturbance area

The parts of the construction area that would be disturbed, requiring vegetation removal, during construction of the project are referred to as the disturbance area. The disturbance area is based on project components from the reference design. The area would be confirmed during finalisation of design and construction methodology and would be developed as part of the consideration of avoidance and impact minimisation.

Disturbance area has the same meaning as ‘Development site’ as defined in the BAM.

The disturbance area would have varying degrees of physical disturbance along the transmission line alignment to reflect construction and operational requirements, and these have been applied to the biodiversity assessment. For the purpose of this BDAR, disturbance area has been divided into the following areas consisting of:

- **Disturbance area A** – assumed for complete removal of vegetation. This includes the disturbance area A category as outlined below.
- **Disturbance area B** – assumed to have no ground disturbance except in circumstances associated with the operational requirements for vegetation maintenance to meet the vegetation clearance heights. The partial vegetation clearing is restricted to clearance of vegetation with growth height potential of 2 metres or above.
- **Disturbance area HZ** – a hazard tree zone where there would be impacts to selected trees that are within the risk category height range 20–30 m and have poor structural stability posing a risk of falling.

The width of the disturbance areas A and B areas for transmission line components vary for the 330 kV and 500 kV transmission lines based on their vegetation clearing requirements and construction methodologies. Figure 1-1 and Figure 1-2 identify the allocation of each area for each line type.

Disturbance area A

Disturbance area A refers to an area at and around the transmission line towers, areas for brake and winch sites and for new/upgraded access tracks in which vegetation would be removed during construction. The area also includes the proposed construction compounds and accommodation camps.

It would include vegetation (including tree) removal and potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal. Except in areas where only temporary disturbance is required (i.e. temporary access tracks and brake and winch sites), this area would also be subject to ongoing maintenance during operation (i.e. removal to ground level) for operational and safety requirements (including bushfire).

Disturbance area B

Refers to an area adjacent to Disturbance area A and in between transmission line towers in the easement in which removal of vegetation (including trees) would be undertaken where they have the potential to exceed vegetation clearance heights. This removal may result in temporary ground disturbance. Vegetation clearance heights are set for operational and safety requirements, including bushfire risk management. This area would also be subject to ongoing maintenance during operation. This zone is a subset to the disturbance area.

Disturbance area HZ

Refers to an area adjacent to Disturbance area B on the 500 kV lines 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 m. 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. The number of trees that are likely to be at risk of falling are likely to be minimal. A Disturbance area HZ has been mapped and a nominal 10% of this area is taken to likely be impacted. Selective tree removal is posed for Disturbance area HZ. This zone is a subset to the disturbance area.

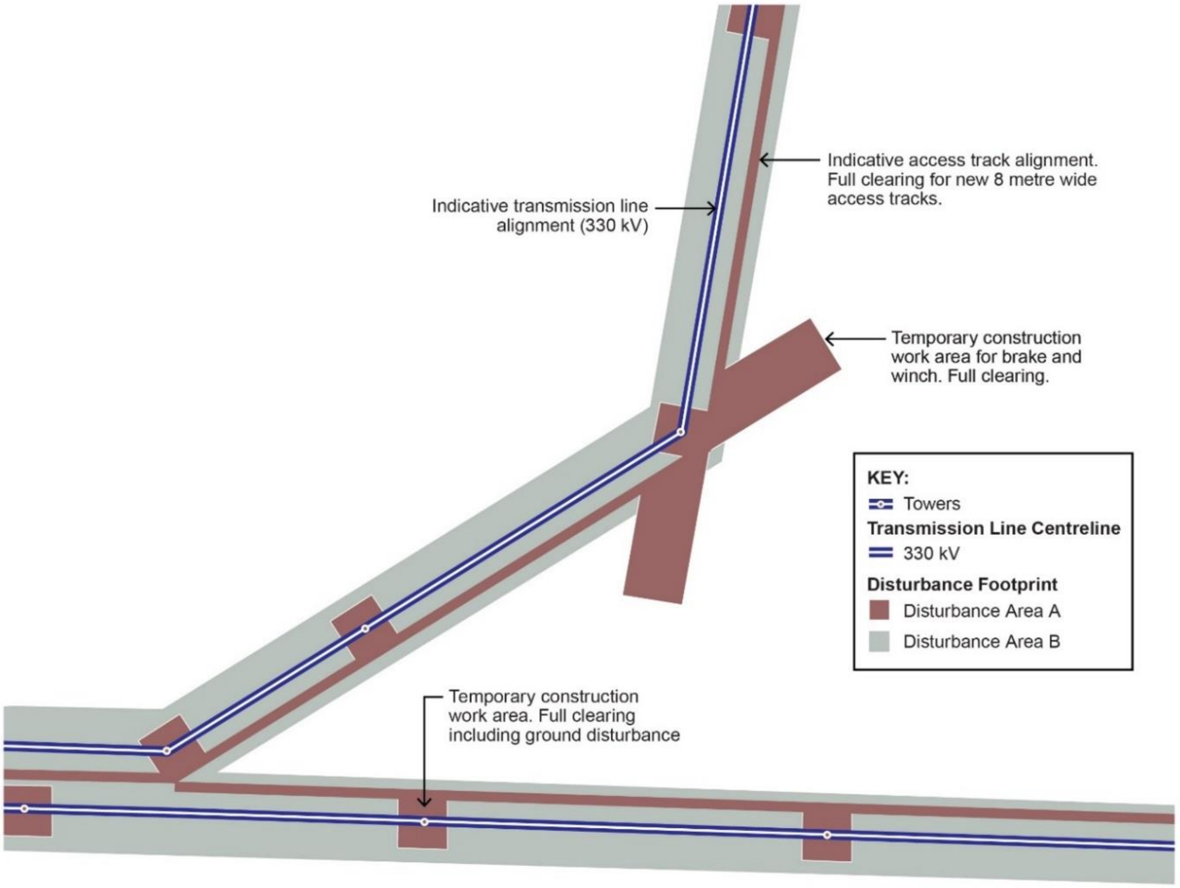


Figure 1-1 Indicative disturbance area definition for a typical 330 kV transmission line section

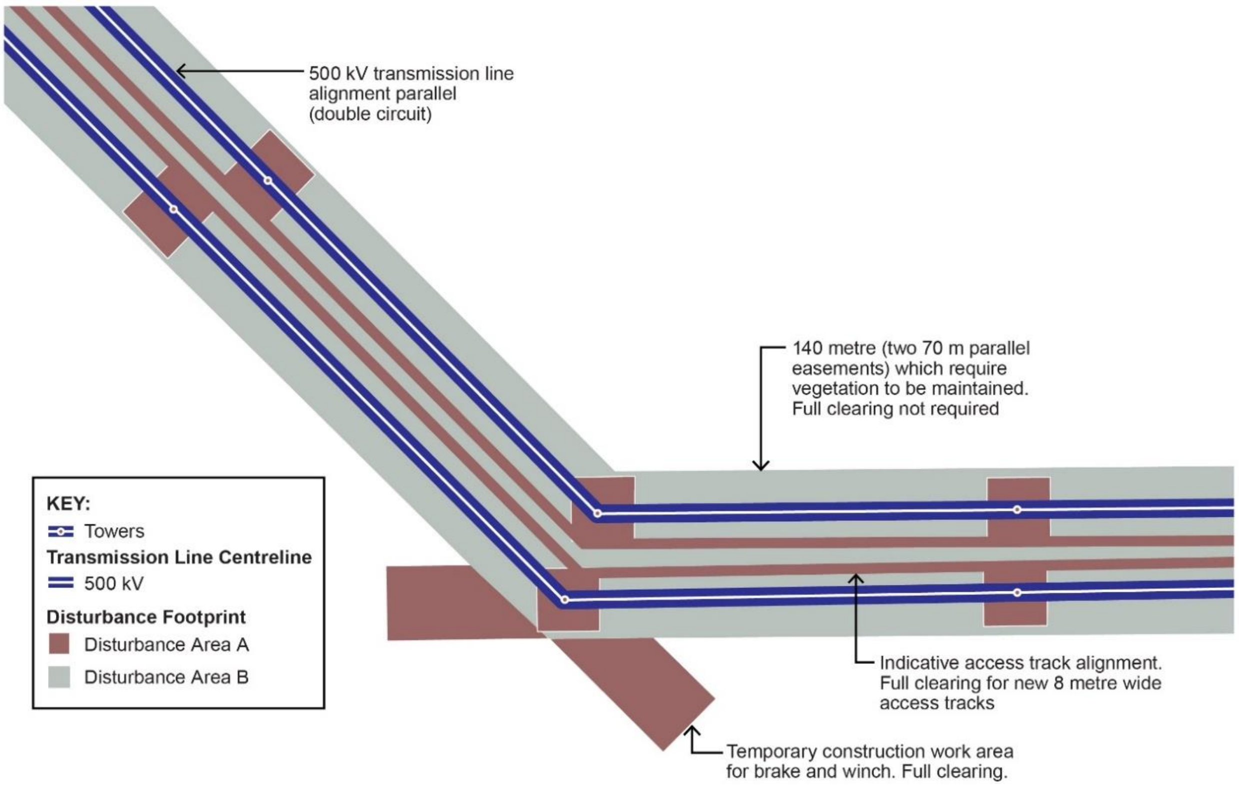


Figure 1-2 Indicative disturbance area definition for a typical twin 500 kV transmission line section

1.1.3.6 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).

The location of the subject land is shown in Figure 14-5. The subject land contains all areas impacted by construction and operation. Specifically, the subject land incorporates Disturbance areas A and B.

1.1.3.7 Project timing

Construction of the project would commence in late 2024, subject to NSW Government and Commonwealth planning approvals, and is estimated to take about three years. The project is expected to become operational in mid-2027.

1.1.4 Other documentation

This BDAR is part of an overall project EIS. This BDAR should be read in conjunction with the EIS and 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 the Department of Planning and Environment and the environment agency head 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 Biodiversity Conservation Regulation 2017 (BC Regulation)). 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 BCS. Further details of the determination process are provided in Section 4.1.2 and Appendix B.

The location of excluded impacts is provided in Figure 14-6.

1.4 Matters of National Environmental Significance

Under the 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.

Following submission of a referral for the project under the EPBC Act, the DCCEEW, as delegate for the Australian Minister for the Environment and Water, determined on 2 March 2023 the project to be a controlled action that would be subject to the NSW Assessment Bilateral Agreement under Part 9 of the EPBC Act.

The NSW Assessment Bilateral Agreement provides for certain actions that are State significant development or 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.

Supplementary SEARs were issued on 28 March 2023 to include the relevant Commonwealth requirements under the NSW Assessment Bilateral Agreement. Appendix C of This BDAR has been prepared to address these requirements. Matters of National Environmental Significance (MNES) under the EPBC Act have been identified within the subject land and these are identified in the BDAR in Section 4.3.2, Chapter 4.7 and Appendix C.

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 Matters of National Environmental Significance, 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.

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 2022)
- BioNet (NSW) Mitchell Landscapes – Version 3.1 (Department of Planning Industry and Environment 2021)
- NSW Interim Biogeographic Regionalisation of Australia (IBRA region and subregion) – Version 7.0) (Department of the Environment and Energy 2018)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Bureau of Meteorology 2021)
- Directory of Important Wetlands of Australia (Department of Agriculture Water and the Environment 2021)
- Register of Declared Areas of Outstanding Biodiversity Value – Critical habitat declarations in NSW (Department of Planning Industry and Environment 2020)

- BioNet Threatened Biodiversity Data Collection (TBDC) (Department of Planning industry and Environment 2021)
- BioNet Atlas (Department of Planning and Environment 2023a)
- BioNet Vegetation Classification (Department of Planning and Environment 2023b)
- Commonwealth Species Profiles and Threats Database (Department of Agriculture Water and the Environment 2021)
- BAM Important Area Maps for threatened species (Department of Planning Industry and Environment, 2021)
- Biodiversity Assessment Method 2020 (Department of Planning Industry and Environment 2020)
- BAM survey guidelines, including:
  - Threatened reptiles: Biodiversity Assessment Method survey guide (Department of Planning and Environment, 2022c).
  - Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide (Department of Planning and Environment, 2022d).
  - Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (Department of Planning, Industry and Environment, 2020a).
  - Flora Species with Specific Survey Requirement.
  - 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (Office of Environment and Heritage, 2018).
  - NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (Department of Planning, Industry and Environment, 2020b).
  - Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (NSW Department of Environment and Conservation, 2004).

The following vegetation mapping datasets were reviewed:

- NSW State Vegetation Type Map (Current Release C1.1.M1.1 (December 2022) (Department of Planning and Environment 2022a)
- NSW State Vegetation Type Map (Pre-Clearing) (Current Release C1.1.M1.1 (December 2022)) (Department of Planning and Environment 2022b)
- Eastern Bushlands Database Central vegetation mapping (Central_ebd_VISmap_181) (Holme, 1993).
- Joint Vegetation Mapping Project: Brigalow Belt South Bioregion, Extant Vegetation model VIS_ID 1649 (BrigalowBeltSth_comp_E_1649)
- Joint Vegetation Mapping Project: Brigalow Belt South Bioregion, Predicted Potential Vegetation model VIS_ID 1650 (BrigalowBeltSth_comp_P_1650) (Lezaich, 2003).
- Native vegetation of Cobbora, Coolah, Coonabarabran, Mendooran and Tambar Springs VIS_ID 2099 (Cobbora_NVMP_VISmap_2099) (Ismay *et al.*, 2004).
- Combined Extant Vegetation for Central West Catchment, 2008 update. VIS_ID 3813 (CWLACH08_VIS_3813) (Department of Planning and Environment 2011a).
- Native vegetation extant in Central West Catchments. VIS_ID 3844 (CWLACH06_VIS_3844) (Department of Planning and Environment 2011b).
- Reconstructed pre-1750 vegetation in Central West Catchments. VIS_ID 3815 CWLACH_p1750_VIS_3815 (Department of Planning and Environment 2011c).
- Vegetation Formations and Classes of NSW (version 3.03 – 200 m Raster) (NSWmap_v3_03_E_3848) (Keith and Simpson, 2010)
- State Forests NSW Forest Types – VIS_ID 4026 (ForestTypesFNSW_E_4026) (Forestry Commission of NSW, 1989)
- State Vegetation Type Map: Central West / Lachlan Region Version 1.4. VIS_ID 4468 (CentWestLachSVM_v1p4_PCT_E_4468) (State Government of NSW and Department of Planning and Environment, 2015).
- State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778 (CentTableSVM_v0p1_PCT_E_4778) (Department of Planning and Environment 2023e).

- Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855 (Hunter_Greater_v4_E_3855) (Department of Planning and Environment 2012).
- State Vegetation Type Map: Upper Hunter v1.0. VIS_ID 4894 (HunterUpperSVM_v1_0_PCT_E_4894) (Department of Planning and Environment 2023d).
- NSW Sheep-Wheat Belt Box-Gum Woodland Biodiversity Survey Sites 2004-2007. VIS_ID 4091 (SheepWheatBeltNSW_EEC_E_4091) (DECC, 2007).
- Goulburn River National Park and Munghorn Gap Nature Reserve vegetation mapping. VIS_ID 3843 (Goulb_riv_NP_VIS_3843) (State Government of NSW and Department of Planning and Environment, 2011).
- Murray Darling Basin M305 Structural Vegetation Layer. VIS_ID 917 (MurrayDarlingM305_Struct_E_917) (Andrews and Flemons, 1997).
- NSW Native vegetation report Cobbora, Coolah, Coonabarabran, Mendooran, Tambar Springs 1: 100 000 map sheets VIS_ID 2101 (Coolah_NVMP_VISmap_2101) (Ismay *et al.*, 2004).
- Western Regional Assessment API Vegetation Data VIS ID 1028 (WRA_API_VIS_1028) (Beckers and Binns, 2000).

The following geology and soil mapping datasets were reviewed:

- Gilgandra 1:250 000 Geological Map (Offenberg, 1968)
- Gulgong_100K_RockUnits_MGAz55 (Watkins, *et al.*, 2000)
- Cobbora_100K_RockUnits_MGAz55 (Meakin, *et al.*, 2000)
- Soil and Land Resources of Central and Eastern NSW (Office of Environment and Heritage, 2018)
- Soil Landscapes of Central and Eastern NSW (Department of Planning, Industry and Environment, 2020c)
- Hydrogeological Landscapes of New South Wales and the Australian Capital Territory (Department of Planning and Environment 2023c)
- Australian Soil Classification (ASC) soil type map of NSW (Department of Planning, Industry and Environment, 2021a)
- Great Soil Group (GSG) Soil Type map of NSW (Department of Planning, Industry and Environment, 2021b)
- Land and Soil Capability Mapping for NSW (Department of Planning, Industry and Environment, 2021c)
- NSW Landuse 2007 (Department of Planning and Environment 2010).

2 Methods

2.1 Site context methods

This chapter describes the approach to identifying and assessing the landscape context in accordance with Chapter 3 of the BAM, and the requirements set out in Part 1 of the BAM 2020 Operational Manual – Stage 1 (Department of Planning 2020). 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:

- 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. Landscape features were observed as part of the field surveys.

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 (Department of Planning and Environment 2023b).

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:

- Barneys Reef Wind Farm Scoping Report (Umwelt, 2021)
- Bellambi Heights Renewable Project Scoping Report (EMM, 2022a)
- Beryl Solar Farm Biodiversity Assessment Report (NGH Environmental, 2017a)
- Birriwa Solar Farm Scoping Report (EMM, 2021a)
- Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b)
- Cobbora Coal Project Terrestrial Ecology Assessment (EMM, 2012)
- Cobbora Solar Farm Scoping Report (EMM, 2021b)
- Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a)
- Liverpool Range Wind Farm – Wind Farm Study Area Biodiversity Assessment (NGH Environmental, 2013a)
- Liverpool Range Wind Farm – Transmission Line Study Area Biodiversity Assessment (NGH Environmental, 2013b)
- Liverpool Range Wind Farm and Transmission Line Project Biodiversity Addendum Report (NGH Environmental, 2017)
- Moolarben Coal Project Flora, Fauna and Aquatic Ecology Assessment (Moolarben Biota, 2006)
- Moolarben Coal Complex OC3 Extension Project Biodiversity Development Assessment Report (Niche Environment and Heritage, 2022)
- Sandy Creek Solar Farm Scoping Report (EMM, 2022c)
- Spicers Creek Wind Farm Scoping Report (Umwelt, 2022b)
- Stubbo Solar Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2020)
- Blue Springs Road Upgrade – Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2021a)
- UCMPL Highett Road Acacia ausfeldii Management Area Monitoring Report (Eco Logical Australia Pty Ltd, 2021b)
- Ulan Solar Farm Scoping Report (Edify Energy Pty Ltd, 2022)
- Valley of the Winds Wind Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2022)
- Wilpinjong Extension Project Biodiversity Assessment Report and Biodiversity Offset Strategy (Hunter Eco, 2015)
- Biodiversity Development Assessment Report Wollar Solar Farm (NGH Environmental, 2019)
- Dunedoo 66MW Photovoltaic Solar Farm Biodiversity Development Assessment Report (NGH Environmental, 2020).

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.

Preliminary mapping of vegetation community boundaries was undertaken through analysis of existing vegetation mapping and aerial photograph interpretation. 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 5.00 meters of 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 C1.1.M1. 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.

Existing BDARs were also used to guide the mapping of native vegetation where the subject land overlaps with these projects. The PCT mapping provided in the Liverpool Range Wind Farm BDAR (Umwelt, 2022) and the Valley of the Winds Wind Farm BDAR (Eco Logical Australia, 2022) were 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 System.

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 322 vegetation integrity plots completed during the survey from July 2022 to June 2023 over 215 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 Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b) and the Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a). 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 2020 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 subject land was not defined at the beginning of the field survey and evolved throughout the life of the survey. As such, the field survey was based around survey of a larger study area that contained the subject land. The study area was a minimum 220 m wide corridor that was focussed on the area of planned infrastructure. Where impacts were likely to be larger, such as at the energy hubs, the study area was widened to accommodate the larger area. The study area incorporated the subject land.

The design of the project evolved during the field survey program, and this resulted in 46 plot-based vegetation surveys being located outside of the subject land as it is outlined in the BDAR. The plot-based vegetation surveys undertaken outside of the subject land in this case were not purposely done by design. Importantly, these plots have been undertaken within the same PCTs and vegetation zones that are within the subject land.

Additionally, these plot-based vegetation surveys are located adjacent to (as close to 50 m) or within 5 km of the subject land the results of these surveys are considered relevant, representative of the vegetation in the subject land, and make a significant contribution to the understanding of PCTs and vegetation integrity. This plot data provides valuable replicates and contain local data. 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 (i.e. 200+ years of agriculture).

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 competed 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 relying on benchmark data that is not directly relevant to the locality.

2.2.3.2 Use of existing BAM plot data

Where BAM Plot data existed for PCTs within or adjacent to the subject land this data was used to supplement the data collected during the survey. The following data was used:

- Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b):
  - BAM Plots 13, 24, 25, 26 and 27 (coded BSF_13, BSF_24, BSF_25, BSF_26 and BSF_27) in Appendix D
- Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a):
  - BAM Plots P_4859_022, P_4859_025, P_4859_026, P_4859_036, P_4859_038, P_4859_061, P_4859_062, P_4859_063, P_4859_064, P_4859_065, P_4859_075, P_4859_077, P_4859_079 in Appendix D.

The existing plot-based vegetation surveys completed for the Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b) and the Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a) that were used to supplement the field survey work done for this BDAR are outlined in Table 2-2. The location of these plots is shown in Figure 14-7.

Table 2-2 Vegetation integrity plot data collected from other projects used to supplement the data used in this BDAR

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b)						
Plot 13 (BSF_13)	Within subject land	80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Pasture	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	Plot 13 is located in a paddock at Merotherie on Gulgong Granite near the interface with Quaternary Colluvial deposits to the north. The original vegetation has been cleared so assignment of this grassland to a PCT is problematic. The remnant trees in the grassland in the vicinity of the Plot 13 are mostly *Eucalyptus albens* with a smaller number of *Eucalyptus microcarpa* trees. *Angophora floribunda*, *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Brachychiton populneus* are also prevalent in the paddocks in similar landscape positions and geologies throughout the subject land. *Eucalyptus albens* is a species of PCT 281 and not PCT 80, while *Eucalyptus microcarpa* is listed for PCT 80 and not PCT 281 in the VIS classification database. Based on the field surveys undertaken in the subject land, *Eucalyptus microcarpa* is relatively common in the *Angophora floribunda / Eucalyptus blakelyi / Eucalyptus melliodora* vegetation that is best matched to PCT 281. The ground layer species recorded in Plot 13 are more like the ground layer described for PCT 281. Species typical of PCT 281 including *Anthosachne scabra*, *Bothriochloa macra*, *Calotis lappulacea*, *Einadia hastata*, *Eragrostis brownii and Oxalis perennans* are present. *Bothriochloa macra* and *Rumex brownii*, species of PCT 281 and not PCT 80, were recorded to 20% cover and 1% cover respectively. Species suggestive of PCT 80 including *Rumex brownii and Rytidosperma caespitosum* were both recorded at 0.5% cover. The ground layer species composition suggests that the original vegetation was most likely PCT 281 rather than PCT 80.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
						PCT 281 is in the Grassy Woodland vegetation formation and occurs on valley floors, flats and drainage lines. PCT 80 is a Floodplain Transition Woodland. Plot 13 is not located in a floodplain transition area. The geology is Gulgong Granite near the interface with Quaternary Colluvial deposits, not a floodplain. Trees and shrubs were recorded as absent. Native species cover was measured at 104.1% and exotic species cover was measured at 15.5%. The results suggest that this plot is representative of the Derived Native Grassland condition class.
Plot 24 (BSF_24)	~300 m	80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Pasture	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	The remnant trees in the grassland in the vicinity of the Plot 24 are mostly *Angophora floribunda* with *Eucalyptus albens* and a smaller number of *Eucalyptus microcarpa* trees. *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Brachychiton populneus* can also be found in the nearby paddocks. Plot 24 is located in a paddock at Merotherie on Gulgong Granite near the interface with Quaternary Colluvial deposits to the north. The original vegetation has been cleared so assignment of this grassland to a PCT is problematic. However, present ground layer species including *Bothriochloa decipiens* var. *decipiens*, *Oxalis perennans*, *Rytidosperma* spp., and *Eragrostis brownii* are typical of PCT 281 while *Oxalis perennans*, *Rumex brownii*, and *Rytidosperma* spp., are found in PCT 80. The high percentage cover of *Bothriochloa decipiens* var. *decipiens* (measured at 50% cover), a species found in PCT 281 and not PCT 80 according to the VIS classification database suggests that the paddock may once have been PCT 281 rather than PCT 80. Trees and shrubs were recorded as absent. Native species cover was measured at 71.3% and exotic species cover was measured at 2.3%. The results suggest that this plot is representative of the Derived Native Grassland condition class.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
Plot 25 (BSF_25)	~200 m	80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Pasture	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	Plot 25 is located in a paddock at Merotherie on Gulgong Granite. The original vegetation has been cleared so assignment of this grassland to a PCT is problematic. The remnant trees in the grassland in the vicinity of the Plot 25 are mostly *Eucalyptus albens* with a smaller number of *Eucalyptus microcarpa* trees. *Angophora floribunda*, *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Brachychiton populneus* are also prevalent in the paddocks in similar landscape positions and geologies throughout the subject land. *Eucalyptus albens* is a species of PCT 281 and not PCT 80, while *Eucalyptus microcarpa* is listed for PCT 80 and not PCT 281 in the VIS classification database. The vegetation is highly disturbed so assignment of this grassland to a PCT is problematic. However, the ground layer species *Bothriochloa decipiens* var. *decipiens* (a species typical of PCT 281) was recorded at 30% cover. *Rumex brownii*, a species common in PCT 80 was recorded at 0.1% cover. The high percentage cover of *Bothriochloa decipiens* var. *decipiens* suggests that the paddock may once have been PCT 281 rather than PCT 80. The only species present from PCT 80 was *Rumex brownii*. Trees and shrubs were recorded as absent. Native species cover was measured at 80.1% and exotic species cover was measured at 3.8%. The results suggest that this plot is representative of the Derived Native Grassland condition class.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
Plot 26 (BSF_26)	Within subject land	80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Pasture	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	Plot 26 is located in a paddock at Merotherie near the interface of Gulgong Granite and Quaternary Colluvial deposits. The vegetation is highly disturbed so assignment of this grassland to a PCT is problematic. The remnant trees in the grassland in the vicinity of the Plot 26 are mostly *Eucalyptus albens* with a smaller number of *Eucalyptus microcarpa* trees. *Angophora floribunda, Eucalyptus blakelyi, Eucalyptus melliodora* and *Brachychiton populneus* are also prevalent in the paddocks in similar landscape positions and geologies throughout the subject land. *Eucalyptus albens* is a species of PCT 281 and not PCT 80, while *Eucalyptus microcarpa* is listed for PCT 80 and not PCT 281 in the VIS classification database. The ground layer species recorded in Plot 26 are indicative of PCT 281 with *Bothriochloa decipiens* var. *decipiens* at 20% cover and *Calotis lappulacea* at 0.1% cover. *Calotis lappulacea* is also present in PCT 80 and is the only ground layer species from PCT 80 that was present. The high percentage cover of *Bothriochloa decipiens* var. *decipiens* suggests that the paddock may once have been PCT 281 rather than PCT 80. Trees and shrubs were recorded as absent. Native species cover was measured at 65.6% and exotic species cover was measured at 0.8%. The results suggest that this plot is representative of the Derived Native Grassland condition class.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
Plot 27 (BSF_27)	~350 m	80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Pasture	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	Plot 27 is located in a paddock at Merotherie on Quaternary Colluvial deposits in the vicinity of a drainage line. The vegetation is highly disturbed so assignment of this grassland to a PCT is problematic. The remnant trees in the grassland in the vicinity of the Plot 26 are mostly *Eucalyptus albens* with a smaller number of *Eucalyptus microcarpa* trees. *Angophora floribunda* is prevalent on the smaller drainage lines in the Merotherie area. *Eucalyptus blakelyi, Eucalyptus melliodora* and *Brachychiton populneus* are also prevalent in the paddocks in similar landscape positions and geologies throughout the subject land. *Eucalyptus albens* is a species of PCT 281 and not PCT 80, while *Eucalyptus microcarpa* is listed for PCT 80 and not PCT 281 in the VIS classification database. Species typical of PCT 281 including *Aristida ramosa, Bothriochloa decipiens* var. *decipiens, Calotis lappulacea*, and *Glycine clandestina* were present at Plot 27. *Aristida ramosa* and *Calotis lappulacea* are also typical of PCT 80. The ground layer species at this location are more indicative of PCT 281. Trees and shrubs were recorded as absent. Native species cover was measured at 26.5% and exotic species cover was measured at 27.6%. The results suggest that this plot is representative of the Derived Native Grassland condition class, albeit a poorer condition example with apparent bare ground given the low vegetation cover in the ground layer that was recorded.

Vegetation integrity plot name	**Distance from subject land (Approx.)**	**PCT No. in original BDAR**	**Condition state in original BDAR**	**Reassigned PCT No. for this BDAR**	**Reassigned condition state for this BDAR**	**Justification for use of the data and change of PCT / condition class**
Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a)						
P_4859a_022	~1 km	483	Mod_Good	483	Poor	Umwelt Plot 22 is located on the basalt hills of the Liverpool Range IBRA subregion. The canopy of this plot is composed of 25% cover of *Eucalyptus albens* which is common for PCT 483 in this locality. The ground layer is in poor condition and is composed predominantly 25% cover of *Cynodon dactylon* and weed species including 65% cover of *Lolium perenne*, 5% cover of *Silybum marianum*, and 2% cover of *Medicago arabica*. The plot indicates that native tree and grass species are present, but the vegetation is in poor condition. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Poor condition state.
P_4859a_025	~3.4 km	483	Exotic	483	Poor	Umwelt Plot 25 is located on the basalt hills of the Liverpool Range IBRA subregion. The canopy of this plot is composed of 5% cover of *Eucalyptus melliodora* which is suggestive of a disturbed condition state of PCT 438. The ground layer has native species including 10% cover *Austrostipa verticillata* with exotic species being dominant (50% cover of *Digitaria sanguinalis*, 10% cover of *Eragrostis cilianensis*, 5% cover of *Lolium perenne*, 5% cover of *Medicago arabica*, 25% cover of *Modiola caroliniana*). The plot indicates that native tree and grass species are present, but the vegetation is in poor condition. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Poor condition state.
P_4859a_036	~2.7 km	479	Mod_Good	479	Mod_Good	Umwelt Plot 36 is located on Pilliga Sandstone in the Pilliga IBRA subregion. The canopy of this plot is composed of 20% *Callitris endlicheri* and 10% *Eucalyptus nubila*. The ground layer is dominated by 35% cover of *Pomax umbellata*. This is typical of moderate to good condition PCT 479. This plot has been used to supplement the results and provide an additional replicate of PCT 479 Mod_Good condition state.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
P_4859a_038	~200 m	281	Mod_Good	281	Mod_Good	Umwelt Plot 38 is located on Pilliga Sandstone in the Pilliga IBRA subregion. The canopy of this plot is composed of 20% *Eucalyptus melliodora* and 3% *Eucalyptus albens* consistent with a lower lying drainage line situation. This plot has been used to supplement the results and provide an additional replicate of PCT 281 Mod_Good condition state (in this case dominated by *Eucalyptus melliodora*).
P_4859a_047	Within subject land	1661	Mod_Good	1661	Mod_Good	Umwelt Plot 47 is located on Pilliga Sandstone in the Pilliga IBRA subregion. It is located very close to Plot CWO_635. This plot has been used to supplement the results and provide an additional replicate of PCT 1661 Mod_Good condition state in the Durridgere SCA.
P_4859a_061	Within subject land	483	Low	483	Poor	Umwelt Plot 61 is located on the basalt hills of the Liverpool Range IBRA subregion. The canopy contains 20% cover of *Eucalyptus melliodora*. The ground layer is disturbed from grazing but contains 25% cover of *Austrostipa verticillata*. Exotic species are dominant in the ground layer with 70% cover of *Bidens pilosa* and 1% cover of *Bromus catharticus*. The vegetation is in poor condition as originally indicated by Umwelt so is included in the Poor condition class. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Poor condition state.
P_4859a_062	Within subject land	483	Mod_Good	483	Mod_Good	Umwelt Plot 62 is located on the basalt hills of the Liverpool Range IBRA subregion. The plot shows 25% cover of *Eucalyptus melliodora* in the canopy and 80% cover of *Austrostipa verticillata* in the ground layer. The vegetation is native dominant and representative of the Mod_Good condition class PCT 483. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Mod_Good condition state.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
P_4859a_063	~2.5 km	479	Mod_Good	479	Mod_Good	Umwelt Plot 63 is located on Pilliga Sandstone in the Pilliga IBRA subregion. The plot shows canopy cover of 25% *Eucalyptus fibrosa* and 10% cover of *Callitris endlicheri* with a shrub layer of 15% cover of *Brachyloma daphnoides*, 10% cover of *Cassinia quinquefaria*. The ground layer was characterised by 70% cover of *Pomax umbellata*. This plot has been used to supplement the results and provide an additional replicate of PCT 479 Mod_Good condition state.
P_4859a_064	~2.3 km	481	Mod_Good	481	Mod_Good	Umwelt Plot 64 is located on Pilliga Sandstone in the Pilliga IBRA subregion. The canopy was composed of 5% cover of *Eucalyptus sparsifolia*, 10% cover of *Eucalyptus crebra* and 15% cover of *Eucalyptus blakelyi*. The shrub layer contained 30% cover of *Cassinia quinquefaria*. The ground layer was dominated by 15% cover of *Schoenus apogon* and 50% cover of *Haloragis heterophylla*. This plot has been used to supplement the results and provide an additional replicate of PCT 481 Mod_Good condition state.
P_4859a_065	~1.8 km	481	Mod_Good	481	Mod_Good	Umwelt Plot 65 is located on the edge of Pilliga Sandstone and Purlawaugh Formation in the Pilliga IBRA subregion. The canopy was composed of 25% cover of *Angophora floribunda* and 1% cover of *Eucalyptus blakelyi*. The shrub layer contained 1% cover of *Brachyloma daphnoides* and 25% cover of *Cassinia quinquefaria*. The ground layer consisted of 25% *Microlaena stipoides*, 2% *Pomax umbellata*, 1% cover of *Aristida ramosa*, 1% cover of *Astroloma humifusum*, and 1% cover of *Arundinella nepalensis*. The species mix is typical of PCT 481 in the subject land. This plot has been used to supplement the results and provide an additional replicate of PCT 481 Mod_Good condition state.

Vegetation integrity plot name	Distance from subject land (Approx.)	PCT No. in original BDAR	Condition state in original BDAR	Reassigned PCT No. for this BDAR	Reassigned condition state for this BDAR	Justification for use of the data and change of PCT / condition class
P_4859a_075	~3.1 km	479	Mod_Good	479	Mod_Good	Umwelt Plot 75 is located on Pilliga Sandstone in the Pilliga IBRA subregion. The canopy was composed of 20% cover of *Eucalyptus punctata* and 4% cover of *Eucalyptus crebra*. The shrub layer contained 1% cover of *Cassinia aculeata*, 30% cover of *Cassinia arcuata*, and 15% cover of *Leptospermum polygalifolium*. The ground layer was characterised by 10% cover of *Microlaena stipoides* and 25% cover of *Pomax umbellata*. This is typical of an eastern occurrence of PCT 479 with the presence of *Eucalyptus punctata.* This plot has been used to supplement the results and provide an additional replicate of PCT 479 Mod_Good condition state.
P_4859a_077	Within subject land	483	Exotic	483	Poor	Umwelt Plot 77 is located on basalt in the Pilliga IBRA subregion. The canopy contained a 10% cover of *Eucalyptus albens* with 2% cover of *Austrostipa verticillata* in the ground layer. The remainder of the ground layer was characterised by exotic species. This plot fits with the Poor condition state described in this BDAR. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Poor condition state.
P_4859a_079	~300 m	483	Low	483	Poor	Umwelt Plot 79 is located on the basalt hills of the Liverpool Range IBRA subregion. The canopy was characterised by 15% cover of *Eucalyptus albens* with native species in the ground layer composed of 20% cover of *Austrostipa bigeniculata* and 2% cover of *Austrostipa verticillata*. The remainder of the ground layer was composed of exotic species. This plot fits with the Poor condition state described in this BDAR. This plot has been used to supplement the results and provide an additional replicate of PCT 483 Poor condition state.

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 54 & 55).
- **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** (1,000 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 five centimetres across: (c) the hollow appeared to have depth: (d) the hollow was at least one metre above the ground and the centre of the tree was located within the sampled quadrat.
- **Number of large trees and stem size diversity** (1,000 metre squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 metre from the ground) of all living trees (greater than five 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** (1,000 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 metre.
- **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 centimetre which is detached from a living plant) from within five 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 five 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 x 20 m 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 (1,000 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 x 20 m 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.

2.2.5 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), whereby the recorder walks 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 2020 has been utilised to assess the impact of clearing scattered trees. As outlined in the BAM 2020, 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 are not threatened species nor do the trees have any records of candidate species credit species (flora or fauna) incidentally using them.

Scattered trees are defined in the BAM 2020 as species listed in the tree growth form group that:

- have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type and are on category 2-regulated land and surrounded by category 1-exempt land on the Native Vegetation Regulatory Map under the LLS Act, or
- have a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is 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, or
- are three or fewer trees that have a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is 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.

Scattered trees were first identified by using that Category 1 land mapping (see Section 4.1.2 and Appendix B) to locate areas of category 2-regulated land and surrounded by category 1-exempt land. Trees in these areas that had a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type were assigned to scattered trees.

Outside of all mapped scattered trees shown in Figure 14-10 have (or are assumed to have) a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH. Alternatively, the trees are three or fewer trees that have (or are assumed to have) a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH. The scattered trees were mapped on-ground where possible and remotely via desktop GIS where property access or other restriction meant that visual inspection of the tree was not possible. Due to the size of the subject land this was unavoidable.

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), and exotic species, and human-made surfaces, and bare ground, not one or the other. Additionally the widely cultivated native species list was not published at the time of writing this BDAR so could not be used to inform the definition of scattered trees. The scattered trees mapped in this BDAR and assessed using the BAM Streamlined assessment module – Scattered tree assessment are trees that are located on agricultural land (i.e. grazing paddocks or in cropping paddocks) that has a highly variable ground cover composition typical of agricultural paddocks.

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.

In undertaking the scattered tree assessment, the following information is required as outlined in Appendix B.2 of the BAM 2020:

- 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 cm DBH and without hollows
  - Class 2: trees that are ≥20 cm DBH and less than the large tree benchmark for the most likely plant community type or trees that are <20 cm DBH that contain at least one 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 deal 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. 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. This conservative approach ensures that larger Class 3 and hollow-bearing trees are not missed and are captured in the offset requirement for scattered trees.

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).

2.3 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:

- Moolarben Coal Complex OC3 Extension Project Biodiversity Development Assessment Report (Niche Environment and Heritage, 2022)
- Barneys Reef Wind Farm Scoping Report (Umwelt, 2021)
- Bellambi Heights Renewable Project Scoping Report (EMM, 2022a)
- Beryl Solar Farm Biodiversity Assessment Report (NGH Environmental, 2017a)
- Birriwa Solar Farm Scoping Report (EMM, 2021a)
- Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b)
- Cobbora Coal Project Terrestrial Ecology Assessment (EMM, 2012)

- Cobbora Solar Farm Scoping Report (EMM, 2021b)
- Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a)
- Liverpool Range Wind Farm – Wind Farm Study Area Biodiversity Assessment (NGH Environmental, 2013a)
- Liverpool Range Wind Farm – Transmission Line Study Area Biodiversity Assessment (NGH Environmental, 2013b)
- Liverpool Range Wind Farm and Transmission Line Project Biodiversity Addendum Report (NGH Environmental, 2017b)
- Moolarben Coal Project Flora, Fauna and Aquatic Ecology Assessment (Moolarben Biota, 2006)
- Sandy Creek Solar Farm Scoping Report (EMM, 2022c)
- Spicers Creek Wind Farm Scoping Report (Umwelt, 2022b)
- Stubbo Solar Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2020)
- Blue Springs Road Upgrade – Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2021a)
- UCMPL Highett Road Acacia ausfeldii Management Area Monitoring Report (Eco Logical Australia Pty Ltd, 2021b)
- Ulan Solar Farm Scoping Report (Edify Energy Pty Ltd, 2022)
- Valley of the Winds Wind Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2022)
- Wilpinjong Extension Project Biodiversity Assessment Report and Biodiversity Offset Strategy (Hunter Eco, 2015)
- Biodiversity Development Assessment Report Wollar Solar Farm (NGH Environmental, 2019)
- Dunedoo 66MW Photovoltaic Solar Farm Biodiversity Development Assessment Report (NGH Environmental, 2020).

2.3.2 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 the two phase grid.

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 *Surveying threatened plants and their habitats; NSW guide for the Biodiversity Assessment Method* (Department for Planning Industry and Environment, 2020):

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

Section 5.3 outlines the threatened species survey effort in detail.

The location of targeted threatened flora survey effort is shown in Figure 14-7.

2.3.2.1 Two-phase grid-based systematic survey

It is recognised that the parallel field traverses survey method is impractical for large scale project, particularly the current project, which has an assessment area of 32,776 hectares. The two-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. The method involves phase-one establishing a grid spaced at 100 square metres that is nested within a one-square-kilometre grid. Surveys are then conducted at each survey location (100 metre grid intersect or greater if open woodland 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-two) is used to locate population extent, which allows a species polygon to be defined. This subsequent phase ensures a greater intensity of survey effort in locations where the target threatened species occurs (Department for Planning Industry and Environment 2020).

Given the linear nature of the subject land, a modified two-phase grid-based systematic survey method was adopted. A minimum 220 m wide survey corridor was established. Within the survey corridor, a linear 100 m survey effort line was established where a 40-metre diameter search area is undertaken (1,256-square-metre circular area) at each 100-metre survey location along the length of the corridor. In non-linear site-based locations a regular 100 m grid was used. Survey locations were pre-loaded onto a handheld GPS to enable an accurate approach to the survey effort.

If a target threatened species was located, a finer-scale grid survey (phase-two) was undertaken to locate population extent and enable a species polygon to be defined.

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 *Prasophyllum* sp., *Acacia ausfeldii*, and *Eucalyptus macrorhyncha* (specimens displaying some characteristics of *Eucalyptus cannonii*) were sent to a herbarium for identification. Correspondence from the Royal Botanic Gardens relating to species identifications is provided in Appendix F. All plant samples were collected under NSW scientific licence number 100630.

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 layers 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.

A summary of targeted threatened flora survey effort within the subject land is presented in Table 2-3. Approximately 3,213 km was covered during the targeted threatened flora species surveys. The bulk of the targeted survey was undertaken in spring, followed by summer and autumn coinciding with the survey months for target species. Table 2-4 shows the percentage of the study area that was able to be covered by the surveys.

Table 2-3 Summary of targeted flora survey effort per IBRA subregion

IBRA subregion	Transect length (km)				Total km
	Spring	Summer	Autumn	Winter	
Inland Slopes	804	129	28	301	**1,262**
Kerrabee	912	131	126	19	**1,188**
Liverpool Range	241	21	72	31	**365**
Pilliga	120	35	26	46	**227**
Talbragar Valley	120	0	8	43	**171**
Total km	**2197**	**316**	**260**	**440**	**3,213**

Table 2-4 Summary of targeted threatened flora survey effort coverage of the subject land

Survey method	Approximate area covered (ha)	% of Total area
Areas surveyed	1,345	71%
Areas not surveyed	114	6%
No access available	442	23%

Finer-scale grid survey

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. Finer scale grid surveys were undertaken for *Prasophyllum petilum* and *Acacia ausfeldii*.

Prasophyllum petilum

A species of *Prasophyllum* was initially recorded in the subject land at Tallawang during a random meander survey in September 2022. Three plants were observed but flowers were not open at that time. The species could not be positively identified but was considered to potentially be the target species *Prasophyllum petilum* or the similar species *Prasophyllum campestre*. The location was marked for detailed resurvey using a finer scale grid on 12 October 2022. The finer scale grid survey undertaken for *Prasophyllum petilum* involved two ecologists walking parallel transects through areas of habitat with distance between transects varying due to the realities of attempting to walk a straight line through vegetation. The October 2022 survey focused on the location of where the plants were initially found in September and in directly adjacent areas that possessed similar characteristics (i.e. open canopy with native grassy ground layer). The survey area varied in habitat condition. The open native grass dominated areas were comprehensively covered by the survey. In areas away from the main population that was recorded, and in areas of greater tree canopy with a more disturbed ground layer, the transects were widened in an attempt to effectively cover a greater area of less suitable habitat.

The survey details are summarised in Table 2-5. This survey allowed for location of 12 *Prasophyllum* sp. plants in the subject land. An additional five *Prasophyllum* sp. plants were located outside of the subject land as ecologists were walking to and from the subject land.

Table 2-5 Detail of finer scale transects undertaken for *Prasophyllum petilum* at Tallawang

No. of observers and habitat area	Distance between transects	Distance covered by transects	Time expended during survey	Average walking speed
2 ecologists Surveying a habitat area of 15 ha in size	The distance between transects done where the plants were initially located and in areas of better quality habitat varied from two metres to 10 m apart. The distance between transects widened to up to 30 m apart in areas of poorer habitat.	Observer 1 = 10.4 km Observer 2 = 9.6 km Total effort = 20 km	7 hrs 45 mins 15.5 person hours 7:45 am to 3:30 pm based on GPS data	2.4 km/h to 3.3 km/h

Prasophyllum sp. plants were also recorded in a BAM plot near Blue Springs Road at Stubbo (BAM Plot IM11) on 25 October 2022. The 20 x 20 m area of the floristic plot was intensely surveyed, and four plants were located. However, finer scale grid-based surveys were not completed at this site. Plants at this location were in a more advanced state of reproduction. Only one plant had a single flower which was partially intact. The remainder of plants had gone to seed. The optimal survey period had passed making an adequate survey at this site unable to be completed. The creation of the species polygon for *Prasophyllum petilum* at this location takes this into account.

The surveys for *Prasophyllum petilum* were undertaken within the subject land in September and October 2022. This is in line with the specific requirements for the species as outlined in BioNet (i.e. survey months differ based on location. Survey Hunter populations in September – October).

A reference population of *Prasophyllum petilum* was surveyed in the Ilford area on 24 October 2022 and the species was in flower. This suggests that the survey was done at the appropriate time under appropriate conditions for detection of the species.

Acacia ausfeldii

Acacia ausfeldii was known to occur in the subject land at Cope. This was identified during the initial review of existing information. The subject land crosses the Ulan Coal Mine Pty Ltd Highett Road *Acacia ausfeldii* Management Area. This area is subject to a Conservation Agreement which satisfies commitments made to secure biodiversity offsets relating to the Ulan Coal Mine.

Surveys were undertaken within the subject land on Ulan Mine land at Cope on 27 October 2022 and 27 and 28 February 2023 with the aim of accurately mapping the extent of the *Acacia ausfeldii* population. Approximately 39.92 km (based off GPS tracks) was covered by a team of up to six ecologists.

The survey recorded over 600 *Acacia ausfeldii* plants from the area approximately 1.3 km west of Highett Road to the area approximately 450 m to the east of Highett Road.

The majority of the surveys for *Acacia ausfeldii* were undertaken within the subject land while the species was in flower. This is in line with the specific requirements for the species as outlined in BioNet (i.e. use flowers and/or pods to identify, as species can be confused with *Acacia verniciflua*). The observers were trained in the field to distinguish between *Acacia ausfeldii* and *Acacia verniciflua* (*Acacia ausfeldii* usually differs by having a single longitudinal vein or only some phyllodes with a less pronounced secondary longitudinally vein, slightly finer punctae, more densely hairy peduncles with the white hairs more loosely spreading (the hairs are often masked by resin in *Acacia verniciflua*) and being less viscid (sticky). The photo of *Acacia ausfeldii* in Section 5.2 shows the characteristic single longitudinal vein on the phyllodes and densely hairy peduncles with the white hairs not masked by resin. All instances of *Acacia verniciflua* found within the subject land were examined closely in an attempt to distinguish it from *Acacia ausfeldii.* The *Acacia ausfeldii* plants were in bud in February 2023 making positive identification from the similar *Acacia verniciflua* possible at this time.

Table 2-6 Detail of finer scale transects undertaken for *Acacia ausfeldii* at Cope

Survey date	No. of observers and habitat area	Distance between transects	Distance covered by transects	Time expended during survey	Average walking speed
27 October 2022	6 ecologists Surveying a habitat area of 60 ha in size	The distance between transects varied from 10 m to 30 m apart.	19.12 kms	6 hrs 33 mins 39 person hours 8:33 am to 3:07 pm based on GPS data	1.25 km/h to 3.7 km/h
27 & 28 February 2023	2 ecologists Surveying a habitat area of 60 ha in size	The distance between transects varied from 10 m to 30 m apart.	20.8 kms	3 hrs 15 mins 6 hrs 5 mins 10 person hours 1:41 pm to 4:56 pm based on GPS data 7:44 am to 1:49 pm based on GPS data	1 km/h to 4 km/h

BioNet record checks

Where the subject land contained or was located near records of threatened species on BioNet, the locations of these records were visited in an attempt to verify the validity of the records.

Eucalyptus cannonii

Two BioNet records of *Eucalyptus cannonii* are present in the Durridgere SCA near Summerhill Road. The records are from 2011. The notes associated with these records are limited but indicate that they are floristics records from systematic flora survey. The spatial accuracy of both records is noted as 100 m. The records are not backed by herbarium specimens.

Samples of stringybark eucalypts from the Durridgere SCA near Summerhill Road at the two locations of the BioNet records were collected and sent to the Royal Botanic Gardens for confirmation of identification. Samples collected from the Merotherie mine site were also sent to the Royal Botanic Gardens for confirmation of identification. Collection of an adequate sample of stringybarks in 2022 and 2023 was difficult as most plants were in poor condition and fruit and buds were scarce.

The samples collected from the Durridgere SCA near Summerhill Road were identified as *Eucalyptus cannonii* or possible *Eucalyptus cannonii* x *macrorhyncha* hybrids (see correspondence in Appendix F). A definitive identification of these trees was not provided by the Royal Botanic Gardens due to the poor quality of material available at the time of collection.

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 NSW Threatened Biodiversity Data Collection (TBDC) was undertaken prior to survey.

Several 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:

- Moolarben Coal Complex OC3 Extension Project Biodiversity Development Assessment Report (Niche Environment and Heritage, 2022)
- Barneys Reef Wind Farm Scoping Report (Umwelt, 2021)
- Bellambi Heights Renewable Project Scoping Report (EMM, 2022a)
- Beryl Solar Farm Biodiversity Assessment Report (NGH Environmental, 2017a)
- Birriwa Solar Farm Scoping Report (EMM, 2021a)
- Birriwa Solar Farm Biodiversity Development Assessment Report (EMM, 2022b)
- Cobbora Coal Project Terrestrial Ecology Assessment (EMM, 2012)
- Cobbora Solar Farm Scoping Report (EMM, 2021b)
- Liverpool Range Wind Farm Biodiversity Development Assessment Report (Umwelt, 2022a)
- Liverpool Range Wind Farm – Wind Farm Study Area Biodiversity Assessment (NGH Environmental, 2013a)
- Liverpool Range Wind Farm – Transmission Line Study Area Biodiversity Assessment (NGH Environmental, 2013b)
- Liverpool Range Wind Farm and Transmission Line Project Biodiversity Addendum Report (NGH Environmental, 2017b)
- Moolarben Coal Project Flora, Fauna and Aquatic Ecology Assessment (Moolarben Biota, 2006)
- Sandy Creek Solar Farm Scoping Report (EMM, 2022c)

- Spicers Creek Wind Farm Scoping Report (Umwelt, 2022b)
- Stubbo Solar Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2020)
- Blue Springs Road Upgrade – Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2021a)
- UCMPL Highett Road Acacia ausfeldii Management Area Monitoring Report (Eco Logical Australia Pty Ltd, 2021b)
- Ulan Solar Farm Scoping Report (Edify Energy Pty Ltd, 2022)
- Valley of the Winds Wind Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2022)
- Wilpinjong Extension Project Biodiversity Assessment Report and Biodiversity Offset Strategy (Hunter Eco, 2015)
- Biodiversity Development Assessment Report Wollar Solar Farm (NGH Environmental, 2019).

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) (Department of Environment and Conservation 2004)
- Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (Department of Planning & Environment 2022)
- NSW Survey Guide for Threatened Frogs (Department of Planning, Industry & Environment 2020)
- ‘Species credit’ Threatened Bats and their Habitats. NSW Survey Guide for the Biodiversity Assessment Method (Office of Environment & Heritage 2018)
- Survey Guidelines for Australia’s Threatened Birds (Department of the Environment Water Heritage and the Arts 2010)
- Threatened Reptiles Biodiversity Assessment Method Survey Guide (Department of Planning & Environment 2022)
- Threatened Species Profile Database (Science 2022).

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.

Diurnal bird surveys

Formal 20-minute diurnal bird searches were completed within the investigation area. Diurnal bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes. 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, but generally occurred during morning hours or evening. 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.

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.

Forty five formal diurnal bird surveys were undertaken across the subject land between 2021 to 2023. The location of diurnal bird survey sites is shown in Figure 14-7 with survey periods outlined in Table 2-7.

Microchiropteran bat surveys

Ultrasonic Anabat bat detection (Titley Electronics) was used to record and identify the echolocation calls of micro bats foraging across a number of native vegetation communities in the subject land. A walkabout Anabat device was utilised as a listening and reference detector during active monitoring of survey sites during nocturnal surveys. Passive monitoring of these survey sites was also achieved by setting Anabat bat detectors to record continuously overnight.

Active walkabout Anabat bat call analysis was completed, taking into consideration 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. Passive Anabat bat call analysis is still being undertaken but will follow the aforementioned guidelines and references.

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 various species occurring in a particular locality (e.g. Corben's Long-eared Bat). Therefore, targeted harp trapping was completed for capture and release of microchiropteran bats. Site selection for the setting of harp traps included a number of rationales, such as, targeting of those habitat areas where hollow-bearing trees 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 or tunnels for others (e.g. Little Bentwing-bat) (Office of Environment & Heritage, 2018). A minimum of three harp traps were set at survey locations for either a three or four-consecutive night period, with surveys conducted in calm and hot, warm, or mild weather conditions to increase the likelihood of bat activity (Office of Environment & Heritage, 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 quite 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.

Ten microbat roost inspections, 28 nights of harp trapping, 18 hours of active Anabat recording and 64 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 2-7.

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 NSW Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide, 2022. 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 then 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).

Seventeen Koala SAT's, 23 spotlighting surveys and 51 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 2-7.

Invertebrate active searches

Targeted invertebrate active searches were undertaken via parallel transects within favourable habitat during warm weather – when the target species (Key's Matchstick Grasshopper and Golden Sun Moth) detectability was maximised.

Surveys consisted of transects across PCT habitats conducted by two people at a spacing of 10 m. In keeping with the preferred habitats of *Keyacris scurra*, surveys were focused on grassland habitats and those areas of open woodland containing grassy understorey habitats. All grasshopper species present were noted and recorded, then, where possible, were identified to species level. All moth or grasshopper species encountered, that appeared to be similar to the target species, were captured and photographed, and sent to University of Melbourne for identification confirmation.

Transects covering 270.39 km across 72 person hours of targeted invertebrate transects have been undertaken across the subject land. The location of invertebrate survey sites is shown in Figure 14-7 with survey periods outlined in Table 2-7.

Herpetofauna active searches

Herpetofauna active searches were undertaken both diurnally and nocturnally, within focused and opportunistic surveys. Diurnal reptile searches involved walking slowly (2 km/h) through suitable habitat, searching visually for active individuals while stopping, and waiting quietly at intervals (10 min) to observe moving and basking individuals. In-active individual searches involved turning over suitable ground shelter including appropriately sized rocks (e.g. Pink-tailed Legless Lizard and Striped Legless Lizard) as well as crevice inspection with a torch. Species specific survey requirements included in-active searches while the temperature was below 25°C, with the flipping of a minimum of 200 rocks per 5 ha of suitable habitat for Pink-tailed Legless Lizards. Sun-exposed sandstone rocks, as well as other suitable cover atop sandstone outcrops, were searched for Broad Headed Snakes 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 involved spotlight search for eyeshine or observable movement. Searches were focussed 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) (Department of Planning and Environment, 2022) or around specific waterbodies including slow flowing streams or pools (e.g. Sloane's Froglet, Giant Burrowing Frog), upland swamps (e.g. Giant Burrowing Frog,) rocky stream sections (e.g. Booroolong Frog) (Department of Planning, Industry and Environment, 2020). 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.

Forty-nine active herpetofauna searches, 23 spotlighting surveys and 15 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 2-7.

Herpetofauna artificial habitat surveys

Artificial cover, in the form of roof tiles, was also used for target species' observation including for Striped Legless Lizards. This including the placement of 2 grids of 10 x 5 tiles (5 m spacing between tiles) 3 months prior to survey inspections, within areas of suitable habitat. Tiles were turned over at optimum times for shallow cover, at temperatures less than 28°C, with visual observation of specimens used as well as the collection of any sloughed/shed skin for potential identification.

Five artificial habitat grids were laid out and checked a total of 16 times across the subject land. The location of artificial habitat grids is shown in Figure 14-7 with survey periods outlined in Table 2-7.

Spotlighting and stag watches

Spotlighting was used to target threatened nocturnal arboreal, flying and ground-dwelling mammals, birds, reptiles and amphibians. Spotlighting was completed after dusk generally following the targeted nocturnal searches 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 owls (e.g. Barking Owl, Masked Owl and Powerful Owl), microchiropteran bats (e.g. Corben's Long-eared Bat and Little Pied 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.

Twenty-three spotlighting surveys and 10 stag watches were undertaken across the subject land. The location of spotlighting & stag watch survey sites is shown Figure 14-7 with survey periods outlined in Table 2-7.

Call playback

Nocturnal call playback was undertaken, within appropriate habitat, to survey for nocturnal birds (e.g. Barking Owl, Bush Stone-Curlew, Masked Owl, and Powerful Owl), and arboreal mammals (e.g. Koala and Squirrel Glider). 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.

Sixty call playback surveys were undertaken across the subject land. The location of call playback survey sites is shown in Figure 14-7 with survey periods outlined in Table 2-7.

Remote camera

Remote motion sensing infra-red 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 lesser 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 m) 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. Baits 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 (Brush-tailed Rock Wallaby).

Remote camera surveys were undertaken at seven sites with a total of 1390 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 2-7.

Opportunistic sightings

Opportunistic sightings of animals 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.

2.5 Weather conditions

Table 2-7 Environmental conditions during threatened species surveys

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
September 2021						
Nocturnal	06/09/21	Anabat	7	18	–	–
Diurnal	07/09/21	Cameras	8	22	–	–
Nocturnal	07/09/21	Anabat				
Nocturnal	08/09/21	Anabat	8	22	–	–
Diurnal	14/09/21	Cameras	4	22	–	–
		Bird survey				
		Anabat				
Diurnal	15/09/21	Bird survey	1	17	–	–
Diurnal	20/09/21	Cameras	7	28.9	–	–
		Bird survey				
Nocturnal	20/09/21	Spotlighting				
		Call-playback				
Diurnal	21/09/21	Tile grids	7.8	28	–	–
August 2022						
Diurnal	22/08/2022	Reptile search	0.8	17.2	ESE 4	0
		Bird survey				
Nocturnal	22/08/2022	Call playback	0.8	17.2	ESE 4	0
		Spotlighting				
		Frog survey				
		Stag watch				
		Anabat (walkabout)				
Diurnal	23/08/2022	Reptile search	6	13.5	NW 9	0
		Bird survey				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
Nocturnal	23/08/2022	Call playback	6	13.5	NW 9	0
		Spotlighting				
		Frog survey				
		Stag watch				
		Microbat search				
Diurnal	24/08/2022	Reptile search	-0.3	14.2	W 4	4.2
		Bird survey				
Nocturnal	24/08/2022	Call playback	-0.3	14.2	W 4	4.2
		Spotlighting				
		Frog survey				
		Stag watch				
		Microbat search				
Diurnal	25/08/2022	Reptile search	1.9	19.1	WSW 9	0
		Bird survey				
Nocturnal	25/08/2022	Call playback	1.9	19.1	WSW 9	0
		Spotlighting				
		Frog survey				
		Stag watch				
Diurnal	26/08/2022	Reptile search	2	18.7	E 4	0
		Bird survey				
Nocturnal	26/08/2022	Call playback	2	18.7	E 4	0
		Spotlighting				
		Frog survey				
		Stag watch				
		Microbat search				
Diurnal	27/08/2022	Reptile search	5.8	22.1	ESE 17	0
		Bird survey				
Nocturnal	27/08/2022	Call playback	5.8	22.1	ESE 17	0
		Spotlighting				
		Frog survey				
		Anabat				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
Diurnal	28/08/2022	Reptile search	8.2	18.3	E 9	0
		Bird survey				
Nocturnal	28/08/2022	Call playback	8.2	18.3	E 9	0
		Spotlighting				
		Frog survey				
		Anabat				
		Microbat search				
Diurnal	29/08/2022	Bird survey	6.8	19.4	SE 4	0
Nocturnal	29/08/2022	Call playback	6.8	19.4	SE 4	0
		Spotlighting				
		Stag watch				
Diurnal	30/08/2022	Bird survey	11.5	20.5	NW 9	0.5
Nocturnal	30/08/2022	Call playback	11.5	20.5	NW 9	0.5
		Spotlighting				
		Frog survey				
		Stag watch				
		Anabat				
November 2022						
Diurnal	14/11/2022	Bird survey	16.3	23	WNW 33	30
Diurnal	15/11/2022	Reptile search	9.6	18	WSW 4	0.2
		Bird survey				
Diurnal	16/11/2022	Reptile search	8.5	21	W 17	0
		Bird survey				
Diurnal	17/11/2022	Reptile search	2.3	22.4	W 37	0
		Bird survey				
Diurnal	18/11/2022	Reptile search	8.2	26.7	SE 17	0
		Bird survey				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
December 2022						
Diurnal	6/12/2022	Bird survey	0.2	21.8	SW 13	0.2
Nocturnal	6/12/2022	Call playback	0.2	21.8	SW 13	0.2
		Spotlighting				
		Frog survey				
Diurnal	7/12/2022	Reptile search	9.9	22.2	W 19	0
		Bird survey				
		Koala SAT				
Nocturnal	7/12/2022	Call playback	9.9	22.2	W 19	0
		Spotlighting				
		Frog survey				
Diurnal	8/12/2022	Reptile search	12.6	22	SW 30	3
		Bird survey				
		Koala SAT				
Nocturnal	8/12/2022	Call playback	12.6	22	SW 30	3
		Spotlighting				
		Frog survey				
Diurnal	9/12/2022	Reptile search	5.8	24	NW 13	0
		Bird survey				
		Koala SAT				
Diurnal	10/12/2022	Reptile search	9.1	32.3	NW 9	0
Nocturnal	10/12/2022	Call playback	9.1	32.3	NW 9	0
		Spotlighting				
		Frog survey				
Diurnal	7/12/2022	Reptile search	9.9	22.2	W 19	0
		Bird survey				
		Koala SAT				
Nocturnal	7/12/2022	Call playback	9.9	22.2	W 19	0
		Spotlighting				
		Frog survey				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
Diurnal	8/12/2022	Reptile search	12.6	22	SW 30	3
		Bird survey				
		Koala SAT				
Nocturnal	8/12/2022	Call playback	12.6	22	SW 30	3
		Spotlighting				
		Frog survey				
Diurnal	9/12/2022	Reptile search	5.8	24	NW 13	0
		Bird survey				
		Koala SAT				
Diurnal	10/12/2022	Reptile search	9.1	32.3	NW 9	0
Nocturnal	10/12/2022	Call playback	9.1	32.3	NW 9	0
		Spotlighting				
		Frog survey				
Diurnal	11/12/2022	Reptile search	9.4	25.1	WNW 19	0
		Bird survey				
		Koala SAT				
Nocturnal	11/12/2022	Call playback	9.4	20.7	WNW 19	0
		Spotlighting				
		Frog survey				
Diurnal	12/12/2022	Bird survey	10.9	24.3	NNW 19	0.4
		Koala SAT				
Nocturnal	12/12/2022	Call playback	10.9	24.3	NNW 19	0.4
		Spotlighting				
		Frog survey				
		Stag watch				
		Anabat				
Diurnal	13/12/2022	Reptile search	7.2	21.2	SW 13	3.2
		Bird survey				
		Koala SAT				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
Nocturnal	13/12/2022	Call playback	7.2	21.2	SW 13	3.2
		Spotlighting				
		Anabat				
Diurnal	14/12/2022	Camera trap installation	9.4	23.6	WSW 11	0
Diurnal	15/12/2022	Camera trap installation	5.8	23.1	SW 13	0
Diurnal	16/12/2022	Camera trap installation	9.9	24.1	NE 19	0
January 2023						
Diurnal	17/01/2023	Anabat install	17.1	32.4	NE 13	4.4
Nocturnal		Harp trap				
Diurnal	18/01/2023	Rebait cameras	21.3	24.6	ESE 4	0
Nocturnal		Harp trap				
Nocturnal	19/01/2023	Rebait cameras	18.7	20.7	SE 13	8.2
Diurnal		Harp trap				
Nocturnal	20/01/2023	Anabat	14.8	24.2	ESE 20	2.2
		Rebait cameras				
		Harp trap				
Diurnal	21/01/2023	Anabat install	14.5	28.7	ENE 15	0
Nocturnal		Call playback				
		Spotlighting				
		Anabat				
		Harp trap				
Nocturnal	22/01/2023	Harp trap	-	23.7	E 33	0
Diurnal	23/01/2023	Reptile search	14.0	26.3	E 17	0
		Koala SAT				
Nocturnal		Harp trap	14.0	26.3	E 17	0
February 2023						
Diurnal	06/02/2023	Koala SAT	8.0	34.1	E 19	0
Nocturnal	06/02/2023	Call playback				
		Spotlight				
		Anabat				
		Harp trap				

Survey period	Date	Survey undertaken (e.g. method/targeted species)	Temperature (°C)		Wind direction and speed (km/h) at 9 am	Rainfall since 9 am (mm)
			Min.	Max		
Nocturnal	07/02/2023	Call playback	17.7	31.7	NE 19	0
		Spotlight				
		Anabat				
		Harp trap				
Diurnal	08/02/2023	Reptile search	15.9	31	E 17	0
		Bird survey				
Nocturnal	08/02/2023	Call playback	15.9	31	E 17	0
		Spotlight				
		Anabat				
		Harp trap				
Diurnal	09/02/2023	Collect cameras	17.2	25.1	N 13	25.6
Nocturnal	09/02/2023	Call playback				
		Spotlight				
		Anabat				
		Harp trap				

Notes: Diurnal surveys take place between 6:00 AM to 5:00 PM (depending on daylight savings). Nocturnal surveys take place between 6:00 PM–1:00 AM (depending on daylight savings). Weather data sourced from Bureau of Meteorology – Gulgong WS (062013), Mudgee WS (062101), Dunedoo WS (064009)

2.6 Limitations

Ecological impact assessment is based extensively on judgment and opinion. It is far less exact 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 proposal, 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 one 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 NSW State Vegetation Type Map (SVTM) release C1.1.M1. This mapping data provides a guide to the occurrence and distribution of Plant Community Types, 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 topologies differ from central and western NSW classification topologies
- some 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 was used. This is discussed further in Section 4.5.1.

2.6.2 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 site investigation program and any later laboratory testing are extrapolated across the subject land to form an overview and scientific opinion is made about overall conditions and their likely behaviour with regard to the proposed development. 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 plant community types 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.

2.6.3 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 Kerrabee) as a result of access restrictions to private property. 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.

2.6.4 Reliance on data

This report is based on the assumption that threatened species data published in the TBDC, BioNet Atlas, BioNet Vegetation Information System, SPRAT 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.

2.6.5 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 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 surrounding assessment area. 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 Section 14 of this BDAR 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 below 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 m buffer surrounding the outside edge of the boundary of the subject land, or
- 500 m along each side of the centre line of a linear-shaped proposal.

The assessor must establish the assessment area using GIS software.

As this is a mixed linear-shaped and site based proposal, a buffer of 500 m along each side of the centre line of the proposal has been implemented to demarcate the assessment area and a 1,500 m buffer placed around site features for this BDAR.

The Location Map (see Figure 14-2) shows the boundary of the subject land, the landscape features identified below in Section 3.2 of this BDAR, 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. The assessment area consists of a 500 m buffer along the centre line of the proposal and a 1,500 m buffer placed around site features.

3.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figure 14-1 Site Map and Figure 14-2 Location Map, respectively. A discussion of relevant landscape features is provided below.

Field reconnaissance was used to confirm the extent and condition of landscape features on the subject land. 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 Topographic and hydrological setting, geology and soils

The subject land crosses through three mapped IBRA regions and five IBRA subregions (see Section 3.2.2 below). A description of the topographic and hydrological setting, geology and soils within the subject land is provided here.

3.2.1.1 Brigalow Belt South

The Brigalow Belt South bioregion forms the southern extremity of the Qld Brigalow Belt and consists of landscapes derived from both extensive basalt flows and quartz sandstones so has very variable soils and vegetation (NSW National Parks and Wildlife Service, 2003).

Several major rivers flow through the bioregion including the MacIntyre, Gwydir, Namoi, Castlereagh, Goulburn, Talbragar and Macquarie Rivers, their catchments forming an integral part of the Murray-Darling River System (NSW National Parks and Wildlife Service, 2003). The Liverpool Range in the southeastern corner of the bioregion feeds the headwaters of the Hunter and Namoi Rivers (NSW National Parks and Wildlife Service, 2003). Of relevance to the subject land is the Talbragar River (part of the Macquarie catchment) and the Liverpool Range (split across the Macquarie catchment and Hunter catchment).

The Brigalow Belt South bioregion's bedrock is mostly composed of Jurassic quartz sandstone and shale, occasionally with conglomerate or basalts (NSW National Parks and Wildlife Service, 2003). The sandstone formations create a low terrain of cliffs and plateaus near stream headwaters, with colluvial fans of coarse sand and gravel in broader valleys (NSW National Parks and Wildlife Service, 2003). The subject land mostly contains the broader valleys adjacent to sandstone formations in this bioregion. The landscape becomes gentler further down valley, eroded into rolling plains and alluvial plains with evidence of larger stream courses (NSW National Parks and Wildlife Service, 2003). These alluvial plains are important water intake beds for the Great Australian Basin (NSW National Parks and Wildlife Service, 2003). Some of the sediments from the Jurassic period include interbedded volcanics, which can have a significant impact on soil and vegetation (NSW National Parks and Wildlife Service, 2003). One notable feature of the subject land is the extensive basalt flows of the Liverpool Range (relevant to the Liverpool Range Stage and the Valley of the Winds Stage). The Liverpool Range is the largest province of lava fields in New South Wales, covering an area of over 6,000 km^2 and dating back 32 to 40 million years (NSW National Parks and Wildlife Service, 2003). The major lava field of the Liverpool Range with its important ecosystems is a main feature of interest in the Brigalow Belt South (NSW National Parks and Wildlife Service, 2003).

Within the Brigalow Belt South bioregion the majority of the subject land is located within the valley floors and rolling hills on sedimentary rocks and volcanics. These areas (particularly the Liverpool Range volcanics) have been subject to extensive modification through agriculture. The subject land does not cross any significant areas of Pilliga Sandstone that contain extensive outcropping but there are some large areas of intact native vegetation.

The specific geology of the subject land within the Brigalow Belt South is mapped by the Gulgong 100K Rock Unit, Cobbora 100K Rock Unit and Gilgandra 250K Rock Unit mapping as:

- Gunnedah Basin (Purlawaugh Formation) – Ferruginised red siltstone, carbonaceous mudstone, fine to medium grained lithic quartz sandstone, ironstone, minor coal.
- Gunnedah Basin (Boulderwood Formation) – Thick-bedded lithic-quartz conglomerate, coarse pebbly lithic-quartz sandstone, and siltstone.
- Gunnedah Basin (Dunedoo Formation) – Pebbly quartz-lithic sandstone to conglomerate, breccia, white claystone, thin coal seams.
- Surat Basin (Napperby Formation) – Siltstone thinly interbedded with fine-medium grained lithic-quartz sandstone, minor conglomerate; bioturbation and burrows are common.
- Surat Basin (Pilliga Sandstone) – Massive to cross-bedded coarse pebbly lithic-quartz sandstone, minor fine grained sandstone and siltstone.
- Tunnabutta Group – Shale, slate and minor volcanic-rich sandstone.

- Tunnabutta Group (Dungaree Volcanics) – Rhyolite to dacite lava, autoclastics, and volcaniclastics, rare latitic to trachytic lava.
- Cainozoic Units – Tholeiite, alkali basalt, basanite, nephelinite, limburgite, trachyte, rare obsidian.

In terms of soils the sandstone ridge tops have thin, sandy, and stony soils with low nutrients, while downslopes have soils with contrasting textures and clay subsoils (NSW National Parks and Wildlife Service, 2003). These soils can be found in the subject land in the Liverpool Range Stage Valley of the Winds Stage. Valley floors have sediments with deep sands, rough grey clays, or high salt concentration (NSW National Parks and Wildlife Service, 2003). These soils can be found in the subject land in the Liverpool Range Stage Valley of the Winds Stage. In basaltic areas (e.g. the Liverpool Range Stage and Valley of the Winds Stage), hilltops have well-structured clays with high nutrient content, while slopes and valley floors have similar but thicker clay soils (NSW National Parks and Wildlife Service, 2003).

3.2.1.2 NSW South Western Slopes

The NSW South Western Slopes Bioregion is a large area of foothills and ranges along the western side of the Great Dividing Range (NSW National Parks and Wildlife Service, 2003). Its variable rock types, topography, and rainfall patterns affect the soils and vegetation (NSW National Parks and Wildlife Service, 2003). The area includes narrow valleys with terraces and local sedimentation, and its geology and soils are complex and diverse, mainly composed of granites and meta-sediments with texture contrast soils (NSW National Parks and Wildlife Service, 2003).

The bioregion includes parts of the Murray, Murrumbidgee, Lachlan and Macquarie River catchments (NSW National Parks and Wildlife Service, 2003). Of relevance to the subject land is the Macquarie River catchment with the majority of the subject land within the NSW South Western Slopes Bioregion falling within this catchment. A small area of the subject land within the NSW South Western Slopes Bioregion falls within the Hunter catchment at Cope.

The NSW South Western Slopes Bioregion lies within the Lachlan Fold Belt, a complex series of sedimentary and volcanic rocks (NSW National Parks and Wildlife Service, 2003). Granites are common and form either central basins or high plateau features (NSW National Parks and Wildlife Service, 2003). Hilly landscapes are controlled by structural features (bedding and faults), and valleys are either in granite or softer rocks such as shale, phyllite, or slate (NSW National Parks and Wildlife Service, 2003). Limited areas of Tertiary basalt with underlying river gravels and sands occur, and as the country becomes lower to the west and north, wide valleys filled with Quaternary alluvium and occasional lakes become the dominant landscape form (NSW National Parks and Wildlife Service, 2003).

Within the NSW South Western Slopes Bioregion the majority of the subject land is located within the valley floors and rolling hills on Gulgong Granite and Tunnabutta Group sandstones with outcropping of Narrabeen Group sandstones and associated Illawarra Coal Measures. These areas have been subject to extensive modification through agriculture.

The specific geology of the subject land within the NSW South Western Slopes Bioregion is mapped by the Gulgong 100K Rock Unit and Cobbora 100K Rock Unit mapping as:

- Gunnedah Basin (Dunedoo Formation) – Pebbly quartz-lithic sandstone to conglomerate, breccia, white claystone, thin coal seams.
- Tunnabutta Group – Shale, slate, quartz and felsic volcanic-rich sandstone.
- Tunnabutta Group – Limestone and limestone breccia.
- Tunnabutta Group (Dungaree Volcanics) – Rhyolite to dacite lava, autoclastics, and volcaniclastics, rare latitic to trachytic lava.
- Cabonne Group (Tucklan Formation) – Dark mudstone, basalt-latite boulder conglomerate or breccia, lithic sandstone, rare chert.
- Carboniferous Intrusions, Gulgong Plutonic Suite (Gulgong Granite) – Leucocratic medium-coarse grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite.
- Carboniferous Intrusions, Gulgong Plutonic Suite (Ulan Quartz Monzonite) – Megacrystic biotite subporphyritic quartz monzonite.
- Sydney Basin (Illawarra Coal Measures) – Quartz-lithic sandstone, mudstone (sporadically carbonaceous), claystone, coal, torbanite, rhyolitic tuff, sporadic lenses of polymictic conglomerate.

- Sydney Basin (Narrabeen Group) – Pebbly lithic quartz to quartz sandstone, red-brown to green mudstone, sporadic lenses of quartz paraconglomerate.
- Cainozoic Units (Cainozoic undifferentiated) – Unconsolidated quartz and quartz lithic gravel, sand, sand, silt and clay.
- Cainozoic Units – Colluvial polymictic gravel, sand, silt and clay; may include some eluvial in-situ regolith deposits.
- Cainozoic Units – Alluvial silt, clay and sand, variable humic content, sporadic pebble- to cobble-sized unconsolidated conglomeratic lenses.

The soil pattern in this landscapes starts with shallow, stony soils on hills and ridges and progresses to texture contrast soils downslope (NSW National Parks and Wildlife Service, 2003). These shallow soils can be found in the subject land in areas such as the low hills east of Barneys Reef. Valley floors contain subsoils with poor drainage and may accumulate soluble salts (dryland salinity is widespread). Alluvial sands and loams are common, but alluvial clays become more important near the Riverine Plain (NSW National Parks and Wildlife Service, 2003). These alluvial soils can be seen most easily in the subject land at Tallawang.

3.2.1.3 Sydney Basin

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 (NSW National Parks and Wildlife Service, 2003). It consist of sandstones and shales of Permian to Triassic age that have been uplifted and gently folded during the formation of the Great Dividing Range (NSW National Parks and Wildlife Service, 2003). Coastal erosion has created a landscape of deep cliffed gorges and remnant plateaus (NSW National Parks and Wildlife Service, 2003). The vegetation is influenced by differences in soil and an east-west rainfall gradient (NSW National Parks and Wildlife Service, 2003).

The Sydney Basin Bioregion includes a significant proportion 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 (NSW National Parks and Wildlife Service, 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 (NSW National Parks and Wildlife Service, 2003). In the south and west the Basin ends in cliff lines formed on sandstones and conglomerates of the basal Permian sediments (NSW National Parks and Wildlife Service, 2003). In the Kerrabee subregion there are sandstone plateau with cliffed edges grading into wide valleys with sandy alluvial fill (NSW National Parks and Wildlife Service, 2003). Volcanic necks form circular depressions or low domes depending on relative erodibility of adjacent rock types (NSW National Parks and Wildlife Service, 2003). The considerable range of rock types, topography and climates in the Sydney Basin has resulted in a large variety of soils and vegetation communities (NSW National Parks and Wildlife Service, 2003). The Kerrabee subregion, where the subject land is found, is composed of Triassic Narrabeen Group quartz and lithic sandstones and shales, with coal measures exposed in valley floors, volcanic necks of Jurassic age, small areas of ridge top Tertiary basalt flows, and Quaternary sandy alluvium is present in main valleys (NSW National Parks and Wildlife Service, 2003).

Within the Sydney Basin Bioregion the subject land is located within the valley floors and rolling hills. These areas have been subject to extensive modification through agriculture and mining. Importantly, the subject land does not cross the elevated sandstone plateaus.

The specific geology of the subject land within the Sydney basin Bioregion is mapped by the Gulgong 100K Rock Unit mapping as:

- Surat Basin (Pilliga Sandstone) – Massive to cross-bedded coarse pebbly lithic-quartz sandstone, minor fine grained sandstone and siltstone.
- Surat Basin (Purlawaugh Formation) – Ferruginised red siltstone, carbonaceous mudstone, fine to medium grained lithic quartz sandstone, ironstone, minor coal.

- Carboniferous Intrusions, Gulgong Plutonic Suite (Ulan Quartz Monzonite) – Megacrystic biotite subporphyritic quartz monzonite.
- Sydney Basin (Illawarra Coal Measures) – Quartz-lithic sandstone, mudstone (sporadically carbonaceous), claystone, coal, torbanite, rhyolitic tuff, sporadic lenses of polymictic conglomerate.
- Sydney Basin (Narrabeen Group) – Pebbly lithic quartz to quartz sandstone, red-brown to green mudstone, sporadic lenses of quartz paraconglomerate.
- Sydney Basin (Shoalhaven Group) – Polymictic conglomerate, lithic sandstone, shale, siltstone, claystone, minor carbonate and evaporite.
- Cainozoic Units – Colluvial polymictic gravel, sand, silt and clay; may include some eluvial in-situ regolith deposits.
- Cainozoic Units – Tholeiite, alkali basalt, basanite, nephelinite, limburgite, trachyte, rare obsidian.
- Cainozoic Units – Alluvial silt, clay and sand, variable humic content, sporadic pebble- to cobble-sized unconsolidated conglomeratic lenses.

Soils vary from shallow sandy profiles and bare rock outcrop on plateau, to sandy texture contrast soils on slopes, harsh texture contrast soils on coal measures, and deep sands and loams on alluvium (NSW National Parks and Wildlife Service, 2003). Basalts have red brown structured loams and clay loams, often buried by slope debris where the volcanic necks form depressions (NSW National Parks and Wildlife Service, 2003).

3.2.2 IBRA bioregions and IBRA subregions

The subject land crosses through three mapped IBRA regions and five IBRA subregions (see Table 3-1):

- Brigalow Belt South (Talbragar Valley, Pilliga, Liverpool Ranges)
- NSW South Western Slopes (Inland Slopes)
- Sydney Basin (Kerrabee).

This was determined using the Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions) and Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions) mapping.

An overview of the extent of each IBRA region and subregion in the subject land and assessment area is presented in Table 3-1 and Figure 14-1.

Table 3-1 IBRA regions and subregions

IBRA region	IBRA subregion	Subject land (ha)	Assessment area (ha)
NSW South Western Slopes	Inland Slopes	1,312	12,562
Sydney Basin	Kerrabee	963	10,335
Brigalow Belt South	Liverpool Ranges	133	3,127
	Pilliga	225	4,847
	Talbragar Valley	240	4,302

3.2.3 Rivers, streams, estuaries and wetlands

Table 3-2 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 the Site Map provided in Chapter 14 of this BDAR as Figure 14-1 and the Location Map provided as Figure 14-2.

Photos providing some examples of the waterways in the assessment area are provided in Photo 3-1 to Photo 3-6.

Table 3-2 Watercourses on, adjacent to, and downstream of the subject land within the assessment area

Strahler Order	Watercourse names
9	Talbragar River
8	None
7	Sandy Creek, Spring Flat Creek, Wollar Creek
6	Barigan Creek, Moolarben Creek
5	Bens Creek, Cainbil Creek, Cockabutta Creek, Copes Creek, Cumbo Creek, Murragamba Creek
4	Four Mile Creek, Moreton bay Creek, Stubbo Creek, Tallawang Creek, Tucklan Creek
3	Back Creek, Deadmans Creek, Fords Creek, Murrumbline Creek, Patricks Creek, Pine Creek, Snakes Creek, White Creek
2	Blackheath Creek, Browns Creek, Curryall Creek, Huxleys Creek, Laheys Creek, Mona Creek, Native Dog Creek, Planters Creek, Sportsmans Hollow Creek, Turill Creek, Wagrobil Creek, Wilpinjong Creek
1	Ironbark Creek, Narrow Creek, Salty Creek, Yellow waterholes gully and a number of unnamed watercourses

Photo 3-1 Laheys Creek, a larger 4th order stream

Photo 3-2 Browns Creek, a small1st ephemeral order stream

Photo 3-3 Wattle Creek, a small 1st order stream subject to significant erosion

Photo 3-4 Cockabutta Creek, a 5th order stream in full flow

Photo 3-5 The Talbragar River, a large 6th order stream in flood

Photo 3-6 An ephemeral unnamed 1st order stream

3.2.4 Habitat connectivity

A variety of definitions have been proposed for ‘habitat connectivity’ [see (Merriam 1984, Taylor, Fahrig et al. 1993, With, 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).

A large part of the project would occur on an area already affected by past clearing and would likely not affect habitat connectivity. However, the project is also planned to go through, or past 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 aerial species such as birds and bats, through the interaction with the proposed 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 affected (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 aerial species.

In the Inland Slopes IBRA subregion, a movement corridor appears to exist from Tuckland State Forest (and vegetation to the north) south through Goodiman State Conservation Area to Yarrobil National Park. The alignment is planned to go through vegetation that adjoins Tuckland State Forest to the north and south, potentially functionally affecting fauna movement in this area. It is highly likely Tuckland State Forest is used by birds and bats for movement between the conservation area and national park, and the project would likely impact these aerial species to a degree.

In the Kerrabee IBRA subregion, movement likely occurs between the Munghorn Gap Nature Reserve and the Goulburn River National Park. The alignment between these two areas could introduce another movement barrier for aerial species. However, the landscape currently retains functional connectivity for birds and bats in the presence of existing coal mine and power line infrastructure. This warrants attention since three threatened bat species (Large Bent-wing bat, Eastern Cave bat, Large-Eared Pied bat) have been located near the rocky escarpments near the planned alignment. These species forage in the forested areas and are likely to use this movement path. Threatened birds have also been located in this area (including the Diamond Firetail, Dusky Woodswallow, the Brown Treecreeper, and the Speckled Warbler). Functional connectivity is likely to remain after construction of the project.

The majority of the subject land has been extensively cleared for agriculture and scattered with a mosaic of fragmented patches of woodland. The importance of these patches should not be generally disregarded. The threatened squirrel glider, for example, does not need continuous habitat and can thrive in remnant linear roadside reserves (van der Ree 2002). The long-term viability of these remnant habitat patches is likely to remain post-construction.

In summary, the project is planned to occur in some likely movement corridors, where it may affect aerial 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 aerial or terrestrial species.

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

There is a known fossil site, the Talbragar fossil site, located about 30 km northeast of Gulgong at Bungaba. The site is registered as Crown Land Reserve for the preservation of fossils. The subject land will not impact on the Talbragar fossil site directly or indirectly. Another fossil site is located near to the subject land west of the Tuckland State Forest (known as Southern boundary of Boyce’s selection, Talbragar River) but the subject land will not impact on this site directly or indirectly.

The assessment area contains a number of cliff lines, caves, crevices and rocks. The location of cliff lines, caves and rocky areas were mapped during the field survey and from interpretation of aerial photos and maps and are shown in Figure 14-1 and Figure 14-2.

The underlying geology drives the presence of these features as follows:

- Narrabeen Group Sandstone – The pebbly lithic quartz to quartz sandstone, red-brown to green mudstone, sporadic lenses of quartz paraconglomerate from Barneys Reef Road to Merotherie Road provide cliff lines, crevices, rocks (see Photo 3-7 and Photo 3-9). Cliffs of Narrabeen Sandstone are also present from east of Blue Springs Road to Ulan, north of the Sandy Hollow Gulgong Railway in the Goulburn River National Park and in the south east near Wollar.
- Illawarra Coal Measures – The Quartz-lithic sandstone, mudstone (sporadically carbonaceous), claystone, coal, torbanite, rhyolitic tuff, sporadic lenses of polymictic conglomerate from Barneys Reef Road to Merotherie Road provide rocky outcrops with rocks and crevices (see Photo 3-11). Illawarra Coal Measures are also present from east of Blue Springs Road to Ulan and north of the Sandy Hollow Gulgong Railway in the Goulburn River National Park.
- Pilliga Sandstone – The massive to cross-bedded coarse pebbly lithic-quartz sandstone, minor fine grained sandstone and siltstone in the area of the Valley of the Winds generator connector at Leadville contains a cave and cliff line with crevices and rocks (see Photo 3-8).

- Boulderwood Formation – The thick-bedded lithic-quartz conglomerate, coarse pebbly lithic-quartz sandstone, and siltstone west of Spring Ridge Road at Dunedoo provide exposed rocks and crevices on low hills.
- Gulgong Granite – Leucocratic medium-coarse grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite areas provide exposed granite outcrops and surface boulders. This is particularly apparent at Tallawang.
- Ulan Quartz Monzonite – The megacrystic biotite subporphyritic quartz monzonite hills at Cope west of Ulan provide areas of exposed rocky outcrops and large surface boulders (see Photo 3-10).
- Volcanic hills (basalt) – Tholeiite, alkali basalt, basanite, nephelinite, limburgite, trachyte, rare obsidian on the Liverpool Range provides small areas of outcropping and small boulder fields (see Photo 3-12) some of which are likely to be natural while others are the result of agricultural intervention (piling of small rocks into mounds).

Photo 3-7 Sandstone cliffs are present to the south of the subject land on Barneys Reef (Narrabeen Group sandstone)

Photo 3-8 A sandstone cave in Pilliga Sandstone in the assessment area near the Valley of the Winds generator connector showing open entrance

Photo 3-9 Rocky sandstone outcropping is present on the Narrabeen Group Sandstone associated with Barneys Reef

Photo 3-10 Quartz Monzonite outcropping and large boulders are present in the subject land near Ulan

Photo 3-11 Rocky sandstone habitats are present in the Merotherie Hub

Photo 3-12 Piles of small basalt boulders are common on the basalt hills in the Liverpool Range

3.2.6 Areas of outstanding biodiversity value

There are no areas of outstanding biodiversity value, as identified under the BC Act, within the subject land or assessment area.

3.2.7 NSW (Mitchell) landscape

Table 3-3 Summary of NSW (Mitchell) landscapes within the proposal study area

NSW (Mitchell) landscapes	Assessment area (ha)	Subject land (ha)
Cassilis Slopes	7,871	452
Cope Hills Granite	7,073	778
Dubbo Basalts	86	8
Goonoo Slopes	4,596	249
Goulburn River Gorges	120	10
Gulgong Ranges	2,338	214
Lees Pinch Foothills	626	54
Liverpool Range Valleys and Footslopes	4,031	215
Talbragar – Upper Macquarie Terrace Sands and Gravels	4,623	482
Upper Goulburn Valleys and Escarpment	3,760	409
Wollemi Ranges	49	0

3.2.8 Additional landscape features identified in SEARs

No additional landscape features were identified in the SEARs.

3.3 Native vegetation cover

Table 3-4 summarises the extent of native vegetation cover within the assessment area. 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 (Current Release C1.1.M1.1 (December 2022)) (reference)) combined with the field verified vegetation mapping within the subject land.

The assessment area contains areas that are not native vegetation. Areas that were considered to be not native vegetation were:

- buildings and roads
- cropping land that had recently been ploughed and seeded
- improved pastures dominated by exotic pasture species.

Table 3-4 Native vegetation cover in the assessment area

Assessment area (ha)	35,172
Total area of native vegetation cover (ha)	16,762
Percentage of native vegetation cover (%)	48%
Class (0–10, >10–30, >30–70 or >70%)	>30–70% cover class

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 BAM with detailed requirements outlined in section 3.2 of the BAM 2020 Operational Manual.

Native vegetation extent within the subject land is illustrated in Figure 14-8 (see Chapter 14). Native vegetation covers approximately 58% of the subject land.

4.1.1 Changes to the mapped native vegetation extent

The extent of native vegetation in 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. In most cases the mapped boundaries of native vegetation differ from the boundaries presented in the SVTM, particularly the mapping of PCT 511: Queensland Bluegrass – Redleg Grass – Rats Tail Grass – spear grass – panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion. In many instances, this mapping of PCT 511 is incorrect as it is located in areas of exotic dominant pasture or Category 1 – exempt land. 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 (see Chapter 14).

4.1.2 Areas that are not native vegetation

The subject land contains areas that are not native vegetation. These areas are illustrated in Figure 14-6 and Figure 14-8.Areas that were considered to be not native vegetation were:

- buildings and roads
- cropping land that had recently been ploughed and seeded (see example in Photo 4-1)
- improved pastures dominated by exotic pasture species (see example in Photo 4-2, Photo 4-3 and Photo 4-4).

Areas of the subject land that are not native vegetation are illustrated in Figure 14-6 (see Chapter 14).

Photo 4-1 An example of an area mapped as not native vegetation in the area of the proposed Elong Elong Hub showing cleared land ploughed and cropped

Photo 4-2 An example of an area mapped as not native vegetation in the area of the proposed Merotherie Energy Hub showing improved pasture dominated by *Lolium perenne* and *Hordeum leporinum*

Photo 4-3 Improved pasture in the Valley of the Winds arm mapped as not native vegetation

Photo 4-4 Exotic pasture dominated by *Malva parviflora* and *Trifolium* spp. east of the proposed Merotherie Energy Hub

4.1.2.1 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 BC Act, the BAM excludes the assessment of impacts on category 1-exempt land (within the meaning of Part 5A of the *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 BCS; however this is currently incomplete, and no category 1 land has been mapped within NSW.

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 this transitional period in accordance with Section 60F. The method applied to determine the categorisation is provided below.

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 three main categories:

- Category 1 – exempt land is land where native vegetation can be cleared without approval from Local Land Services.
- Category 2 – land is divided into:
  - Category 2 – regulated land is Category 2 land that is not Vulnerable or Sensitive regulated land. You may need 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 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 Land Management Code (Native Vegetation) Code 2018, and a limited range of allowable activities is permitted.
- Excluded land – is land where the Land Management (Native Vegetation) Code 2018 and allowable activities do not apply.

Land category criteria

Each land category is determined by various criteria as outlined in the Local Land Services Act 2013 (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:

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

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

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

Land is to be designated as Category 1 – exempt land if the land is biodiversity certified under Part 8 of the Biodiversity Conservation Act 2016 or under any Act repealed by that Act.

However:

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
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
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.

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

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.

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.

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.

Determinations may be made by the Environment Agency Head that land was cleared of native vegetation as at 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).

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.

Biodiversity assessment method requirements

In accordance with section 6.8 (3) of the BC Act, when applying the Biodiversity Assessment Method (BAM) the assessor is to exclude the assessment of impacts of any clearing of native vegetation and loss of habitat on Category 1 – exempt land (within the meaning of Part 5A of the LLS Act), other than any impacts prescribed by the regulations under section 6.3.

All other rural lands that do not meet the definition of Category 1 – exempt land form part of the assessment area subject to the BAM.

Assessment of Category 1 exempt land

The LLS Act publishes maps (the 'native vegetation regulatory map) that show areas of the State to which Part 5A of the LLS Act applies, which are designated as Category 1 – exempt land. However, the native vegetation regulatory map is currently incomplete, and Category 1 – exempt land has not yet been mapped within NSW.

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.

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

In defining the area Category 1 – exempt land, an initial analysis of the following spatial datasets has been 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, version 3.0, published 26 March 2021
- Zoning: EPI LEP LZN Land Zoning, current at 23 April 2021
- Travelling Stock Routes, LPI, supplied by ARTC 30 October 2020
- State Vegetation Type Map (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 undertaken to confirm Category 1 or precautionary approach adopted and Category 2 assigned.

Each of these datasets was 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 the following:

1 An initial inclusion of all land use classifications 3, 4 and most of 5 as mapped by the Land use: NSW Land Use 2017 v1.2, published June 2020 (consistent with figure 7 of the NVR method statement) (OEH 2017).

The land use classification was subsequently overlayed with the Transitional Native Vegetation Regulatory Map, version 3.0, published 26 March 2021 and any areas of the subject land mapped as Category 2 lands were excluded. This is followed by the exclusion of areas of extant remnant vegetation as published within the Woody vegetation: NSW Woody Vegetation Extent 2011, (OEH, 2015), NSW Native Vegetation Extent 5m raster v1.2 dataset, State-wide Landcover and Tree Survey (SLATS) clearing for NSW and areas of SVTM mapped native derived grassland potentially corresponding with a Critically Endangered Ecological Community (CEEC) will be included within the Category 2 lands.

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

Finally, in areas of conflicting data, or potential derived native grasslands characteristic of a CEEC, a site-based verification undertaken to confirm 'Low conservation grasslands' and Category 1.

A summary of this process is provided in Figure 4-1.

The outcome of native vegetation regulatory mapping category 1-exempt land is presented in illustrated in Figure 14-6 (see Chapter 14). These areas have been identified through a combination of desktop modelling and field survey (where possible).

All category 1 lands identified within the subject land are exempt from BAM assessment and are not considered further in this BDAR.

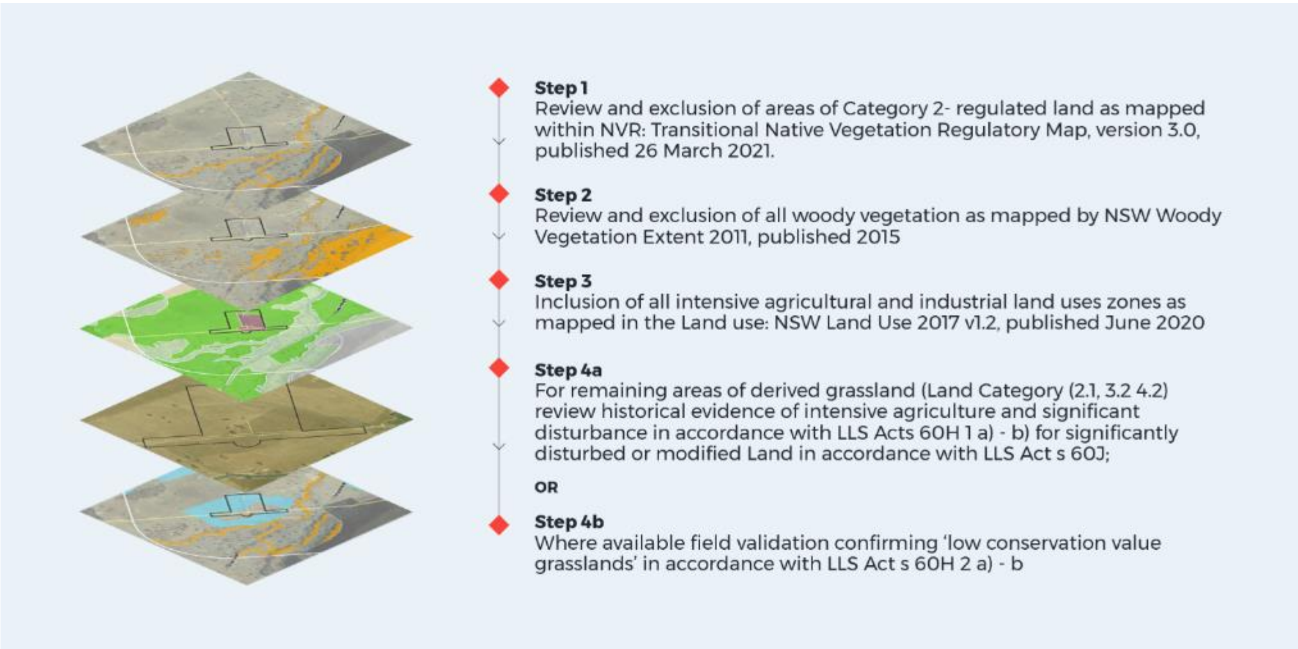


Figure 4-1 The approach used in the BDAR to identify Category 1 – exempt land

The approach used has been inherently conservative as agreed with BCS and as such lands identified as Category 1 are highly disturbed and could not contain native vegetation, such as the examples shown in the photos below.

Photo 4-5 An example of Category 1 – Exempt land at the proposed Elong Elong Hub showing recently ploughed soil

Photo 4-6 Ploughed land assigned to Category 1 – Exempt land at the proposed Elong Elong Hub

Photo 4-7 An example of Category 1 – Exempt land at the proposed Merotherie Hub showing recently ploughed soil

Photo 4-8 Ploughed land assigned to Category 1 – Exempt land at the proposed Merotherie Hub

Photo 4-9 Ploughed land assigned to Category 1 – Exempt land on the Valley of the Winds arm

Photo 4-10 Cropping land assigned to Category 1 – Exempt land on the Valley of the Winds arm

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 in Chapter 14. There were 22 PCTs identified within the subject land during the field survey.

The work undertaken for this BDAR was done before the Revised East Coast PCT Classification was deployed and live in the BAM Calculator. As such, under the transitional arrangements for in-progress assessments the pre-Eastern NSW PCTs have been applied.

Native vegetation has been recorded by vegetation formation, class and associated PCT. The native vegetation recorded within the subject land has been assigned to four vegetation formations and eight vegetation classes that occur across the Brigalow Belt South (Talbragar Valley, Pilliga, Liverpool Ranges), NSW South Western Slopes (Inland Slopes), and Sydney Basin (Kerrabee) IBRA regions. The recorded vegetation formations and vegetation classes in the subject land are:

- Dry Sclerophyll Forests (Shrubby sub-formation)
  - Western Slopes Dry Sclerophyll Forests
  - Southern Tableland Dry Sclerophyll Forests
  - North Coast Dry Sclerophyll Forests
- Dry Sclerophyll Forests (Shrub/grass sub-formation)
  - North-west Slopes Dry Sclerophyll Woodlands
- Grassy Woodlands
  - Western Slopes Grassy Woodlands
  - Coastal Valley Grassy Woodlands
  - Floodplain Transition Woodlands
- Forested Wetlands
  - Eastern Riverine Forests.

Detailed descriptions of each PCT within each vegetation formation and vegetation class are provided in the following subsections. There were 22 PCTs identified within the subject land.

Some PCTs in the subject land are currently poorly described in the BioNet Vegetation Classification database and have been identified with a very low classification confidence level. The description provided for many PCTs provide few species from each structural layer to aid in identification of the PCT. Other described PCTs provide a single broad definition that encompasses several distinct vegetation types. Some PCTs are very similar in structure, species composition, and landscape position and in this case the vegetation was assigned to a PCT based on the judgement of the assessor based on in field observations. Some PCTs represent different interpretations of what is fundamentally the same vegetation type in different IBRA regions (e.g. see PCT 1176/PCT 1177 and PCT 483/618) and have been developed based off discrete local mapping projects. In reality, the differences in vegetation assigned to the same PCT in different adjacent bioregions are not visible on the ground in terms of species or structure. In many cases there is no distinct linear boundary to assist in determining the distribution of different PCTs within the subject land, so a line of best fit has been applied. The difficulty in assigning native vegetation to PCTs is compounded by the disturbed nature of the vegetation in many areas and the broad ecotones that are present between PCTs.

Table 4-1 PCTs identified within the subject land in the Inland Slopes IBRA subregion

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
81	Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	15.78
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	0.18
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	76.27
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	179.56
281	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	236.55
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	78.52
461	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	9.75
478	Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	0.68
479	Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	26.25
481	Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	11.10
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	52.18
	Total area	**686.82**

Table 4-2 PCTs identified within the subject land in the Kerrabee IBRA subregion

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
42	River Red Gum/River Oak riparian woodland wetland in the Hunter Valley	1.21
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1.43
281	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	199.27
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	10.67
461	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	34.55
477	Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	16.25
478	Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	9.40
479	Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	93.16
481	Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	14.02
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	10.62
599	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	8.74
618	White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	165.25
1176	Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	2.27
1610	White Box – Black Cypress Pine shrubby woodland of the Western Slopes	4.95
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	11.82
1674	Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	1.21
	Total area	**584.82**

Table 4-3 PCTs identified within the subject land in the Liverpool Ranges IBRA subregion

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	0.02
281	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	1.25
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	1.59
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	102.55
	Total area	**105.41**

Table 4-4 PCTs identified within the subject land in the Pilliga IBRA subregion

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
281	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	10.16
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	9.98
477	Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	2.38
479	Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	16.17
481	Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	6.82
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	60.92
599	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	6.57

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
618	White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	4.70
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	6.14
1696	Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	10.16
	Total area	**134**

Table 4-5 PCTs identified within the subject land in the Talbragar Valley IBRA subregion

PCT ID	PCT name	Subject land area (ha) (includes the full extent of mapped hazard tree zone)
81	Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	33.68
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	3.20
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	13.56
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	3.48
461	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	0.12
468	Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	4.64
599	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	33.68
	Total area	**92.36**

4.2.2 PCT 42 – River Red Gum/River Oak riparian woodland wetland in the Hunter Valley

4.2.2.1 PCT overview

PCT 42 – River Red Gum/River Oak riparian woodland wetland in the Hunter Valley is described in the BioNet Vegetation Classification database as a tall forest and woodland dominated by *Eucalyptus camaldulensis* in the Hunter Valley with a grassy ground cover. *Casuarina cunninghamiana* may be present. The shrub layer is generally absent. The ground cover may be dense and dominated by weed species. This PCT occurs on clayey and sandy soils on the banks and inner floodplains of the Hunter River and major tributaries. Occurs on flood plains, alluvial flats and terraces.

Due to land access restrictions, field validation of this PCT has not been completed by WSP.

Table 4-6 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database.

Table 4-6 PCT 42 – River Red Gum/River Oak riparian woodland wetland in the Hunter Valley

PCT ID	42
PCT name	River Red Gum/River Oak riparian woodland wetland in the Hunter Valley
Vegetation formation	Forested Wetlands
Vegetation class	Eastern Riverine Forests
Per cent cleared value (%)	95.00%
Extent within subject land (ha)	1.21 ha

4.2.2.2 Condition states

Within the subject land PCT 42 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Moderate/Good
- Thinned.

4.2.2.3 Justification of PCT selection

Due to land access restriction, field verification of this PCT has not been completed by WSP. PCT 42 has been mapped along the Talbragar River. While field verification of this PCT was not possible during the survey period, this area of vegetation is mapped in the Valley of the Winds Wind Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2022) as PCT 42. Our mapping is consistent with the mapping of PCT 42 in the Valley of the Winds Wind Farm Biodiversity Development Assessment Report (Eco Logical Australia Pty Ltd, 2022) in the absence of any data collected for this BDAR.

4.2.2.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 42 is equivalent to 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.

However, Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions is the name given to the ecological community that generally occurs on floodplains and associated floodplain rises along the Hunter River and tributaries (NSW Scientific Committee, 2021). The occurrence of PCT 42 within the subject land is along the Talbragar River in the Macquarie catchment and therefore does not meet the definition of the TEC provided in the Final Determination.

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 42.

4.2.3 PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

4.2.3.1 PCT overview

PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a tall *Eucalyptus microcarpa* dominated woodland commonly 20 m high, often with scattered *Callitris glaucophylla, Allocasuarina luehmannii* and *Brachychiton populneus*. Other trees may include *Callitris endlicheri, Eucalyptus crebra, Eucalyptus melliodora* and *Angophora floribunda*. PCT 81 is known to occur in the NSW South Western Slopes, Darling Riverine Plains, Nandewar and Brigalow Belt South bioregions.

The vegetation within the subject land that is assigned to PCT 81 is a tall *Eucalyptus microcarpa* dominated grassy woodland. The underlying geology varies from Dunedoo Formation (Pebbly quartz-lithic sandstone to conglomerate, breccia, white claystone, thin coal seams), Tunnabutta Group shale, slate and minor volcanic-rich sandstone, Dungaree Volcanics (Rhyolite to dacite lava, autoclastics, and volcaniclastics, rare latitic to trachytic lava), to Tucklan Formation (dark mudstone, basalt-latite boulder conglomerate or breccia, lithic sandstone, rare chert).

The dominant species in the canopy was *Eucalyptus microcarpa.* The midstorey was absent from the sample due to disturbance. The ground layer was dominated by the native grass species *Austrostipa verticillata* with other native species including *Dichondra* sp. A, *Oxalis perennans, Urtica incisa, Brachyscome ciliaris* at very low cover and abundance. Ubiquitous weeds of agricultural land including *Marrubium vulgare, Cirsium vulgare, Stellaria media, Capsella bursa-pastoris, Malva parviflora, Hypochaeris radicata*, and *Medicago* sp. were common.

Table 4-7 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-8 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 81 during the field survey.

Table 4-7 PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

PCT ID	81
PCT name	Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Floodplain Transition Woodlands
Per cent cleared value (%)	78.00%
Extent within subject land (ha)	49.46 ha

Table 4-8 PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus microcarpa*
Shrubs	None
Ferns	None
Grass & grasslike	*Austrostipa verticillata*, *Eragrostis* sp., *Dichanthium sericeum*
Forbs	*Urtica incisa*, *Dichondra* sp. A, *Oxalis perennans*, *Brachyscome ciliaris*
Other	None

Photo 4-11 PCT 81 on Dapper Road

Photo 4-12 PCT 81 at survey plot LC3

4.2.3.2 Condition states

Within the subject land PCT 81 is present in the following broad condition state (equivalent to vegetation zones):

- Moderate/Good
- Thinned
- Derived Native Grassland.

Photo 4-13 PCT 81 Moderate/Good condition state on Dapper Road

Photo 4-14 PCT 81 Thinned condition state at Plot LC3

Photo 4-15 PCT 81 in a paddock on the Laheys Creek floodplain at the corner of Dapper Road and Spring Ridge Road showing typical cleared land with a mixed ground layer of native grasses (browned off grass) and exotic species (green colour) consistent with grazing (Derived Native Grassland condition state

4.2.3.3 Justification of PCT selection

PCT 81 is described in the BioNet Vegetation Classification database as a tall *Eucalyptus microcarpa* dominated woodland in the Grassy Woodlands formation in the Floodplain Transition Woodlands class. The vegetation within the subject land that is assigned to PCT 81 is a tall *Eucalyptus microcarpa* dominated grassy woodland (although shrubby areas were present due to management). The vegetation is located on floodplains with alluvial soils (e.g. the Laheys Creek floodplain) and forms an intermediate vegetation type (transitional) that occupies the landscape between Riverine Forests and Dry Sclerophyll Forests at higher elevations on hills.

One survey plot (LC3) has been completed in PCT 81 to date. The survey plot was done in a considerably disturbed patch, so species richness was low. However, the characteristic tree species *Eucalyptus microcarpa* dominated the canopy (60% cover, 25 individuals). The characteristic grass species *Austrostipa verticillata* dominated the ground layer (70% cover, 2,000 individuals) with other characteristic species including *Dichondra* sp. A, *Oxalis perennans, Brachyscome ciliaris* at very low cover and abundance (0.1 to 0.5% cover, 1 to 50 individuals).

The SVTM maps the vegetation at plot LC3 as PCT 81. This mapping is in agreeance with our field observations. The SVTM does however map PCT 81 as also occurring on sandstone hills dominated by various stringybark and ironbark eucalypts so is somewhat inaccurate. The vegetation along Dapper Road and Spring Ridge Road is mapped by the SVTM as PCT 599 and PCT 281. PCT 599 is a *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated community often with *Angophora floribunda* on flats or *Eucalyptus albens* on hills. The vegetation assigned to PCT 81 within the subject land is dominated by *Eucalyptus microcarpa*. PCT 281 lacks the presence of *Eucalyptus microcarpa* being an *Angophora floribunda* dominated vegetation type with *Eucalyptus blakelyi* or *Eucalyptus melliodora*. The vegetation assigned to PCT 81 within the subject land is dominated by *Eucalyptus microcarpa*.

Of the *Eucalyptus microcarpa* dominated PCTs known from the Brigalow Belt South – Talbragar Valley IBRA subregion, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- 70 – White Cypress Pine woodland on sandy loams in central NSW wheatbelt.
- 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion.
- 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion.
- 267 – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion.
- 403 – Dapper Mugga Ironbark – Western Grey Box – Blakely's Red Gum – Black Cypress Pine grass shrub hill woodland (southern Brigalow Belt South Bioregion).

The vegetation within the subject land is a Floodplain Transition Woodland. PCT 201 and PCT 267 are Western Slopes Grassy Woodlands and dominated by *Eucalyptus conica* and *Eucalyptus albens* respectively. PCT 201 and PCT 267 can contain *Eucalyptus microcarpa* but as a subdominant species. The vegetation assigned to PCT 81 in the subject land is dominated by *Eucalyptus microcarpa.* PCT 403 is a Western Slopes Dry Sclerophyll Forest and is a *Eucalyptus sideroxylon* dominated community found on hills. The vegetation class, species composition, and landscape position of PCT 403 is not a good fit for this *Eucalyptus microcarpa* dominated floodplain vegetation.

PCT 70 is a Floodplain Transition Woodland. However, the dominant species in PCT 70 is *Callitris glaucophylla*. PCT 70 can contain *Eucalyptus microcarpa* but the presence of *Callitris glaucophylla* is necessary for PCT 70 to be present. *Callitris glaucophylla* is absent from the subject land where PCT 81 has been mapped.

4.2.3.4 Alignment with TECs

PCT 81 is part of the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC listed under the BC Act. This TEC is listed as an Endangered Ecological Community under the BC Act.

This TEC is discussed further in Section 4.3.

4.2.3.5 Alignment with EPBC Act listed ECs

PCT 81 is part of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC listed under the EPBC Act.

This TEC is discussed further in Section 4.3.

4.2.4 PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion

4.2.4.1 PCT overview

PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion is described in the BioNet Vegetation Classification database as a tall woodland up to 20 m high dominated by *Eucalyptus conica* (and intergrades) as the sole tree species or co-existing with *Eucalyptus blakelyi, Eucalyptus melliodora, Callitris glaucophylla, Eucalyptus populnea* subsp. *bimbil*, and *Eucalyptus pilligaensis*. Other trees may include *Eucalyptus albens* or *Allocasuarina luehmannii. Eucalyptus moluccana* occurs in the north east near the Dumaresq River and *Eucalyptus dawsonii* in the south. This PCT occurs on alluvial and colluvial sandy loam to light clay soils on undulating plains, terraces, footslopes or lining Creeks in the region from Coonabarabran north to the Queensland border extending into Queensland in the Brigalow Belt South and Nandewar Bioregions.

The vegetation within the subject land that is assigned to PCT 202 is a *Eucalyptus conica* dominated grassy woodland located on floodplains with alluvial soils and colluvial soils. The underlying geology varies from Quaternary Alluvium (Alluvial silt, clay and sand, variable humic content, sporadic pebble to cobble sized unconsolidated conglomeratic lenses), Napperby Formation (Siltstone thinly interbedded with fine-medium grained lithic-quartz sandstone, minor conglomerate), Dunedoo Formation (Pebbly quartz-lithic sandstone to conglomerate, breccia, white claystone, thin coal seams), and Tunnabutta Group shale, slate and minor volcanic-rich sandstone.

The dominant species in the canopy was *Eucalyptus conica* with *Angophora floribunda, Eucalyptus melliodora, Eucalyptus blakelyi*. The shrub layer was dominated by a range of *Acacia* and *Cassinia* species along with the Faboideae species *Bossiaea* sp., *Dillwynia sieberi,* and *Pultenaea spinosa*. *Eremophila debilis, Maireana microphylla, Melichrus urceolatus,* and *Pimelea curviflora* were also present in the shrub layer. The dominant ground layer species were *Austrostipa densiflora, Austrostipa scabra* subsp. *scabra, Asperula conferta, Calotis cuneifolia, Plantago varia, Vittadinia cuneata, Xerochrysum viscosum, Dichondra repens, Dianella revoluta, Aristida ramosa* and *Aristida personata.* Ubiquitous weeds of agricultural land including *Cirsium vulgare, Medicago* sp., *Soliva sessilis, Trifolium campestre, Verbena officinale, Vulpia myuros* and *Hypochaeris radicata* were common.

Table 4-9 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-10 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 202 during the field survey.

Table 4-9 PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion

PCT ID	202
PCT name	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	75.00%
Extent within subject land (ha)	3.38 ha

Table 4-10 PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus conica* with *Angophora floribunda, Eucalyptus melliodora, Eucalyptus blakelyi, Callitris endlicheri*
Shrubs	*Acacia buxifolia, Acacia decora, Acacia penninervis, Acacia spectabilis, Acacia uncinata, Bossiaea* sp., *Cassinia laevis, Cassinia arcuata, Cassinia sifton, Dillwynia sieberi, Eremophila debilis, Maireana microphylla, Melichrus urceolatus, Pimelea curviflora, Pultenaea spinosa*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Austrostipa densiflora, Austrostipa scabra* subsp. *scabra, Austrostipa verticillata, Aristida personata, Aristida ramosa, Austrostipa scabra, Carex appressa, Carex inversa, Cymbopogon refractus, Cyperus gracilis, Dichelachne* sp., *Fimbristylis dichotoma, Gahnia aspera, Juncus subsecundus, Lomandra filiformis* subsp. *coriacea, Microlaena stipoides, Panicum effusum, Poa sieberiana, Rytidosperma erianthum, Rytidosperma setaceum, Sporobolus creber, Themeda triandra*

Growth form	Species recorded
Forbs	*Ajuga australis, Arthropodium fimbriatum, Asperula conferta, Brachyscome dentata, Bulbine bulbosa, Caladenia fuscata, Calotis cuneifolia, Calotis lappulacea, Chrysocephalum apiculatum, Cyanicula caerulea, Cymbonotus lawsonianus, Desmodium brachypodum, Dianella longifolia, Dianella revoluta, Dichondra repens, Einadia nutans, Euchiton involucratus, Geranium solanderi* var. *solanderi, Gonocarpus elatus, Goodenia bellidifolia* subsp. *bellidifolia, Goodenia hederacea* subsp. *hederacea, Hydrocotyle laxiflora, Hypericum gramineum, Hypoxis hygrometrica, Laxmannia gracilis, Lomandra multiflora* subsp. *multiflora, Microtis* sp., *Plantago varia, Pterostylis* sp., *Rumex brownii, Scutellaria humilis, Sida corrugata, Solenogyne* sp., *Swainsona galegifolia, Swainsona monticola, Tricoryne elatior, Vittadinia cuneata, Wahlenbergia communis, Wahlenbergia stricta, Xerochrysum viscosum*
Other	*Glycine clandestina*

Photo 4-16 PCT 202 in the Spring Ridge Road reserve near Laheys Creek at Cobbora

Photo 4-17 PCT 202 in the Spring Ridge Road reserve at Cobbora

4.2.4.2 Condition states

Within the subject land PCT 202 is present in the following broad condition state (equivalent to vegetation zones):

- Moderate/Good
- Thinned
- Derived Native Grassland.

Photo 4-18 An example of PCT 202 in Moderate/ Good condition within the subject land

4.2.4.3 Justification of PCT selection

PCT 202 is described in the BioNet Vegetation Classification database as a tall woodland up to 20 m high dominated by *Eucalyptus conica* (and intergrades) as the sole tree species or co-existing with *Eucalyptus blakelyi, Eucalyptus melliodora, Callitris glaucophylla, Eucalyptus populnea* subsp. *bimbil*, and *Eucalyptus pilligaensis*. The BioNet Vegetation Classification database lists *Angophora floribunda* as a species of the upper stratum. This PCT occurs on alluvial and colluvial sandy loam to light clay soils on undulating plains, terraces, footslopes or lining Creeks. PCT 202 is in the Western Slopes Grassy Woodlands vegetation class.

The vegetation within the subject land that is assigned to PCT 202 is a grassy woodland dominated by *Eucalyptus conica* with *Angophora floribunda*, *Eucalyptus melliodora* and *Eucalyptus blakelyi* that is present on the alluvial floodplains and adjacent colluvium (e.g. Laheys Creek floodplain). *Eucalyptus conica* was the dominant tree species recorded from survey plots completed to date in this PCT (LC36, IM14, IM15, IM16) ranging from 3% to 30% cover. Plot LH44 only contained *Angophora floribunda* in the tree layer at 30% cover. This level of tree cover is typical of a grassy woodland.

The shrub layer recorded from the subject land did not match the species from the middle stratum published for PCT 202 in the BioNet Vegetation Classification database with the exception of *Maireana microphylla*. This may be due to a limited number of plots informing the description of PCT 202 rather than a restrictive list of what occurs in this PCT.

The ground stratum recorded from the subject land is typical of PCT 202 with the species *Cassinia laevis*, *Cheilanthes sieberi, Austrostipa scabra* subsp. *scabra*, *Austrostipa verticillata, Aristida personata*, *Aristida ramosa, Cymbopogon refractus, Cyperus gracilis, Dichelachne* sp., *Lomandra filiformis* subsp. *coriacea, Microlaena stipoides, Panicum effusum, Poa sieberiana, Rytidosperma setaceum, Ajuga australis, Calotis cuneifolia, Calotis lappulacea, Chrysocephalum apiculatum, Einadia nutans, Hydrocotyle laxiflora, Hypericum gramineum, Laxmannia gracilis, Rumex brownii, Scutellaria humilis* and *Glycine clandestina*.

The SVTM maps the vegetation at plot IM16 and LH44 as PCT 202, so the mapping is in agreeance with our field observations in these locations. The SVTM maps the vegetation at plot LC36 as PCT 281 with PCT 202 mapped 150 m to the south east. Plot IM15 is also mapped as PCT 281. PCT 281 is Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion. The vegetation at plot IM14 is mapped by the SVTM as PCT 468 which is Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo).

PCT 281 is another Western Slopes Grassy Woodland that occurs in similar landscape positions to PCT 202. PCT 202 is characterised by the presence of *Angophora floribunda, Eucalyptus blakelyi, Eucalyptus melliodora, Callitris glaucophylla, Eucalyptus camaldulensis, Casuarina cunninghamiana, Eucalyptus albens,* and *Brachychiton populneus* in the tree layer. The middle stratum of PCT 281 as described in the BioNet Vegetation Classification database is also similar to what is present at plot LC36. However, given the dominance of *Eucalyptus conica* in the sample, a species which is not listed as present in PCT 281 in the BioNet Vegetation Classification database, the vegetation was assigned to PCT 202.

PCT 468 is an ironbark dominated vegetation type present on soils derived from sandstone on hillslopes, hill crests and footslopes in low hill landforms. *Eucalyptus crebra* and *Eucalyptus microcarpa*, species that are characteristic of PCT 468, were noted outside of the plot upslope. It is likely that the vegetation in this part of the subject land represents a transitional zone (ecotone) between PCT 202 and PCT 468. Given the *Eucalyptus conica* in the canopy in this area the vegetation has been assigned to PCT 202.

Of the *Eucalyptus conica* dominated PCTs, or PCTs known to contain *Eucalyptus conica*, known from the Brigalow Belt South – Talbragar Valley IBRA subregion, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
- PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
- PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.

PCT 201 is very similar to PCT 202 and these two PCTs are from the same vegetation formation and vegetation class. The absence of *Angophora floribunda* from the description of PCT 201 suggests that PCT 202 is a better fit considering the presence of *Angophora floribunda* within the vegetation in the subject land.

PCT 599 and PCT 277 are also from the same vegetation formation and vegetation class as PCT 202, but they are *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated vegetation types and can contain *Eucalyptus conica* as a minor component. The vegetation mapped as PCT 202 within the subject land do contain *Eucalyptus blakelyi* and *Eucalyptus melliodora* but are dominated by *Eucalyptus conica* suggesting that the vegetation is a better fit for PC202.

4.2.4.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 202 is equivalent to the BC Act listed Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions TEC. This TEC is listed as Endangered under the BC Act.

This TEC is discussed further in Section 4.3.

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 202.

4.2.5 *PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion*

4.2.5.1 PCT overview

PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a tall woodland with trees to 25 m high dominated by *Eucalyptus albens* with *Brachychiton populneus* subsp. *populneus* often present. Other eucalypt species including *Eucalyptus bridgesiana*, *Eucalyptus blakelyi* or *Eucalyptus melliodora* may also be present as minor components of the canopy. The shrub layer is usually sparse or absent depending on grazing history or soil type and contains a variety of *Acacia* species, *Dodonaea viscosa* subsp. *cuneata, Bursaria spinosa* subsp. *spinosa* and *Cassinia* species. The ground cover is usually mid-dense to dense except during drought and may be very diverse in grass and forb species. The soils are mainly red-brown earths, red or yellow podsols with some brown and black earths. The soils are derived from a variety of lithologies including shale, limestone, fine grained metamorphic rocks, granite and basalt. Species composition appears not to vary greatly across these lithologies. Mainly occurs on hillslopes in low hill or hill landform patterns in the NSW South-western Slopes Bioregion overlapping into the South Eastern Highlands Bioregion.

The vegetation within the subject land that is assigned to PCT 266 is a *Eucalyptus albens* dominated grassy woodland located on hillslopes in low hill or hill landform patterns in the NSW South-western Slopes Bioregion. The underlying geology is Tucklan Formation (dark mudstone, basalt-latite boulder conglomerate or breccia, lithic sandstone, rare chert) and Gulgong Granite (leucocratic medium-coarse grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite).

The dominant species in the canopy was *Eucalyptus albens* with *Eucalyptus blakelyi*, *Angophora floribunda*, and *Brachychiton populneus*. The shrub layer was largely disturbed and characterised by *Acacia implexa* (a species typical of PCT 266) *Maireana microphylla*, *Cassinia sifton*, and *Lissanthe strigosa*. The ground layer contained species typical of PCT 266 including *Poa sieberiana, Bothriochloa macra, Panicum effusum, Aristida ramosa, Cymbonotus lawsonianus, Oxalis perennans*, *Lomandra filiformis, Hydrocotyle laxiflora, Asperula conferta, Cheilanthes sieberi, Acaena novae-zelandiae, Wahlenbergia luteola, Solenogyne* sp., and *Rumex brownii*.

Table 4-11 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-12 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 266 during the field survey.

Table 4-11 PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

PCT ID	266
PCT name	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	94.00%
Extent within subject land (ha)	76.29 ha

Table 4-12 PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion characteristic floristic composition and structure

Growth form	**Species recorded**
Trees	*Eucalyptus albens, Eucalyptus blakelyi, Angophora floribunda, Brachychiton populneus*
Shrubs	*Maireana microphylla, Acacia implexa, Cassinia sifton, Lissanthe strigosa*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida personata, Aristida ramosa, Aristida vagans, Austrostipa scabra, Austrostipa verticillata, Bothriochloa decipiens, Bothriochloa macra, Carex appressa, Eragrostis leptostachya, Eragrostis* sp., *Juncus* sp., *Juncus usitatus, Lomandra filiformis* subsp. *filiformis, Lomandra longifolia, Panicum effusum, Poa sieberiana, Sporobolus creber*
Forbs	*Acaena novae-zelandiae, Asperula conferta, Calotis lappulacea, Cymbonotus lawsonianus, Daucus glochidiatus, Dichondra repens, Euchiton sphaericus, Geranium homeanum, Geranium* sp., *Hydrocotyle laxiflora, Mentha* sp., *Oxalis perennans, Rumex brownii, Solenogyne* sp., *Urtica incisa, Vittadinia pterochaeta, Wahlenbergia luteola*
Other	*Glycine tabacina*

Photo 4-19 PCT 266 showing *Eucalyptus albens* with weed dominated ground layer

Photo 4-20 PCT 266 showing *Eucalyptus albens* trees on hills subject to grazing

4.2.5.2 Condition states

Within the subject land PCT 266 is present in the following broad condition state(equivalent to vegetation zones):

- Moderate/Good
- Thinned
- Derived Native Shrubland
- Derived Native Grassland.

Photo 4-21 PCT 266 Moderate/Good condition state

Photo 4-22 PCT 266 Thinned condition state showing *Brachychiton populneus* trees retained on hills

Photo 4-23 PCT 266 Derived native shrubland condition state

Photo 4-24 PCT 266 Derived native grassland condition state showing extensive paddocks with mixed native and exotic ground layer

4.2.5.3 Justification of PCT selection

PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a tall woodland dominated by *Eucalyptus albens* with *Brachychiton populneus* subsp. *populneus* often present. Other eucalypt species including *Eucalyptus bridgesiana, Eucalyptus blakelyi* or *Eucalyptus melliodora* may also be present as minor components of the canopy. The shrub layer is usually sparse or absent depending on grazing history or soil type and contains a variety of *Acacia* species, *Dodonaea viscosa* subsp. *cuneata, Bursaria spinosa* subsp. *spinosa* and *Cassinia* species. The ground cover is usually mid-dense to dense except during drought and may be very diverse in grass and forb species. The soils are mainly red-brown earths, red or yellow podsols with some brown and black earths. The soils are derived from a variety of lithologies including shale, limestone, fine grained metamorphic rocks, granite and basalt in low hill or hill landform patterns in the NSW South-western Slopes Bioregion overlapping into the South Eastern Highlands Bioregion.

The vegetation within the subject land that is assigned to PCT 266 is a tall grassy woodland dominated by *Eucalyptus albens* (25% cover) with *Eucalyptus blakelyi* and *Brachychiton populneus.* In some cases stands or scattered individuals of *Eucalyptus albens* or *Brachychiton populneus* are all that remains of the PCT on the rolling hills that have been cleared for agriculture. The underlying geology is Tucklan Formation (dark mudstone, basalt-latite boulder conglomerate or breccia, lithic sandstone, rare chert) and Gulgong Granite (leucocratic medium-coarse grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite). Granite, mudstone and basalt geologies are typical of PCT 266.

The shrub layer recorded from the subject land did not match the species from the middle stratum published for PCT 266 in the BioNet Vegetation Classification database well apart from the species *Acacia implexa*. This may be due to a limited number of plots informing the description of PCT 266 rather than a restrictive list of what occurs in this PCT. The disturbance to the PCT in the subject land is also likely to have reduced the shrub layer species richness and cover.

The ground stratum recorded from the subject land is typical of PCT 266 with the species *Poa sieberiana, Bothriochloa macra, Panicum effusum, Aristida ramosa, Cymbonotus lawsonianus, Oxalis perennans, Lomandra filiformis, Hydrocotyle laxiflora, Asperula conferta, Cheilanthes sieberi, Acaena novae-zelandiae, Wahlenbergia luteola, Solenogyne* sp., and *Rumex brownii*.

The SVTM maps the vegetation mapped as PCT 266 in this BDAR variously as:

- PCT 511 – Queensland Bluegrass – Redleg Grass – Rats Tail Grass – spear grass – panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion
- PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakelys Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)
- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 277 – Blakelys Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- Not native vegetation.

Derived PCTs cannot be used (see BAM Section 4.2.3) so PCT 511 has not been used in this BDAR. PCT 468 is an ironbark dominated vegetation type present on soils derived from sandstone and the vegetation mapped as PCT 266 in this BDAR is dominated by *Eucalyptus albens* on granite, mudstone and basalt geologies. PCT 281 is dominated by *Angophora floribunda* but does contain *Eucalyptus albens*, *Eucalyptus blakelyi* and *Brachychiton populneus* and occurs on valley floors, flats, and drainage lines. The vegetation mapped as PCT 266 in this BDAR is dominated by *Eucalyptus albens* with *Angophora floribunda* as a sub-dominant species and is present on rolling hills. PCT 277 is a *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated vegetation type that occurs in similar landscape positions and geologies as PCT 266. Within the subject land, PCT 266 intergrades with PCT 277. The vegetation mapped as PCT 266 within the subject land was separated from PCT 277 by the dominance of *Eucalyptus albens*.

Of the *Eucalyptus albens* dominated Grassy Woodland PCTs, or PCTs known to contain *Eucalyptus albens*, known from the Inland Slopes IBRA subregion, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
- PCT 274 – White Box – Rough-barked Apple alluvial woodland of the NSW central western slopes including in the Mudgee region
- PCT 464 – Red Stringybark – Kurrajong – mixed eucalypt grassy open forest of the Coonabarabran – Gulgong region in the Brigalow Belt South and NSW SWS Bioregion
- PCT 1383 – White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

PCT 281 is dominated by *Angophora floribunda* but does contain *Eucalyptus albens, Eucalyptus blakelyi* and *Brachychiton populneus* and occurs on valley floors, flats, and drainage lines. The vegetation mapped as PCT 266 in this BDAR is dominated by *Eucalyptus albens* with *Angophora floribunda* as a sub-dominant species and is present on rolling hills.

PCT 81 is a vegetation type dominated by *Eucalyptus microcarpa* but does contain *Eucalyptus albens, Angophora floribunda, Eucalyptus blakelyi* and *Brachychiton populneus*. The vegetation mapped as PCT 266 in this BDAR is dominated by *Eucalyptus albens* and *Eucalyptus microcarpa* is not present.

PCT 274 is similar to PCT 266; however, PCT 274 does not contain *Brachychiton populneus* and occurs on alluvial or colluvial red clay soils derived from shale in valley bottoms and on adjoining lower slopes. Alluvial or colluvial red clay soils are not present in the subject land where PCT 266 is mapped.

PCT 464 is a vegetation type dominated by *Eucalyptus macrorhyncha* and *Brachychiton populneus* that can contain *Eucalyptus albens.* The vegetation mapped as PCT 266 in the subject land is dominated by *Eucalyptus albens*.

PCT 1383 is a similar vegetation type to PCT 266, but it occurs on Creek flats, lower slopes and alluvial plains mainly on sedimentary substrates. PCT 1383 also contains arrange of eucalypt species not found in the vegetation mapped as PCT 266 in the subject land including *Eucalyptus laevopinea, Eucalyptus melanophloia,* and *Eucalyptus pilligaensis*.

4.2.5.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 266 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

This TEC is discussed further in Section 4.3.

4.2.5.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 266 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in Section 4.3.

4.2.6 *PCT 277 – Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*

4.2.6.1 PCT overview

PCT 277 – Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a tall woodland to about 20 m high dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*. *Eucalyptus blakelyi* and *Eucalyptus melliodora* vary in their dominance and either can be absent in some places grading into areas with more *Eucalyptus bridgesiana*, *Eucalyptus goniocalyx* and rarely *Eucalyptus microcarpa*. Shrubs are sparse or absent and may include *Acacia dealbata*. The ground cover may be dense to sparse depending on rainfall and is dominated by grass species including *Poa sieberiana, Bothriochloa macra, Aristida ramosa*, *Themeda triandra*, *Austrodanthonia* species and *Austrostipa* species. Forbs include *Vittadinia cuneata, Chrysocephalum apiculatum* and *Sida corrugata*. A very widespread community on fertile deep, loam or clay soils derived from a range of substrates including fine-grained sedimentary and metamorphic rocks but also volcanics and fine-grained granite.

The vegetation with the subject land that is assigned to PCT 277 is a *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated grassy woodland located on deep loam or clay soils derived from Gulgong Granite (leucocratic medium-coarse grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite), Quaternary Alluvium (silt, clay, sand), Quaternary colluvium (Colluvial polymictic gravel, sand , silt and clay), and Ulan Quartz Monzonite (Megacrystic biotite subporphyritic quartz monzonite). Within the subject land PCT 277 is located in the Inland Slopes IBRA subregion.

The dominant species in the canopy was *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Angophora floribunda, Brachychiton populneus, Eucalyptus microcarpa, Eucalyptus albens* occurring as occasional trees in some locations, potentially in areas of intergradation with other PCTs such as PCT 281 and PCT 266. The shrub layer of the vegetation mapped as PCT 277 within the subject land was more diverse than the middle stratum outlined for the PCT in the BioNet Vegetation Classification database. However, the typical species *Hibbertia obtusifolia* was present. The ground layer contained species typical of PCT 277 including *Themeda triandra, Aristida ramosa, Panicum effusum, Austrostipa verticillata, Austrostipa scabra, Cymbopogon refractus, Juncus usitatus, Lomandra filiformis, Alternanthera nana, Chrysocephalum apiculatum*, *Carex inversa*, *Cheilanthes sieberi*, *Vittadinia cuneata,* and *Bulbine bulbosa*.

Table 4-13 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-14 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 277 during the field survey.

Table 4-13 PCT 277 – Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

PCT ID	277
PCT name	Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	94.00%
Extent within subject land (ha)	181.00 ha

Table 4-14 PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus blakelyi, Eucalyptus melliodora, Angophora floribunda, Brachychiton populneus, Eucalyptus microcarpa, Eucalyptus albens*
Shrubs	*Acacia implexa, Acacia buxifolia, Acacia decora, Brachyloma daphnoides, Cassinia arcuata, Cassinia sifton, Hibbertia obtusifolia, Maireana brevifolia, Lissanthe strigosa, Maireana microphylla, Melichrus procumbens, Melichrus urceolatus, Monotoca scoparia, Pimelea* sp., *Phyllanthus gunnii, Pultenaea* sp., *Pultenaea cinerascens, Styphelia triflora*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida personata, Aristida ramosa, Aristida vagans, Austrostipa scabra, Austrostipa verticillata, Carex appressa, Carex inversa, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Cyperus* sp., *Dichanthium sericeum, Echinopogon caespitosus, Eragrostis* sp., *Eragrostis elongata, Eragrostis leptostachya, Eragrostis parviflora, Eriochloa* sp., *Juncus australis, Juncus continuus, Juncus usitatus, Lomandra filiformis* subsp. *filiformis, Lomandra longifolia, Lomandra multiflora, Microlaena stipoides, Panicum* sp., *Panicum buncei, Panicum effusum, Paspalidium* sp., *Rytidosperma* sp., *Rytidosperma caespitosum, Rytidosperma fulvum, Sporobolus creber, Themeda triandra*
Forbs	*Acaena echinata, Alternanthera nana, Asperula conferta, Brachyscome dentata, Bulbine bulbosa, Caladenia atrovespa, Calotis cuneifolia, Calotis lappulacea, Chrysocephalum apiculatum, Cymbonotus lawsonianus, Cyanicula caerulea, Dianella longifolia, Dichondra repens, Dichondra* sp. A, *Drosera peltata, Einadia nutans, Euchiton sphaericus, Gonocarpus elatus, Goodenia hederacea, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Hypoxis hygrometrica, Isotoma fluviatilis, Lagenophora stipitata, Laxmannia gracilis, Microtis unifolia, Poranthera microphylla, Prasophyllum* sp., *Pterostylis bicolor, Rumex brownii, Schoenus* sp., *Solanum prinophyllum, Stackhousia muricata, Velleia paradoxa, Vittadinia cuneata, Wahlenbergia communis, Wahlenbergia planiflora, Wahlenbergia stricta, Xerochrysum viscosum*
Other	*Glycine tabacina, Glycine clandestina, Polymeria calycina, Thysanotus patersonii*

Photo 4-25 PCT 277 in Moderate/Good condition on Tuckland Road

Photo 4-26 PCT 277 at BAM plot IM11

4.2.6.2 Condition states

Within the subject land PCT 277 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Moderate/Good
- Thinned.

Photo 4-27 PCT 277 in Moderate/Good condition in Barneys Reef Road Reserve in the subject land (BAM Plot LC6)

Photo 4-28 PCT 277 in Thinned condition along Merotherie Road

Photo 4-29 PCT 277 in Derived Native Grassland in the subject land adjacent to Merotherie Road

4.2.6.3 Justification of PCT selection

PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a tall woodland to about 20 m high dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* on fertile deep, loam or clay soils derived from a range of substrates including fine-grained sedimentary and metamorphic rocks but also volcanics and fine-grained granite.

The vegetation within the subject land that is assigned to PCT 277 is a *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated grassy woodland located on deep loam or clay soils derived from Gulgong Granite, Quaternary Alluvium, Quaternary colluvium, and Ulan Quartz Monzonite. Within the subject land PCT 277 is located in the Inland Slopes IBRA subregion.

The dominant species in the canopy was *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Angophora floribunda, Brachychiton populneus, Eucalyptus microcarpa, Eucalyptus albens* occurring as occasional trees in some locations. *Angophora floribunda* and *Brachychiton populneus* are not listed as species in this PCT in the BioNet Vegetation Classification database so the presence of these species may suggest an intergrade towards other PCTs such as PCT 281 or PCT 266 or the natural variation in PCT 277 is not yet fully captured.

The shrub layer of the vegetation mapped as PCT 277 within the subject land was more diverse than the middle stratum outlined for the PCT in the BioNet Vegetation Classification database. However, the typical species *Hibbertia obtusifolia* was present.

The ground layer contained species typical of PCT 277 including *Themeda triandra, Aristida ramosa, Panicum effusum, Austrostipa verticillata, Austrostipa scabra, Cymbopogon refractus, Juncus usitatus, Lomandra filiformis, Alternanthera nana, Chrysocephalum apiculatum, Carex inversa, Cheilanthes sieberi, Vittadinia cuneata*, and *Bulbine bulbosa*.

The SVTM maps the vegetation mapped as PCT 277 in this BDAR as PCT 277 in locations including Tucklan Road, Merotherie Road, and Barneys Reef Road. However, the SVTM also incorrectly maps sandstone hills dominated by *Eucalyptus crebra* and *Eucalyptus dealbata* in the Merotherie Hub as PCT 277. There are patches of PCT 277 mapped north of Tuckland State Forest; however, given the geology (Tucklan Formation and Dunedoo Formation) and surrounding vegetation this is more likely to be PCT 1177 dominated by *Eucalyptus dawsonii* (note that this area has not been surveyed on ground due to access limitations). The vegetation at Blue Springs Road at Stubbo mapped as PCT 277 in this BDAR is mapped by the SVTM as PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion. This area at Blue Springs Road is located on Gulgong Granite and the vegetation is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* (see Plot DLQ5 and IM11). The mapping prepared for this BDAR has also mapped areas of PCT 277 Derived Native Grassland in areas mapped by the SVTM as non-native vegetation due to the native species content and inferences made about the original vegetation type.

Of the *Eucalyptus blakelyi* and *Eucalyptus melliodora* dominated Grassy Woodland PCTs, known from the Inland Slopes IBRA subregion, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
- PCT 464 – Red Stringybark – Kurrajong – mixed eucalypt grassy open forest of the Coonabarabran – Gulgong region in the Brigalow Belt South and NSW SWS Bioregion
- PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT 316 – Nortons Box – Red Box – Red Stringybark +/- Nodding Flax Lily forb-grass open forest mainly on the Tumut region
- PCT 280 – Red Stringybark – Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland of the NSW South Western Slopes Bioregion

- PCT 282 – Blakely's Red Gum – White Box – Yellow Box – Black Cypress Pine box grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion
- PCT 80 – Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion
- PCT 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
- PCT 350 – Candlebark – Blakely's Red Gum – Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion.

PCT 281 is dominated by *Angophora floribunda* but does contain *Eucalyptus blakelyi* and *Eucalyptus melliodora* and occurs on valley floors, flats, and drainage lines. The vegetation mapped as PCT 277 in this BDAR is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Angophora floribunda* as a sub-dominant species and is present on flats and rolling hills.

PCT 81 is a vegetation type dominated by *Eucalyptus microcarpa* but does contain *Eucalyptus blakelyi* and *Eucalyptus melliodora*. The vegetation mapped as PCT 266 in this BDAR is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*. *Eucalyptus microcarpa* is present but does not dominate the canopy.

PCT 464 is a vegetation type dominated by *Eucalyptus macrorhyncha* and *Brachychiton populneus* that can contain *Eucalyptus blakelyi* and *Eucalyptus melliodora*. The vegetation mapped as PCT 277 in the subject land is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*.

PCT 266 is a vegetation type dominated by *Eucalyptus albens* and *Brachychiton populneus* that can contain *Eucalyptus blakelyi* and *Eucalyptus melliodora* as minor components of the canopy. The vegetation mapped as PCT 277 in the subject land is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*. PCT 277 intergrades with PCT 266 in the subject land.

PCT 316 is a *Eucalyptus nortonii*, *Eucalyptus polyanthemos* subsp. *polyanthemos, Eucalyptus macrorhyncha* dominated vegetation type with patches of *Callitris endlicheri*. This PCT can also contain *Eucalyptus blakelyi* and *Eucalyptus melliodora* but as a minor component. The vegetation mapped as PCT 277 in the subject land is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* and lacks *Eucalyptus nortonii, Eucalyptus polyanthemos* subsp. *polyanthemos* and *Eucalyptus macrorhyncha.*

PCT 280 is dominated by *Eucalyptus macrorhyncha* and *Eucalyptus blakelyi* sometimes with *Eucalyptus goniocalyx* or *Eucalyptus melliodora*. The absence of *Eucalyptus macrorhyncha* and *Eucalyptus goniocalyx* and predominance of *Eucalyptus melliodora* suggest that the vegetation is a better fit for PCT 277.

PCT 282 is a *Eucalyptus blakelyi* and *Eucalyptus albens* dominated community often with either *Eucalyptus melliodora* or *Eucalyptus bridgesiana* and stands of *Callitris endlicheri*. The vegetation mapped as PCT 277 in the subject land is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* and generally lacks *Eucalyptus albens* or has *Eucalyptus albens* as a minor component of the canopy. Stands of *Callitris endlicheri* were not present in the areas where data has been collected in this vegetation. This evidence suggests that the vegetation is a better fit for PCT 277.

PCT 80 is a vegetation type co-dominated by *Eucalyptus microcarpa* and *Callitris glaucophylla*. *Eucalyptus blakelyi* and *Eucalyptus melliodora* do occur in PCT 80 but the dominant species are *Eucalyptus microcarpa* and *Callitris glaucophylla*. *Eucalyptus microcarpa* is present in the vegetation mapped as PCT 277 and is also a part of this PCT. As *Eucalyptus microcarpa* and *Callitris glaucophylla* are not the dominant species, the vegetation is a better fit for PCT 277.

PCT 201 is a *Eucalyptus conica* dominated community. *Eucalyptus microcarpa, Eucalyptus melliodora, Eucalyptus blakelyi* and *Brachychiton populneus* are components of this PCT. As the vegetation mapped as PCT 277 does not contain *Eucalyptus conica*, PCT 277 is considered to be a better fit.

PCT 350 is dominated by *Eucalyptus rubida* often with *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus bridgesiana* and less commonly *Eucalyptus macrorhyncha*. The vegetation mapped as PCT 277 does not contain *Eucalyptus rubida*, PCT 277 is considered to be a better fit.

4.2.6.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 277 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

This TEC is discussed further in Section 4.3.

4.2.6.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 277 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in Section 4.3.

4.2.7 PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion

4.2.7.1 PCT overview

PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a tall open forest or woodland with trees up to 30 m high dominated by *Angophora floribunda* usually with *Eucalyptus blakelyi* or *Eucalyptus melliodora*. Other tree species may include *Callitris glaucophylla, Brachychiton populneus* and various red gum intergrades. *Casuarina cunninghamiana* subsp. *cunninghamiana* may be present. In some areas *Eucalyptus blakelyi* has been cut out so *Angophora floribunda* dominates.

PCT 281 occurs on black, brown and grey alluvial and colluvial clay loam, loam or sandy loam soils derived from a range of substrates on valley flats and footslopes in valleys in hill landform patterns mainly in the Brigalow Belt South Bioregion. Some areas also occur north of Mudgee in the Gulgong-Dunedoo area in the NSW South-western Slopes Bioregion.

The vegetation within the subject land that is assigned to PCT 281 is an *Angophora floribunda* dominated community with a mix of other eucalypts most commonly *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Acacia linearifolia, Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii, Callitris glaucophylla, Eucalyptus conica, Eucalyptus microcarpa,* and *Casuarina cunninghamiana* depending on location, geology, landscape position and adjacent PCTs. The underlying geology varies from Quaternary Alluvium, Gulgong Granite, Unconsolidated quartz and quartz lithic gravel and sand, Colluvium, Pilliga Sandstone, the igneous Ulan Quartz Monzonite, and the sedimentary rocks of the Illawarra Coal Measures. The PCT is widespread within the subject land.

Within the subject land PCT 281 is located in the Inland Slopes, Kerrabee and Pilliga IBRA subregions.

The dominant species in the canopy was *Angophora floribunda* with *Eucalyptus blakelyi* and *Eucalyptus melliodora*. Depending upon location other tree species including *Acacia linearifolia, Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii, Callitris glaucophylla, Eucalyptus conica, Eucalyptus microcarpa,* and *Casuarina cunninghamiana* were present. The shrub layer of the vegetation mapped as PCT 281 within the subject land was typical of PCT 281 with a range of *Acacia* species, and *Hibbertia obtusifolia* with a number of other shrub species depending on location including *Crowea exalata, Cassinia uncata, Cassinia sifton, Exocarpos strictus, Hovea apiculata, Indigofera adesmiifolia, Leucopogon juniperinus, Lissanthe strigosa*, *Persoonia linearis, Solanum cinereum,* and *Eremophila debilis*. The ground layer contained a number of species typical of PCT 281.

Table 4-15 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-16 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 281 during the field survey.

Table 4-15 PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion

PCT ID	281
PCT name	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	67.00%
Extent within subject land (ha)	447.22 ha

Table 4-16 PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Angophora floribunda, Eucalyptus blakelyi, Eucalyptus melliodora, Acacia linearifolia, Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii, Callitris glaucophylla, Eucalyptus conica, Eucalyptus microcarpa, Casuarina cunninghamiana*
Shrubs	*Acacia decora, Acacia gladiiformis, Acacia implexa, Acacia polybotrya, Acacia ulicifolia, Crowea exalata, Cassinia uncata, Cassinia sifton, Exocarpos strictus, Hibbertia obtusifolia, Hovea apiculata, Indigofera adesmiifolia, Leucopogon juniperinus, Lissanthe strigosa, Persoonia linearis, Solanum cinereum, Eremophila debilis*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Anthosachne scabra, Aristida personata, Aristida ramosa, Aristida vagans, Arundinella nepalensis, Austrostipa scabra, Austrostipa verticillata, Baumea* sp., *Bothriochloa macra, Carex appressa, Chloris ventricosa, Cynodon dactylon, Cyperus gracilis, Dichelachne micrantha, Digitaria diffusa, Echinopogon ovatus, Enneapogon nigricans, Eragrostis brownii, Eragrostis leptostachya, Gahnia aspera, Imperata cylindrica, Juncus bufonius, Juncus continuus, Juncus usitatus, Lomandra longifolia, Lomandra filiformis, Lomandra multiflora, Luzula flaccida, Microlaena stipoides, Panicum decompositum, Panicum effusum, Rytidosperma* sp., *Rytidosperma fulvum, Rytidosperma setaceum, Schoenus apogon, Sporobolus creber, Themeda triandra*

Growth form	Species recorded
Forbs	*Acaena agnipila, Acaena ovina, Apium prostratum, Asperula conferta, Bulbine bulbosa, Brachyscome dentata, Calotis cuneifolia, Calotis lappulacea, Centipeda* sp., *Chrysocephalum apiculatum, Chrysocephalum semipapposum, Cotula australis, Crassula sieberiana, Cymbonotus lawsonianus, Daucus glochidiatus, Dianella longifolia, Dichondra repens, Dichondra* sp. A, *Drosera* sp., *Einadia hastata, Einadia nutans, Euchiton sphaericus, Galium* sp., *Geranium homeanum, Geranium solanderi, Haloragis heterophylla, Haloragis serra, Hydrocotyle laxiflora, Hydrocotyle tripartita, Hypericum gramineum, Isotoma fluviatilis, Laxmannia gracilis, Lythrum hyssopifolia, Microtis* sp., *Oxalis exilis, Oxalis perennans, Pelargonium* sp., *Plantago varia, Pomax umbellata, Poranthera microphylla, Ranunculus lappaceus, Rorippa* sp., *Rumex brownii, Stellaria flaccida, Stypandra glauca, Swainsona behriana, Urtica incisa, Veronica plebeia, Vittadinia cuneata, Vittadinia sulcata, Wahlenbergia luteola, Wahlenbergia planiflora, Wahlenbergia stricta, Wurmbea dioica*
Other	*Hardenbergia violacea, Macrozamia spiralis, Glycine tabacina, Desmodium varians, Glycine clandestina*

Photo 4-30 PCT 281 at BAM plot LC40

Photo 4-31 PCT 281 at BAM plot LC43

4.2.7.2 Condition states

Within the subject land PCT 281 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Derived Native Shrubland
- Mod_Good
- Poor
- Thinned.

Photo 4-32 PCT 281 Thinned condition state at Tallawang

Photo 4-33 PCT 281 Moderate/Good condition state at Tallawang

Photo 4-34 PCT 281 Moderate/Good condition state at the Merotherie Hub

Photo 4-35 PCT 281 Derived native grassland condition state at the Merotherie Hub

4.2.7.3 Justification of PCT selection

PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a tall open forest or woodland with trees up to 30 m high dominated by *Angophora floribunda* usually with *Eucalyptus blakelyi* or *Eucalyptus melliodora*. Other tree species may include *Callitris glaucophylla, Brachychiton populneus* and various red gum intergrades. *Casuarina cunninghamiana* subsp. *cunninghamiana* may be present. In some areas *Eucalyptus blakelyi* has been cut out so *Angophora floribunda* dominates. PCT 281 occurs on black, brown and grey alluvial and colluvial clay loam, loam or sandy loam soils derived from a range of substrates on valley flats and footslopes in valleys in hill landform patterns mainly in the Brigalow Belt South Bioregion. Some areas also occur north of Mudgee in the Gulgong-Dunedoo area in the NSW South-western Slopes Bioregion.

The vegetation within the subject land that is assigned to PCT 281 is an *Angophora floribunda* dominated community with a mix of other eucalypts most commonly *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Acacia linearifolia, Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii, Callitris glaucophylla, Eucalyptus conica, Eucalyptus microcarpa,* and *Casuarina cunninghamiana* depending on location, geology, landscape position and adjacent PCTs. The canopy species found in this vegetation fit the description of PCT 281 well.

The shrub layer of the vegetation mapped as PCT 281 within the subject land contains the typical species *Acacia decora, Acacia gladiiformis, Acacia implexa, Acacia ulicifolia,* and *Hibbertia obtusifolia*. The shrub layer also contains a number of species not listed for PCT 281 including *Acacia polybotrya, Crowea exalata, Cassinia uncata, Cassinia sifton, Exocarpos strictus, Hovea apiculata, Indigofera adesmiifolia, Leucopogon juniperinus, Lissanthe strigosa, Persoonia linearis, Solanum cinereum,* and *Eremophila debilis*. It is unlikely that the entire diversity of the PCT 281 shrub layer is captured in the BioNet Vegetation Classification database given the widespread nature of this PCT and varying geology on which it occurs.

The ground layer contained species typical of PCT 281 including *Anthosachne scabra, Aristida ramosa, Aristida vagans, Arundinella nepalensis, Austrostipa verticillata, Bothriochloa macra, Carex appressa, Dichelachne micrantha, Eragrostis brownii, Juncus continuus, Juncus usitatus, Lomandra longifolia, Microlaena stipoides, Themeda triandra, Calotis cuneifolia, Calotis lappulacea, Einadia hastata, Einadia nutans, Vittadinia cuneata, Wahlenbergia luteola, Cheilanthes sieberi, Cymbonotus lawsonianus, Geranium solanderi, Haloragis heterophylla, Hydrocotyle laxiflora, Urtica incisa, Wahlenbergia stricta, Desmodium varians,* and *Glycine clandestina*. The ground layer is a good fit for PCT 281.

PCT 281 is described as occurring on a range of substrates and the underlying geology. Within the subject land where PCT 281 is mapped varies from Quaternary Alluvium, Gulgong Granite, Unconsolidated quartz and quartz lithic gravel and sand, Colluvium, Pilliga Sandstone, the igneous Ulan Quartz Monzonite, and the sedimentary rocks of the Illawarra Coal Measures. PCT 281 is described as mainly occurring in the Brigalow Belt South Bioregion with some areas also occur north of Mudgee in the Gulgong-Dunedoo area in the NSW South-western Slopes Bioregion. This fits the description of the vegetation mapped as PCT 281 in the subject land well. There are also some areas of vegetation assigned to PCT 281 in the adjacent Kerrabee IBRA subregion.

The SVTM maps some of the vegetation mapped as PCT 281 in this BDAR as PCT 281, particularly in the Tallawang area. However, given the widespread nature of this PCT in the subject land, the SVTM also maps these areas variously as:

- PCT 511 – Queensland Bluegrass – Redleg Grass – Rats Tail Grass – spear grass – panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion.
- PCT 277 – Blakelys Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.
- PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion.
- PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion.

- PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion.
- PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion.
- PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes.
- Not native vegetation.

Derived PCTs cannot be used (see BAM Section 4.2.3) so PCT 511 has not been used in this BDAR.

PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a tall woodland to about 20 m high dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*. *Eucalyptus blakelyi* and *Eucalyptus melliodora* vary in their dominance and either can be absent in some places grading into areas with more *Eucalyptus bridgesiana, Eucalyptus goniocalyx* and rarely *Eucalyptus microcarpa*. PCT 277 is similar to PCT 281 and the SVTM maps these two PCTs adjacent to each other in the subject land. The dominance of *Angophora floribunda* in the vegetation suggests that it is a better fit for PCT 281.

PCT 478 and PCT 479 are ironbark dominated vegetation types that lack *Angophora floribunda*. The vegetation lacks *Eucalyptus macrorhyncha* and ironbarks so PCT 440 is not appropriately mapped in these areas. PCT 477 is a *Eucalyptus rossii* dominated PCT that lacks *Angophora floribunda*. PCT 1610 is dominated by *Eucalyptus albens* and *Callitris endlicheri* and lacks *Angophora floribunda*.

The mapping prepared for this BDAR has also mapped areas of PCT 281 Derived Native Grassland in areas mapped by the SVTM as non-native vegetation due to the native species content and inferences made about the original vegetation type.

Of the *Angophora floribunda* dominated Grassy Woodland PCTs, known from the Inland Slopes, Kerrabee, and Pilliga IBRA subregions, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion.
- PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion.

PCT 202 is a *Eucalyptus conica* dominated community that also contains *Angophora floribunda* and *Eucalyptus blakelyi, Eucalyptus melliodora, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii*, and *Callitris glaucophylla*. PCT 202 and PCT 281 contain similar species. However, *Eucalyptus conica* only occurs in the vegetation mapped as PCT 281 in the subject land as an occasional tree and is not dominant suggesting that PCT 281 is a better fit for this vegetation.

PCT 599 dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* often with *Angophora floribunda* on flats or *Eucalyptus albens* on hills. The canopy is a good match for the vegetation mapped as PCT 281 in the subject land however the shrub layer is quite different to that observed during the survey with PCT 599 lacking most of the species outlined in Table 4-16. The midstorey species observed during the survey suggests that PCT 281 is a better match for this vegetation.

4.2.7.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 281 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

This TEC is discussed further in Section 4.3.

4.2.7.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 281 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

This TEC is discussed further in Section 4.3.

4.2.8 PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion

4.2.8.1 PCT overview

PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a mid-high to tall woodland to open forest dominated by *Eucalyptus macrorhyncha*, with *Eucalyptus crebra, Callitris endlicheri*, *Eucalyptus dealbata* or *Eucalyptus dwyeri*. Rocky sites contain red gums such as *Eucalyptus dwyeri* mixing with *Eucalyptus macrorhyncha*. The shrub layer is sparse and includes *Cassinia arcuata, Monotoca scoparia, Persoonia cuspidifera, Styphelia triflora, Brachyloma daphnoides* subsp. *pubescens, Acacia penninervis* var. *penninervis, Leptospermum parvifolium, Hovea rosmarinifolia* and *Grevillea triternata*. The ground cover is sparse to mid-dense and includes grasses such as *Joycea pallida, Microlaena stipoides* var. *stipoides, Aristida personata, Dichelachne micrantha, Austrostipa scabra* subsp. *scabra, Austrostipa densiflora, Digitaria ramularis* and *Aristida vagans.* The sedge *Lepidosperma laterale* is common. Forb species include *Pomax umbellata, Gonocarpus elatus, Platysace ericoides, Calotis cuneifolia, Chrysocephalum semipapposum, Stypandra glauca* and *Laxmannia gracilis*.

PCT 440 occurs on shallow grey-brown to dark-brown loamy sand soil derived from sandstone on rocky hillcrests and hillslopes in low hill or hill landform patterns in the Binnaway – Mendooran region in the southern part of the NSW Brigalow Belt South Bioregion.

The vegetation within the subject land that is assigned to PCT 440 is a mixed Stringybark (*Eucalyptus macrorhyncha, Eucalyptus sparsifolia*), Ironbark (*Eucalyptus crebra, Eucalyptus fibrosa*), Red Gum (*Eucalyptus blakelyi, Eucalyptus dwyeri, Eucalyptus dealbata, Eucalyptus blakelyi* x *dwyeri, Eucalyptus blakelyi* x *dealbata*) with *Callitris endlicheri* dominated community with a significant proportion of *Angophora floribunda*. This vegetation occurs on sandstone on rocky hillcrests and hillslopes in low hill or hill landform patterns. The subject land is to the south east of the Binnaway – Mendooran region.

Within the subject land, native vegetation assigned to PCT 440 is located in the Talbragar Valley IBRA subregion at Cobbora and Dunedoo, Inland Slopes IBRA subregion at Tallawang, Merotherie, and Cope, the Pilliga and Liverpool Range IBRA subregions at Uarbry, and in the Kerrabee IBRA subregion at Merotherie and Leadville. This distribution is as outlined in the BioNet Vegetation Classification database with the exception of the Kerrabee IBRA subregion.

The dominant tree species in the canopy were *Eucalyptus macrorhyncha, Eucalyptus blakelyi, Acacia linearifolia, Eucalyptus crebra,* and *Angophora floribunda* with a range of other species dependent upon location, landscape position, geology, soils and adjacent PCT with which PCT 440 intergrades. *Callitris endlicheri, Eucalyptus dealbata, Eucalyptus dwyeri* (likely hybrids), and *Eucalyptus fibrosa* were present. This tree layer matches well with the description of PCT 440 provided in the BioNet Vegetation Classification database. The shrub layer of the vegetation mapped as PCT 281 within the subject land was species rich and contained species typical of PCT 440 including *Acacia buxifolia, Acacia gladiiformis, Acacia penninervis* var. *penninervis, Brachyloma daphnoides, Calytrix tetragona, Cassinia arcuata, Cassinia laevis, Cryptandra amara, Dodonaea viscosa, Leptospermum parvifolium, Phyllanthus hirtellus, Pultenaea cinerascens, Sannantha cunninghamii* and *Styphelia triflora*. The ground layer contained species typical of PCT 440 including *Cheilanthes sieberi, Aristida vagans, Austrostipa scabra, Entolasia stricta, Gahnia aspera, Lepidosperma laterale, Lomandra filiformis, Microlaena stipoides, Calotis cuneifolia, Chrysocephalum semipapposum, Einadia nutans, Gonocarpus elatus, Goodenia hederacea, Hypericum gramineum, Laxmannia gracilis, Pomax umbellata, Stypandra glauca,* and *Desmodium varians*.

Table 4-17 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-18 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 440 during the field survey.

Table 4-17 PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion

PCT ID	440
PCT name	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion
Vegetation formation	Dry Sclerophyll Forests (shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	34.29%
Extent within subject land (ha)	114.33 ha

Table 4-18 PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus macrorhyncha, Eucalyptus blakelyi, Acacia linearifolia, Eucalyptus crebra, Angophora floribunda, Acacia doratoxylon, Callitris endlicheri, Eucalyptus blakelyi, Eucalyptus blakelyi* x *dwyeri, Eucalyptus dwyeri* (outside of plots), *Eucalyptus bridgesiana, , Eucalyptus dealbata, Eucalyptus fibrosa, , Eucalyptus melliodora, Eucalyptus rossii, Eucalyptus sparsifolia, Allocasuarina littoralis*.
Shrubs	*Acacia acinacea, Acacia buxifolia, Acacia decora, Acacia gladiiformis, Acacia implexa, Acacia penninervis* var. *penninervis, Acacia polybotrya, Acacia spectabilis, Acacia ulicifolia, Brachyloma daphnoides, Calytrix tetragona, Cassinia arcuata, Cassinia laevis, Cassinia* sp., *Cassinia uncata, Cryptandra amara, Dillwynia phylicoides, Dillwynia sericea, Dodonaea viscosa, Dodonaea viscosa* subsp. *cuneata, Grevillea ramosissima* subsp. *ramosissima, Grevillea sericea, Hibbertia circumdans, Hibbertia linearis, Hibbertia monogyna, Hovea apiculata, Leptospermum parvifolium, Leptospermum* sp., *Leucopogon muticus, Lissanthe strigosa, Ozothamnus diosmifolius, Persoonia linearis, Phyllanthus hirtellus, Pimelea linifolia, Platysace linearifolia, Pultenaea cinerascens, Sannantha cunninghamii, Solanum cinereum, Styphelia triflora, Styphelia tubiflora, Westringia eremicola.*
Ferns	*Cheilanthes sieberi.*
Grass & grasslike	*Aristida jerichoensis* var. *jerichoensis, Aristida personata, Aristida ramosa, Aristida vagans, Austrostipa scabra, Austrostipa verticillata, Arundinella nepalensis, Carex inversa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Dichanthium sericeum, Dichelachne crinita, Digitaria* sp., *Echinopogon caespitosus, Echinopogon ovatus, Enneapogon nigricans, Entolasia stricta, Eragrostis brownii, Eragrostis* sp., *Fimbristylis dichotoma, Gahnia aspera, Imperata cylindrica, Juncus usitatus, Lepidosperma laterale, Lomandra confertifolia* subsp. *pallida, Lomandra filiformis, Lomandra gracilis, Lomandra longifolia, Lomandra multiflora, Luzula* sp., *Microlaena stipoides, Panicum effusum, Rytidosperma* sp., *Schoenus apogon, Sorghum* sp., *Sporobolus creber, Sporobolus* sp., *Themeda triandra, Thyridolepis mitchelliana.*

Growth form	Species recorded
Forbs	*Asperula conferta, Brachyscome dentata, Brachyscome* sp., *Bulbine* sp., *Calocephalus citreus, Calotis cuneifolia, Calotis lappulacea, Chrysocephalum apiculatum, Chrysocephalum semipapposum, Cotula australis, Crassula colorata, Crassula sieberiana, Cyanicula caerulea, Cymbonotus lawsonianus, Cymbonotus preissianus, Dampiera lanceolata, Daucus glochidiatus, Dianella longifolia, Dichondra repens, Dichondra* sp. Inglewood, *Drosera peltata, Einadia nutans, Galium gaudichaudii, Geranium homeanum, Gonocarpus elatus, Gonocarpus tetragynus, Gonocarpus teucrioides, Goodenia hederacea* subsp. *hederacea, Haloragis heterophylla, Hibbertia obtusifolia, Hovea linearis, Hydrocotyle laxiflora, Hypericum gramineum, Isotoma axillaris, Lagenophora stipitata, Laxmannia gracilis, Opercularia diphylla, Oxalis perennans, Patersonia* sp., *Pelargonium* sp., *Plantago* sp., *Platysace linifolia, Pomax umbellata, Poranthera microphylla, Pterostylis concinna, Rumex brownii, Sida corrugata, Solenogyne bellioides, Stackhousia muricata, Stylidium laricifolium, Stypandra glauca, Urtica incisa, Veronica plebeia, Viola* sp., *Wahlenbergia luteola, Wahlenbergia planiflora, Wahlenbergia latifolia, Ammobium alatum, Wurmbea latifolia, Xerochrysum* sp.
Other	*Cassytha* sp., *Desmodium varians, Glycine canescens, Glycine clandestina, Glycine tabacina, Macrozamia spiralis, Hardenbergia violacea.*

Photo 4-36 PCT 440 at Merotherie showing a patch of low mallee form *Eucalyptus dwyeri* on sandstone

Photo 4-37 PCT 440 on sandstone at Merotherie showing *Eucalyptus macrorhyncha* dominated canopy

4.2.8.2 Condition states

Within the subject land PCT 440 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Derived Native Shrubland
- Mod_Good
- Poor
- Thinned.

Photo 4-38 PCT 440 Poor condition state at Merotherie showing heavily grazed and weed dominated ground layer

Photo 4-39 PCT 440 Mod/Good condition state at Merotherie showing intact native vegetation in all layers

Photo 4-40 PCT 440 Derived Native Grassland condition state at Merotherie

Photo 4-41 PCT 440 Derived Native Shrubland showing dense midstorey dominated by *Acacia gladiiformis*

4.2.8.3 Justification of PCT selection

The dominant tree species in the canopy were *Eucalyptus macrorhyncha, Eucalyptus blakelyi, Acacia linearifolia, Eucalyptus crebra,* and *Angophora floribunda* with a range of other species dependent upon location, landscape position, geology, soils and adjacent PCT with which PCT 440 intergrades. *Callitris endlicheri, Eucalyptus dealbata, Eucalyptus dwyeri* (likely hybrids), and *Eucalyptus fibrosa* were present. This tree layer matches well with the description of PCT 440 provided in the BioNet Vegetation Classification database. The shrub layer of the vegetation mapped as PCT 281 within the subject land was species rich and contained species typical of PCT 440 including *Acacia buxifolia, Acacia gladiiformis, Acacia penninervis* var. *penninervis, Brachyloma daphnoides, Calytrix tetragona, Cassinia arcuata, Cassinia laevis, Cryptandra amara, Dodonaea viscosa, Leptospermum parvifolium, Phyllanthus hirtellus, Pultenaea cinerascens, Sannantha cunninghamii* and *Styphelia triflora*. The ground layer contained species typical of PCT 440 including *Cheilanthes sieberi, Aristida vagans, Austrostipa scabra, Entolasia stricta, Gahnia aspera, Lepidosperma laterale, Lomandra filiformis, Microlaena stipoides, Calotis cuneifolia, Chrysocephalum semipapposum, Einadia nutans, Gonocarpus elatus, Goodenia hederacea, Hypericum gramineum, Laxmannia gracilis, Pomax umbellata, Stypandra glauca,* and *Desmodium varians*.

This vegetation occurs on sandstone on rocky hillcrests and hillslopes in low hill or hill landform patterns. Within the subject land, native vegetation assigned to PCT 440 is located in the Talbragar Valley IBRA subregion at Cobbora and Dunedoo, Inland Slopes IBRA subregion at Tallawang, Merotherie, and Cope, the Pilliga and Liverpool Range IBRA subregions at Uarbry, and in the Kerrabee IBRA subregion at Merotherie and Leadville. This distribution is as outlined in the BioNet Vegetation Classification database with the exception of the Kerrabee IBRA subregion.

The SVTM maps some of the vegetation mapped as PCT 440 in this BDAR as follows:

- The vegetation on the low sandstone hills at Cobbora and Dunedoo is mapped variously as PCT 81, PCT 468 and PCT 511.
- The vegetation on the hill at Tallawang is mapped as PCT 478.
- The vegetation on the hills at Merotherie is mapped variously as PCT 478, PCT 277, PCT 281, PCT 1610, and PCT 461.
- The vegetation on the hills at Cope is mapped variously as PCT 476, PCT 478, and PCT 479.
- The vegetation on the hills at Uarbry is mapped as PCT 477, PCT 440 (conforming to the field verified mapping in this area), PCT 479, and PCT 468.
- The vegetation on the hills at Leadville is mapped as PCT 381 and PCT 479.

Derived PCTs cannot be used (see BAM Section 4.2.3) so PCT 511 has not been used in this BDAR.

PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion is a Floodplain Transition Woodland dominated by *Eucalyptus microcarpa*. The vegetation mapped as PCT 440 by the SVTM at Cobbora and Dunedoo is on a low sandstone hill off the floodplain and is dominated by *Eucalyptus macrorhyncha, Eucalyptus crebra, Eucalyptus blakelyi* (or possible hybrid), *Angophora floribunda* and *Callitris endlicheri*. The vegetation in this location best matches PCT 440.

PCT 381 as mapped at Leadville is Rough-barked Apple – Yellow Box grass/shrub footslope open forest, Brigalow Belt South Bioregion. PCT 381 is a *Angophora floribunda, Eucalyptus melliodora, Eucalyptus blakelyi, Brachychiton populneus, Eucalyptus albens* and occasionally *Callitris endlicheri* or *Eucalyptus crebra* community that occurs on brown to chocolate clay loam soils derived from basalt, other volcanic or sedimentary rocks on hillslopes or footslopes. The patch of PCT 440 mapped at Leadville is on a Pilliga Sandstone outcropping and *Eucalyptus macrorhyncha* is present outside the BAM Plot undertaken in this area. Combined with the presence of ground layer species including *Gonocarpus elatus, Stypandra glauca* and *Einadia nutans,* this suggests that the vegetation in this area could be assigned to PCT 440.

PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion is a Grassy Woodland dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Angophora floribunda, Brachychiton populneus, Eucalyptus microcarpa,* and *Eucalyptus albens*. The vegetation mapped as PCT 277 in some areas at Merotherie is a *Eucalyptus macrorhyncha, Eucalyptus dealbata, Eucalyptus crebra* dominated community on low sandstone hills and does not match the description of PCT 277. These areas are assigned to PCT 440.

PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion is a Grassy Woodland dominated by *Angophora floribunda* usually with *Eucalyptus blakelyi* or *Eucalyptus melliodora*. Some areas of vegetation mapped as PCT 281 by the SVTM at Merotherie are a *Eucalyptus macrorhyncha, Eucalyptus dealbata, Eucalyptus crebra* dominated community on low sandstone hills and does not match the description of PCT 281. These areas are assigned to PCT 440.

PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes is a woodland characterised by a canopy strongly dominated by *Eucalyptus albens* in association with *Callitris endlicheri*. The vegetation mapped as PCT 1610 by the SVTM at Merotherie is assigned to PCT 440 as this area contains low sandstone hills dominated by *Eucalyptus macrorhyncha, Eucalyptus fibrosa* and *Eucalyptus crebra*. *Eucalyptus albens* is absent.

PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion is co-dominated by *Eucalyptus rossii, Eucalyptus macrorhyncha* and *Callitris endlicheri*. The vegetation mapped as PCT 477 by the SVTM at Uarbry is dominated by *Angophora floribunda, Eucalyptus macrorhyncha* and *Eucalyptus crebra* which is characteristic of PCT 440. PCT 477 lacks *Angophora floribunda* which is a dominant species in this area.

PCT 461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion as mapped at Merotherie is assigned to PCT 440 due to a lack of *Eucalyptus sideroxylon, Eucalyptus albens* and *Brachychiton populneus* and the presence of the other ironbarks *Eucalyptus crebra* and *Eucalyptus fibrosa* which are typical of PCT 440.

There are several PCTs mapped at Cobbora, Merotherie, Uarbry, and Cope that are very similar to PCT 440 including:

- PCT 464 – Red Stringybark – Kurrajong – mixed eucalypt grassy open forest of the Coonabarabran – Gulgong region in the Brigalow Belt South and NSW SWS Bioregion.
- PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo).
- PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion.
- PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion

These four PCTs listed above were considered for this vegetation mapped as PCT 440. The BioNet Vegetation Classification database PCT Filter Tool was used to separate the areas assigned to PCT 440 from PCT 464, PCT 468, PCT 478 and PCT 479. The vegetation was allocated to PCT 440 for the following reasons:

- PCT 464 is a mid-high to tall open forest dominated by *Eucalyptus macrorhyncha* with *Brachychiton populneus*. Other trees may include *Corymbia trachyphloia* subsp. *amphistomatica, Eucalyptus albens, Eucalyptus blakelyi* and *Eucalyptus melliodora*. BAM Plot LC32 was considered for allocation to PCT 464 but the presence of species including *Eucalyptus dealbata, Phyllanthus hirtellus, Gonocarpus elatus* and *Calotis cuneifolia* suggest that PCT 440 is a better fit. Plot LC33 was also considered for PCT 464 but the presence of *Eucalyptus crebra, Eucalyptus dealbata, Gonocarpus elatus,* and *Calotis cuneifolia* suggest that PCT 440 is a better fit.

- PCT 468 is a tall to mid-high woodland or open forest dominated by *Eucalyptus crebra* with *Callitris endlicheri* and often *Eucalyptus blakelyi*. PCT 468 is very similar to PCT 440. The vegetation at BAM Plots LC1 and LC2 is similar to PCT 468 but the presence of *Angophora floribunda* on these hills (outside of the BAM Plots) suggests that the vegetation is a better fit for PCT 440. BAM Plot IM1 was considered for PCT 468 but the presence of *Dodonaea viscosa* and *Pultenaea cinerascens* in the shrub layer suggests that it is more aligned with PCT 440. BAM Plot LC9 was considered for PCT 468 but the presence of *Eucalyptus dealbata* in the canopy suggests it is more likely to be PCT 440. BAM Plot LH24 was considered for PCT 468 but is more aligned to PCT 440 due to the presence of *Eucalyptus dealbata* and *Microlaena stipoides*.
- PCT 478 is a mid-high to tall open forest co-dominated by *Eucalyptus fibrosa, Callitris endlicheri*, *Eucalyptus macrorhyncha* and/or *Eucalyptus sparsifolia* and the small tree *Acacia linearifolia*. The vegetation at BAM Plot IM1 is more representative of PCT 440 due to the presence of *Eucalyptus macrorhyncha* in the canopy and *Acacia buxifolia* and *Pultenaea cinerascens* in the shrub layer which aren't listed for PCT 478. At BAM Plot IM3, the presence of *Eucalyptus blakelyi* x *dwyeri* hybrids suggests that the vegetation is more like PCT 440. The vegetation at BAM Plot LH24 is assigned to PCT 440 not PCT 478 as the canopy at this location as the vegetation contains *Eucalyptus macrorhyncha, Eucalyptus dealbata, Austrostipa scabra,* and *Microlaena stipoides* suggesting it is more like PCT 440.
- PCT 479 is a tall open forest dominated by *Eucalyptus crebra* and *Callitris endlicheri* often with *Eucalyptus sparsifolia, Eucalyptus punctata* or *Eucalyptus dwyeri*. Other tree species may include *Eucalyptus nubila, Acacia linearifolia, Acacia crassa, Eucalyptus macrorhyncha, Eucalyptus fibrosa* and *Corymbia trachyphloia* subsp. *amphistomatica*. The vegetation at BAM Plot DLQ2 could be assigned to either PCT 440 or PCT 479 but the presence of *Aristida personata* and *Austrostipa scabra* in the ground layer suggests PCT 440. Adjacent patches of *Acacia gladiiformis* also suggest PCT 440. IM1 – The vegetation at BAM Plot IM1 is more representative of PCT 440 due to the presence of *Acacia gladiiformis, Dodonaea viscosa* and *Pultenaea cinerascens* in the shrub layer which aren't listed for PCT 479. BAM Plots LC32 and LC33 are located in *Eucalyptus macrorhyncha, Eucalyptus crebra, Eucalyptus dealbata* dominated vegetation however the presence of species including *Aristida personata, Aristida vagans*, *Austrostipa scabra, Aristida vagans*, *Calotis cuneifolia*, and *Einadia nutans* suggests PCT 440 is a better fit. BAM Plot LH24 was considered to be a better fit for PCT 440 due to the presence of *Austrostipa scabra* and *Calotis cuneifolia* otherwise this vegetation is similar to PCT 479.

4.2.8.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 440.

4.2.8.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 440.

4.2.9 PCT 461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion

4.2.9.1 PCT overview

PCT 461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a mid-high to low open woodland to woodland dominated by *Eucalyptus dealbata* often with no other tree species. Other trees that may be present include *Brachychiton populneus, Eucalyptus albens, Callitris endlicheri, Eucalyptus macrorhyncha* and *Eucalyptus sideroxylon*. The shrub layer is very sparse or absent. Tall shrubs include *Acacia implexa* and *Allocasuarina verticillata*. Low shrubs include *Acacia decora, Xanthorrhoea glauca* subsp. *angustifolia*, *Hibbertia obtusifolia, Calytrix tetragona, Brachyloma daphnoides*, *Pultenaea spinosa* and *Harmogia densifolia*. The ground cover is mainly composed of bare earth or stones with the vegetation cover very sparse to sparse depending on rainfall.

PCT 461 occurs on shallow to stony brown to red sandy loam to light clay soils derived from metasediments or granite on hillslopes, hillcrests and gullies in rises, low hills and hills landform patterns mainly in the Gulgong – Dunedoo – Goolma – Tanner Springs region in the NSW South-western Slopes Bioregion with minor outliers to the north at the southern edge of the Brigalow Belt South Bioregion.

The vegetation within the subject land that is assigned to PCT 461 is dominated by *Eucalyptus dealbata* and is present on hills, gullies and rises. The geology varies from Dungaree Volcanics (rhyolite to dacite lava, autoclastics, and volcaniclastics, rare latitic to trachytic lava) in the Talbragar Valley IBRA subregion to the Ulan Quartz Monzonite (megacrystic biotite subporphyritic quartz monzonite) at Cope in the Inland Slopes and Kerrabee subregions. Parts of the subject land underlain by volcanic geology that were clearly dominated by *Eucalyptus dealbata* were assigned to PCT 461. The vegetation assigned to PCT 461 contains a considerable component of *Callitris endlicheri* (particularly at Cope) and also contains *Brachychiton populneus* and *Eucalyptus macrorhyncha*. *Hibbertia obtusifolia, Calytrix tetragona,* and *Allocasuarina verticillata* which are species typical of PCT 461 are found in the midstorey particularly at Cope. The ground layer contains species typical of PCT 461 including *Aristida personata, Aristida vagans, Cheilanthes sieberi, Cymbonotus lawsonianus, Goodenia hederacea, Hydrocotyle laxiflora, Poa sieberiana,* and *Stypandra glauca.*

Table 4-19 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-20 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 461 during the field survey.

Table 4-19 PCT 461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion

PCT ID	461
PCT name	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	50.00 %
Extent within subject land (ha)	47.78 ha

Table 4-20 PCT 461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus dealbata*
Shrubs	*Acacia undulifolia, Cassinia sifton, Hibbertia obtusifolia, Pultenaea villosa, Phyllanthus hirtellus*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Anthosachne scabra, Aristida vagans, Bothriochloa decipiens, Carex inversa, Cyperus gracilis, Dichelachne crinita, Dichelachne micrantha, Digitaria diffusa, Paspalidium gracile, Eragrostis leptostachya, Lachnagrostis filiformis, Poa sieberiana, Rytidosperma caespitosum, Sporobolus creber,*
Forbs	*Alternanthera nana, Amphibromus nervosus, Calotis cuneifolia, Calotis lappulacea, Cyanicula caerulea, Cymbonotus lawsonianus, Digitaria divaricatissima, Dysphania pumilio, Geranium solanderi* var. *solanderi, Goodenia hederacea, Gonocarpus* sp., *Juncus usitatus, Laxmannia gracilis, Rumex brownii, Veronica plebeia, Wahlenbergia communis*
Other	*Glycine clandestina*

Photo 4-42 PT461 at BAM Plot DLQ10 at Dunedoo showing canopy dominated by *Eucalyptus dealbata*

Photo 4-43 PCT 461 at Cope showing dense *Callitris endlicheri* canopy with *Eucalyptus dealbata* on hills

4.2.9.2 Condition states

Within the subject land PCT 461 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

Photo 4-44 PCT 461 Derived Native Grassland at Dunedoo

Photo 4-45 PCT 461 at Cope showing exposed rock and heathy regrowth post fire

Photo 4-46 PCT 461 Mod/Good condition at Cope

Photo 4-47 PCT 461 at Cope showing *Allocasuarina verticillata*

4.2.9.3 Justification of PCT selection

The vegetation within the subject land that is assigned to PCT 461 is dominated by *Eucalyptus dealbata* and is present on hills, gullies and rises. The geology varies from Dungaree Volcanics (rhyolite to dacite lava, autoclastics, and volcaniclastics, rare latitic to trachytic lava) in the Talbragar Valley IBRA subregion to the Ulan Quartz Monzonite (megacrystic biotite subporphyritic quartz monzonite) at Cope in the Inland Slopes and Kerrabee subregions. Parts of the subject land underlain by volcanic geology that were clearly dominated by *Eucalyptus dealbata* were assigned to PCT 461. The vegetation assigned to PCT 461 contains a considerable component of *Callitris endlicheri* (particularly at Cope) and also contains *Brachychiton populneus* and *Eucalyptus macrorhyncha*. *Hibbertia obtusifolia, Calytrix tetragona,* and *Allocasuarina verticillata* which are species typical of PCT 461 are found in the midstorey particularly at Cope. The ground layer contains species typical of PCT 461 including *Aristida personata, Aristida vagans, Cheilanthes sieberi, Cymbonotus lawsonianus, Goodenia hederacea, Hydrocotyle laxiflora, Poa sieberiana,* and *Stypandra glauca.*

PCT 461 is mapped in the subject land in the Talbragar Valley IBRA subregion at Dunedoo and in the Inland Slopes and Kerrabee IBRA subregions (at the border of these two subregions) at Cope. The BioNet Vegetation Classification database indicates that PCT 461 occurs in the Talbragar Valley and Inland Slopes IBRA subregions. PCT 461 is mapped at the very edge of the Kerrabee subregion where it joins the Inland Slopes at Cope and there is no abrupt change in landscape or vegetation type in this location. Assigning PCT 461 to this vegetation in the Kerrabee subregion is based on the on ground observations made during the surveys.

The SVTM maps some of the vegetation mapped as PCT 461 in this BDAR as follows:

- In the Talbragar Valley subregion at Dunedoo the vegetation mapped as PCT 461 in this BDAR is mapped by the SVTM as PCT 461. The BDAR mapping and SVTM are in agreeance at this location.
- In the Inland Slopes and Kerrabee subregions at Cope the vegetation mapped as PCT 461 in this BDAR is mapped by the SVTM as PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes which is described in the BioNet Vegetation Classification database as a woodland characterised by a canopy strongly dominated by *Eucalyptus albens* in association with *Callitris endlicheri*. The data collected during the field surveys indicate that *Eucalyptus albens* is not present in this area and that the vegetation is a better fit for PCT 461. The SVTM also maps small areas of PCT 1675 – Scribbly Gum – Narrow-leaved Ironbark – Bossiaea rhombifolia heathy open forest on sandstone ranges of the Sydney Basin (dominated by *Eucalyptus rossii*) which was not found to be present in this area during the field survey, and small areas of PCT 1871 which is no longer an active PCT.

There are areas mapped as PCT 461 at Dunedoo that were field verified to be PCT 266 (*Eucalyptus albens*) and PCT 1177 (dominated by *Eucalyptus dawsonii*). There are small areas of vegetation mapped as PCT 461 on the sandstone hills at Merotherie and while *Eucalyptus dealbata* is present in these areas it is not the dominant species and the data collected during the field surveys indicate that this vegetation is more closely aligned to PCT 440 and PCT 479.

4.2.9.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 461.

4.2.9.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 461.

4.2.10 PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)

PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo) is described in the BioNet Vegetation Classification database as a tall to mid-high woodland or open forest dominated by *Eucalyptus crebra* with *Callitris endlicheri* and often *Eucalyptus blakelyi*. Other tree species include *Allocasuarina luehmannii* and *Eucalyptus sideroxylon.* The shrub layer is sparse to mid-dense depending on time since fire, grazing history and soil depth. Shrub species include *Calytrix tetragona, Melichrus urceolatus, Acacia triptera, Pultenaea boormanii, Dillwynia sieberi, Daviesia acicularis, Acacia hakeoides, Melaleuca erubescens, Kunzea parvifolia, Dillwynia sieberi, Grevillea arenaria, Acacia sertiformis* and *Acacia spectabilis*. The ground cover is sparse and includes the low shrubs *Astroloma humifusum* and Platysace ericoides along with grasses such as *Austrodanthonia monticola, Aristida vagans, Aristida ramosa* and *Austrostipa scabra*. The mat-rush *Lomandra filiformis* subsp. *coriacea* is common. Forb species include *Goodenia hederacea* subsp. *hederacea, Gonocarpus tetragynus, Dianella revoluta* var. *revoluta, Xerochrysum viscosa* and *Laxmannia gracilis*.

PCT 468 Occurs on brown to yellow loamy sand or sandy loam soils derived from sandstone on hillslopes, hill crests and footslopes in low hill landforms mainly in the Goonoo forest and reserves north of Dubbo in the far south-western part of the Brigalow Belt South Bioregion. PCT 468 is associated with the Talbragar Valley subregion.

A small area of PCT 468 is mapped in the subject land south of Dapper Road at Cobbora in the Talbragar Valley subregion. The vegetation at this location is dominated by *Eucalyptus crebra* with *Eucalyptus microcarpa* and *Eucalyptus blakelyi*. A shrub layer composed of *Acacia spectabilis, Acacia uncinata, Cassinia laevis, Cassinia sifton, Melichrus urceolatus, Ozothamnus diosmifolius, Phyllanthus hirtellus,* and *Pultenaea microphylla.*

Table 4-21 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-22 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 461 during the field survey.

Table 4-21 PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)

PCT ID	468
PCT name	Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)
Vegetation formation	Dry Sclerophyll Forests (shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	33.00 %
Extent within subject land (ha)	0.12 ha

Table 4-22 PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo) characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus crebra with Eucalyptus microcarpa and Eucalyptus blakelyi.*
Shrubs	*Acacia spectabilis, Acacia uncinata, Cassinia laevis, Cassinia sifton, Melichrus urceolatus, Ozothamnus diosmifolius, Phyllanthus hirtellus, Pultenaea microphylla*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Austrostipa densiflora, Austrostipa rudis* subsp. *nervosa, Austrostipa scabra, Austrostipa setacea, Dichelachne crinita, Entolasia stricta, Gahnia aspera, Juncus subsecundus, Lomandra filiformis* subsp. *coriacea, Lomandra filiformis* subsp. *filiformis, Microlaena stipoides, Panicum simile, Rytidosperma monticola, Rytidosperma pallidum*
Forbs	*Calotis cuneifolia, Dianella longifolia, Einadia nutans, Euchiton involucratus, Goodenia heterophylla, Haloragis heterophylla, Opercularia diphylla, Pomax umbellata, Poranthera microphylla, Stypandra glauca, Wahlenbergia communis, Xerochrysum viscosum*
Other	*Hardenbergia violacea*

Photo 4-48 PCT 468 at BAM Plot CWREZ_507

Photo 4-49 PCT 468 on Dapper Road showing canopy of *Eucalyptus crebra*

4.2.10.1 Condition states

Within the subject land PCT 468 is present in the following broad condition state (equivalent to vegetation zones):

- Thinned.

Photo 4-50 PCT 468 Thinned condition state showing canopy trees and disturbance

Photo 4-51 PCT 468 on Dapper Road showing disturbance (canopy thinning)

4.2.10.2 Justification of PCT selection

A small area of PCT 468 is mapped in the subject land south of Dapper Road at Cobbora in the Talbragar Valley subregion. The vegetation at this location is dominated by *Eucalyptus crebra* with *Eucalyptus microcarpa* and *Eucalyptus blakelyi*. A shrub layer composed of *Acacia spectabilis, Acacia uncinata, Cassinia laevis, Cassinia sifton, Melichrus urceolatus, Ozothamnus diosmifolius, Phyllanthus hirtellus,* and *Pultenaea microphylla.* Characteristic canopy species of PCT 468 are present. Some characteristic midstorey species of PCT 468 are present but species richness is likely reduced due to disturbance. The ground layer contains species characteristic of PCT 468 including *Rytidosperma monticola, Lomandra filiformis* subsp. *coriacea, Calotis cuneifolia, Gahnia aspera, Xerochrysum viscosum,* and *Cheilanthes sieberi*.

PCT 468 Occurs on brown to yellow loamy sand or sandy loam soils derived from sandstone on hillslopes, hill crests and footslopes in low hill landforms mainly in the Goonoo forest and reserves north of Dubbo in the far south-western part of the Brigalow Belt South Bioregion. The vegetation mapped as PCT 468 in the subject land is located on sandstone derived soils (sedimentary geology). PCT 468 is associated with the Talbragar Valley subregion.

The SVTM maps the vegetation mapped as PCT 468 in this BDAR as PCT 468.

There is another PCT mapped at Cobbora that is similar to PCT 468 which is PCT 440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion. PCT 440 is a n open forest dominated by *Eucalyptus macrorhyncha,* with *Eucalyptus crebra, Callitris endlicheri, Eucalyptus dealbata* or *Eucalyptus dwyeri.* PCT 440 is mapped in the subject land on the low hills to the north of Dapper Road. The vegetation mapped as PCT 468 did not contain *Eucalyptus macrorhyncha, Callitris endlicheri, Eucalyptus dealbata* or *Eucalyptus dwyeri* so was considered to be more representative of PCT 468.

4.2.10.3 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no BC Act listed TEC associated with PCT 468.

4.2.10.4 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no EPBC Act listed TEC associated with PCT 468.

4.2.11 PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion

PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion is described in the BioNet Vegetation Classification database as a mid-high open forest co-dominated by *Eucalyptus rossii*, *Eucalyptus macrorhyncha* and *Callitris endlicheri*. Other common trees include *Eucalyptus fibrosa* and *Eucalyptus polyanthemos* subsp. *polyanthemos* and rarely *Acacia doratoxylon*. The shrub layer is sparse and includes *Phyllanthus hirtellus, Cassinia laevis, Allocasuarina gymnanthera, Persoonia linearis, Pultenaea microphylla, Dillwynia sieberi, Hibbertia circumdans, Olearia microphylla, Acacia uncinata, Indigofera australis, Lissanthe strigosa* subsp. *strigosa, Bursaria spinosa* subsp. *spinosa, Brachyloma daphnoides* subsp. *pubescens, Hibbertia obtusifolia, Melichrus urceolatus* and *Ozothamnus diosmifolius*. The ground cover is mid-dense to sparse often with large amounts of leaf litter. The small shrub *Platysace ericoides* is often present. Grasses include *Joycea pallida, Dichelachne rara* and *Notodanthonia semiannularis*. The mat-rushes *Lomandra filiformis, Lomandra confertifolia* and *Lomandra multiflora* are often present along with the sedges *Lepidosperma laterale* and *Gahnia aspera*. Forb species include *Pomax umbellata, Chrysocephalum semipapposum, Goodenia hederacea* subsp. *hederacea, Veronica plebeia, Stypandra glauca, Wahlenbergia luteola* and *Dianella revoluta* var. *revoluta*.

PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion occurs on sandy loam to clayey sands soils derived from sandstone on hillcrests and hillslopes in hill landform patterns in the Dunedoo – Merriwa region of the extreme south BBS Bioregion overlapping into the NSW SWS Bioregion.

PCT 477 is mapped in the subject area at Durridgere, Bungaba and Uarbry. These areas are sandy plains dominated by distinct stands of *Eucalyptus rossii* and *Callitris endlicheri* with other eucalypts including *Eucalyptus dealbata, Eucalyptus macrorhyncha, Eucalyptus crebra* present. Smaller groups of *Eucalyptus rossii* are present in areas at Merotherie and Cope but these areas were too small to map as a distinct PCT. The shrub layer contains the typical species *Cassinia laevis, Allocasuarina gymnanthera, Persoonia linearis, Brachyloma daphnoides, Hibbertia obtusifolia* and *Ozothamnus diosmifolius* along with a range of other sclerophyllous shrubs. The ground layer contained the characteristic species *Lomandra filiformis, Gahnia aspera, Pomax umbellata, Goodenia hederacea*, and *Dianella revoluta* along with a range of other species.

Table 4-23 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-24 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 477 during the field survey.

Table 4-23 PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion

PCT ID	477
PCT name	Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	40.00 %
Extent within subject land (ha)	18.63 ha

Table 4-24 PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus rossii, Callitris endlicheri, Eucalyptus dealbata, Eucalyptus macrorhyncha, Eucalyptus crebra*
Shrubs	*Allocasuarina gymnanthera, Astroloma humifusum, Calytrix tetragona, Cassinia laevis, Cassinia sifton, Cassinia arcuata, Dillwynia* sp., *Hibbertia monogyna, Leucopogon muticus, Persoonia linearis, Philotheca ericifolia, Platysace ericoides, Pultenaea* sp., *Acacia gladiiformis, Bossiaea rhombifolia, Hibbertia riparia, Leptospermum polygalifolium, Micromyrtus ciliata, Persoonia lanceolata, Acacia penninervis, Bossiaea concolor, Brachyloma daphnoides, Grevillea sericea, Hibbertia obtusifolia, Ozothamnus diosmifolius, Persoonia curvifolia, Styphelia triflora*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida ramosa, Dichelachne micrantha, Digitaria diffusa, Digitaria ramularis, Echinopogon caespitosus, Eragrostis brownii, Fimbristylis dichotoma, Gahnia aspera, Juncus usitatus, Lomandra filiformis* subsp. *coriacea, Lomandra filiformis* subsp. *filiformis, Lomandra multiflora subsp. multiflora, Austrostipa densiflora, Austrostipa scabra* subsp. *falcata, Centrolepis strigosa* subsp. *strigosa, Cynodon dactylon, Microlaena stipoides, Rytidosperma tenuius, Rytidosperma pallidum, Xyris complanata, Themeda triandra*
Forbs	*Euchiton japonicus, Gonocarpus elatus, Goodenia hederacea* subsp. *hederacea, Hovea linearis, Isotoma axillaris, Pomax umbellata, Poranthera microphylla, Wahlenbergia luteola, Wahlenbergia stricta, Goodenia paniculata, Laxmannia gracilis, Opercularia hispida, Patersonia sericea, Stellaria* sp., *Tricoryne elatior, Wahlenbergia gracilis, Wahlenbergia communis, Calotis cuneifolia, Dampiera lanceolata, Dianella revoluta, Hybanthus monopetalus*
Other	*Hardenbergia violacea, Cassytha pubescens, Billardiera scandens, Grona varians, Macrozamia secunda*

Photo 4-52 PCT 477 in Durridgere State Conservation Area showing canopy of *Eucalyptus rossii* and grassy ground layer

Photo 4-53 PCT 477 in Durridgere State Conservation Area showing canopy of *Eucalyptus rossii* in decline and younger regeneration

4.2.11.1 Condition states

Within the subject land PCT 477 is present in the following broad condition states (equivalent to vegetation zones):

- Moderate_Good.
- Thinned.
- Derived Native Grassland.

Photo 4-54 PCT 477 Moderate_Good condition state in Durridgere State Conservation Area

Photo 4-55 PCT 477 in Durridgere State Conservation Area Moderate_Good condition state

4.2.11.2 Justification of PCT selection

PCT 477 is mapped in the subject area at Durridgere, Bungaba and Uarbry on sandy plains dominated by distinct stands of *Eucalyptus rossii* and *Callitris endlicheri* with other eucalypts including *Eucalyptus dealbata, Eucalyptus macrorhyncha, Eucalyptus crebra*. This vegetation type is distinct in the region and not confused with any other PCT.

Using the BioNet Vegetation Classification database PCT Filter Tool, the other *Eucalyptus rossii* dominant PCTs within the Brigalow Belt IBRA Region include:

- PCT 379: Inland Scribbly Gum – White Bloodwood – Red Stringybark – Black Cypress Pine shrubby sandstone woodland mainly of the Warrumbungle Nation Park – Pilliga region in the Brigalow Belt South Bioregion. Stated to occur in the Warrumbungle National Park and southern Pilliga Forests regions near Coonabarabran extending to Tambar Springs in the east. This PCT has a distinct component of *Corymbia trachyphloia* subsp. *amphistomatica* in the canopy which is absent from the vegetation in the subject land.
- PCT 1133: Scribbly Gum – Brown Bloodwood woodland on volcanic slopes of the southern Brigalow Belt South Bioregion. Stated to occur on ridges and slopes on sedimentary and volcanic substrates. This PCT has a distinct component of *Corymbia trachyphloia* subsp. *amphistomatica* in the canopy which is absent from the vegetation in the subject land.
- PCT 1675: Scribbly Gum – Narrow-leaved Ironbark – Bossiaea rhombifolia heathy open forest on sandstone ranges of the Sydney Basin. This community occurs in Munghorn Gap Nature Reserve; Durridgere State Conservation Area and western Goulburn River National Park. It is most strongly associated with dissected Narrabeen sandstone. This PCT is the same as PCT 477 but occurs in the Sydney Basin bioregion instead of the Brigalow Belt South bioregion.

4.2.11.3 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 477.

4.2.11.4 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no EPBC Act listed EC associated with PCT 477.

4.2.12 PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion

PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion is described in the BioNet Vegetation Classification database as a mid-high to tall open forest co-dominated by *Eucalyptus fibrosa, Callitris endlicheri, Eucalyptus macrorhyncha* and/or *Eucalyptus sparsifolia* and the small tree *Acacia linearifolia*. Other trees may include *Eucalyptus rossii, Eucalyptus punctata* and *Eucalyptus dawsonii*. The shrub layer is sparse and includes *Phyllanthus hirtellus, Brachyloma daphnoides* subsp. *daphnoides, Hibbertia obtusifolia, Melichrus urceolatus, Cassinia laevis, Persoonia linearis, Pultenaea microphylla, Dillwynia sieberi, Hibbertia circumdans, Olearia microphylla, Acacia uncinata, Indigofera australis, Lissanthe strigosa* subsp. *strigosa, Bursaria spinosa* subsp. *spinosa* and *Ozothamnus diosmifolius.* The ground cover is mid-dense to sparse. The small shrubs *Platysace ericoides* and *Astroloma humifusa* are often present. Grasses include *Joycea pallida* and *Austrodanthonia racemosa*. The mat-rushes include *Lomandra filiformis, Lomandra confertifolia* and *Lomandra multiflora* along with the sedge *Lepidosperma laterale*. Forb species include *Pomax umbellata, Chrysocephalum semipapposum, Goodenia hederacea* subsp. *hederacea, Veronica plebeia,* and *Stypandra glauca.*

PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion occurs on sandy loam to clayey sand soils derived from sandstone, siltstone, shale or slate on footslopes, hillcrests and hillslopes in hill and low hill landform patterns in the Dunedoo – Merriwa region of the extreme south BBS Bioregion overlapping into the NSW SWS Bioregion and upper Hunter Valley and Capertee Valley.

PCT 478 is mapped in the subject area at Wilpinjong, Bungaba, and Merotherie. These areas are dominated by the species typical of PCT 478 including *Eucalyptus sparsifolia, Callitris endlicheri, Acacia linearifolia, Eucalyptus crebra, Eucalyptus punctata, Eucalyptus dawsonii,* and *Eucalyptus fibrosa.* The shrub layer contains the typical species *Phyllanthus hirtellus, Persoonia linearis, Lissanthe strigosa,* and *Bursaria spinosa* with a range of other sclerophyllous shrub species. The ground layer contained the characteristic species.

Table 4-25 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-26 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 477 during the field survey.

Table 4-25 PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion

PCT ID	478
PCT name	Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	29.00 %
Extent within subject land (ha)	10.08 ha

Table 4-26 PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus sparsifolia, Eucalyptus sideroxylon, Eucalyptus blakelyi, Callitris endlicheri, Acacia linearifolia, Allocasuarina luehmannii, Eucalyptus crebra, Eucalyptus punctata. Eucalyptus dawsonii* and *Eucalyptus fibrosa* outside of plots.
Shrubs	*Acacia spectabilis, Bursaria spinosa, Cassinia sifton, Correa reflexa* var. *reflexa, Dodonaea viscosa* subsp. *cuneata, Lissanthe strigosa, Persoonia linearis, Platysace ericoides, Persoonia linearis, Podolobium ilicifolium, Alchornea ilicifolia, Bursaria spinosa, Lissanthe strigosa, Phyllanthus hirtellus*
Ferns	*Cheilanthes sieberi, Lindsaea linearis, Asplenium flabellifolium*
Grass & grasslike	*Lepidosperma* sp., *Lomandra longifolia, Rytidosperma* sp.
Forbs	*Calotis cuneata, Chrysocephalum semipapposum, Goodenia decurrens, Wahlenbergia gracilis*
Other	*Billardiera scandens, Hardenbergia violacea*

Photo 4-56 PCT 478 at Merotherie

Photo 4-57 PCT 478 at Wilpinjong

4.2.12.1 Condition states

Within the subject land PCT 478 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

Photo 4-58 PCT 478 Mod_Good condition at Wilpinjong

Photo 4-59 PCT 478 Mod_Good condition at Merotherie

4.2.12.2 Justification of PCT selection

The dominant tree species in the canopy were *Eucalyptus sparsifolia, Eucalyptus sideroxylon, Eucalyptus blakelyi, Callitris endlicheri, Acacia linearifolia, Allocasuarina luehmannii, Eucalyptus crebra, Eucalyptus punctata*. *Eucalyptus dawsonii* was present outside of plots at Merotherie. *Eucalyptus fibrosa* was also common outside of plots, particularly near the Freeflight Motor Cross Park at Merotherie Road. This combination of tree species is considered most likely to fit PCT 478 as described in the BioNet Vegetation Classification database.

PCT 478 is mapped in the subject land at Wilpinjong, Bungaba, and Merotherie in the Inland Slopes and Kerrabee IBRA subregions. The BioNet Vegetation Classification database indicates that this PCT is found in the Inland Slopes subregion. There is likely to be overlap of this PCT into the adjacent Kerrabee subregion.

This vegetation mapped as PCT 478 is located in hill land forms on the Narrabeen Group sandstone and the Illawarra Coal Measures.

The SVTM map agrees with the mapping of PCT 478 at Merotherie. PCT 1610 is mapped at Wilpinjong which is White Box – Black Cypress Pine shrubby woodland of the Western Slopes. The vegetation sampled in this area at Wilpinjong does not match the description of PCT 1610 provided in the BioNet Vegetation Classification database as it lacks *Eucalyptus albens*.

4.2.12.3 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 478.

4.2.12.4 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 478.

4.2.13 *PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion*

4.2.13.1 PCT overview

PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion is described in the BioNet Vegetation Classification database as a tall open forest dominated by *Eucalyptus crebra*, *Callitris endlicheri* often with *Eucalyptus sparsifolia, Eucalyptus punctata* or *Eucalyptus dwyeri*. Other tree species may include *Eucalyptus nubila*, *Acacia linearifolia*, *Acacia crassa*, *Eucalyptus macrorhyncha*, *Eucalyptus fibrosa* and *Corymbia trachyphloia* subsp. *amphistomatica*. The shrub layer is usually sparse but may be mid-dense in places and is rich in species. Shrub species include *Cassinia arcuata*, *Acacia buxifolia* subsp. *buxifolia, Acacia verniciflua, Acacia piligera, Cassinia laevis, Dodonaea triangularis, Phyllanthus hirtellus, Sannantha cunninghamii, Macrozamia spiralis, Melichrus urceolatus, Allocasuarina gymnanthera, Melichrus erubescens, Grevillea sericea, Styphelia triflora, Acacia sertiformis, Leucopogon muticus, Hibbertia obtusifolia, Kunzea parvifolia, Acrotriche rigida, Prostanthera howelliae, Exocarpos cupressiformis* and *Choretrum* sp. A. The ground cover is usually sparse and may contain litter or rock. Grass species include *Joycea pallida, Austrostipa densiflora, Echinopogon caespitosus* var. *caespitosus, Digitaria ramularis, Aristida vagans* and *Microlaena stipoides* var. *stipoides*. The low shrub *Astroloma humifusum* may be present. Sedges such as *Gahnia aspera* and *Lepidosperma laterale* and mat-rushes such as *Lomandra glauca* and *Lomandra filiformis* subsp. *coriacea* may be present. Forb species include *Pomax umbellata, Goodenia hederacea* subsp. *hederacea, Gonocarpus elatus, Dianella revoluta* var. *revoluta, Stypandra glauca* and *Xerochrysum viscosa*.

PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion occurs on red-brown loamy clay to sandy loam soils derived from sandstone, siltstone and shale in hill and low hill landforms in the southern BBS, northern NSW SWS and north-western Sydney Basin Bioregions.

PCT 479 is mapped in the subject area at Turill, Cope, and Merotherie. The vegetation in these areas is dominated by a canopy of *Eucalyptus crebra, Eucalyptus sideroxylon, Eucalyptus sparsifolia, Eucalyptus dwyeri, Acacia linearifolia* with *Eucalyptus macrorhyncha* and *Eucalyptus punctata*. These species are generally characteristic of PCT 479. The shrub layer contains the characteristic species *Phyllanthus hirtellus, Sannantha cunninghamii, Melichrus urceolatus, Bursaria spinosa, Lissanthe strigosa* and *Hibbertia obtusifolia*. The ground layer contains typical species including *Aristida vagans, Microlaena stipoides, Digitaria* sp., *Lepidosperma laterale, Lomandra filiformis, Gonocarpus elatus, Goodenia hederacea, Cheilanthes sieberi* and *Pomax umbellata*.

Table 4-27 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-28 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 477 during the field survey.

Table 4-27 PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion

PCT ID	479
PCT name	Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion
Vegetation formation	Dry Sclerophyll Forests (shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	40%
Extent within subject land (ha)	135.58 ha

Table 4-28 PCT 479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Acacia doratoxylon, Angophora floribunda, Eucalyptus dwyeri, Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus macrorhyncha, Eucalyptus punctata, Eucalyptus sideroxylon, Eucalyptus sparsifolia, Acacia linearifolia*
Shrubs	*Acacia ausfeldii, Acacia decora, Acacia implexa, Bursaria spinosa, Cassinia sifton, Dodonaea viscosa, Exocarpos cupressiformis, Hibbertia obtusifolia, Lissanthe strigosa, Melichrus urceolatus, Muehlenbeckia rhyticarya, Phyllanthus hirtellus, Persoonia linearis, Poranthera corymbosa, Pultenaea cinerascens, Sannantha cunninghamii, Solanum cinereum*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Austrostipa scabra., Aristida personata, Aristida ramosa, Aristida vagans, Arundinella nepalensis, Bothriochloa* sp., *Carex inversa, Cleistochloa rigida, Cymbopogon refractus, Dichelachne crinita, Digitaria* sp., *Echinopogon ovatus, Eragrostis* sp., *Fimbristylis dichotoma, Hibbertia obtusifolia, Juncus usitatus, Lepidosperma laterale, Lomandra filiformis, Lomandra longifolia, Lomandra multiflora, Microlaena stipoides, Panicum* sp., *Rytidosperma racemosum* var. *obtusatum, Rytidosperma setaceum, Schoenus apogon, Sporobolus creber*
Forbs	*Acaena echinata* var. *subglabricalyx, Acaena ovina, Brachyscome dentata., Calotis cuneifolia, Calotis lappulacea, Cotula australis, Dichondra* sp. Inglewood, *Dichondra repens, Einadia nutans, Geranium solanderi, Gonocarpus elatus, Gonocarpus tetragynus, Goodenia hederacea, Haloragis heterophylla, Hibbertia obtusifolia, Hydrocotyle laxiflora, Lagenophora stipitata, Laxmannia gracilis, Lepidium* sp., *Oxalis perennans, Pomax umbellata, Ranunculus sessiliflorus* var. *sessiliflorus, Rumex brownii, Spergularia marina, Solanum prinophyllum, Tricoryne elatior, Veronica plebeia, Vittadinia gracilis, Wahlenbergia gracilis, Wahlenbergia planiflora, Wahlenbergia stricta, Wurmbea dioica*
Other	*Amyema miquelii, Desmodium varians, Glycine clandestina, Glycine tabacina*

Photo 4-60 PCT 479 at Merotherie showing canopy of *Eucalyptus sparsifolia* on a western slope

Photo 4-61 PCT 479 at Merotherie showing vegetation on a north facing slope

4.2.13.2 Condition states

Within the subject land PCT 479 is present in the following broad condition states (equivalent to vegetation zones):

- Derived Native Grassland
- Derived Native Shrubland
- Mod_Good
- Poor
- Thinned.

Photo 4-62 PCT 479 Derived Native Grassland at Cope

Photo 4-63 PCT 479 Thinned at Cope

Photo 4-64 PCT 479 Moderate_Good condition at Merotherie

4.2.13.3 Justification of PCT selection

The dominant tree species in the canopy were *Eucalyptus crebra, Eucalyptus sideroxylon, Eucalyptus sparsifolia, Eucalyptus dwyeri, Acacia linearifolia* with *Eucalyptus macrorhyncha* and *Eucalyptus punctata*. These species are generally characteristic of PCT 479. The shrub layer contains the characteristic species *Phyllanthus hirtellus, Sannantha cunninghamii, Melichrus urceolatus, Bursaria spinosa, Lissanthe strigosa* and *Hibbertia obtusifolia*. The ground layer contains typical species including *Aristida vagans, Microlaena stipoides, Digitaria* sp., *Lepidosperma laterale, Lomandra filiformis, Gonocarpus elatus, Goodenia hederacea, Cheilanthes sieberi* and *Pomax umbellata*.

PCT 479 is mapped in the study area at Turill, Cope, and Merotherie in the Pilliga, Kerrabee and Inland Slopes IBRA subregions. These subregions are as outlined in the BioNet Vegetation Classification database with the exception of Kerrabee. However, the portion of the Kerrabee IBRA subregion where PCT 479 is mapped in the subject land is directly adjacent to the Inland Slopes IBRA subregion so there is likely to be some overlap of PCTs in this area and there is no hard IBRA subregion boundary present.

This vegetation mapped as PCT 479 is located in hill land forms on the Ulan Quartz Monzonite and Tunnabutta Group (Shale, slate and minor volcanic-rich sandstone) at Cope, Pilliga Sandstone at Turill, and the Narrabeen Group sandstone and the Illawarra Coal Measures at Merotherie.

The SVTM maps some of the vegetation mapped as PCT 479 in this BDAR as follows:

- The vegetation on the sandstone hills at Merotherie is mapped largely as PCT 477 with smaller areas of PCT 461, PCT 478 and PCT 476.
- The vegetation on the Pilliga sandstone at Turill is mapped as PCT 484, PCT 1696, and PCT 1661.
- The vegetation at Cope is mapped as PCT 478, PCT 1610, PCT 1871, and PCT 1669.

PCT 477 is a forest co-dominated by *Eucalyptus rossii, Eucalyptus macrorhyncha* and *Callitris endlicheri. Eucalyptus rossii* was not a dominant component of the vegetation mapped as PCT 479 in the subject land.

PCT 461 is dominated by *Eucalyptus dealbata* which was not dominant in the vegetation mapped as PCT 479 in the subject land.

PCT 476 – Narrow-leaved Wattle low open forest / very tall shrubland on ridges in northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion mapped at Merotherie does contain *Acacia linearifolia* and *Eucalyptus crebra* but is largely dominated by *Eucalyptus sparsifolia, Eucalyptus fibrosa* suggesting that PCT 479 is a better fit for this vegetation.

PCT 484 is a derived tall spear grass grassland PCT. Derived PCT cannot be used in a BDAR (see BAM Section 4.2.3).

PCT 1696 – Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter is not a good match for the vegetation mapped as PCT 479 at Turill with the exception of vegetation along Waterholes Gully. Most of the vegetation mapped as PCT 1696 at Turill is ironbark dominated and more likely a match for PCT 479.

PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin is dominated by *Eucalyptus crebra* but based on analysis of BAM Plot data using the BioNet Vegetation Classification database PCT Filter Tool none of the surveys done in vegetation mapped as PCT 1661 are more representative of PCT 479 (see BAM plot IM5).

PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes is described in the BioNet Vegetation Classification database as a woodland characterised by a canopy strongly dominated by *Eucalyptus albens*. *Eucalyptus albens* is present in very low numbers in the vegetation mapped as PCT 479 but is not a dominant species.

PCT 1871 is no longer an active PCT.

PCT 1669 – Red Ironbark – Grey Gum – Narrow-leaved Stringybark – Brown Bloodwood shrubby open forest on sandstone ranges of the Sydney Basin mapped at Cope is very similar to PCT 479. The data collected at the BAM plot undertaken in this area (BAM plot LH30) suggests that the vegetation is more like PCT 479 due to the presence of *Eucalyptus dealbata, Acacia linearifolia, Sannantha cunninghamii, Astroloma humifusum* and *Lissanthe strigosa* which are not part of PCT 1669 as outlined in the BioNet Vegetation Classification database.

PCT 478 is very similar to PCT 479. Both PCTs are characterised by ironbarks, stringybarks and black cypress pine and occupy similar landscape positions. It is likely that these two PCTs grade into each other or are variations of a similar vegetation type. Detailed analysis of BAM vegetation integrity plots suggests that the areas mapped as PCT 479 in the study area are more likely to be PCT 479 due to the presence of species such as *Eucalyptus dealbata, Sannantha cunninghamii, Leucopogon muticus, Grevillea sericea, Styphelia triflora, Prostanthera howelliae* which suggest that the vegetation is more like PCT 479.

PCT 440 is also very similar to PCT 479. It is likely that these two PCTs grade into each other or are variations of a similar vegetation type as they are both stringybark, ironbark, black cypress pine communities that occupy similar landscape positions. The BAM vegetation integrity plots suggest that the presence of species such as *Eucalyptus sparsifolia* and *Lissanthe strigosa* indicates that the vegetation is more representative of PCT 479 in the subject land. The ecotone between PCT 440 and PCT 479 is likely to be broad.

4.2.13.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 479.

4.2.13.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 479.

4.2.14 PCT 481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region

PCT 481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region is described in the BioNet Vegetation Classification database as a tall open forest to woodland dominated by *Angophora floribunda, Eucalyptus blakelyi* with *Eucalyptus punctata* grading upslope into *Eucalyptus crebra, Eucalyptus sparsifolia, Acacia linearifolia* and *Callitris endlicheri*. Shrubs are sparse and include *Styphelia triflora, Hibbertia obtusifolia, Persoonia linearis* and *Xanthorrhoea johnsonii*. The ground cover is very sparse and bare in creek beds. Grasses include *Microlaena stipoides* var. *stipoides, Echinopogon caespitosus, Echinopogon ovatus, Imperata cylindrica* var. *major, Arundinella nepalensis* and *Lachnagrostis filiformis*. Forbs include *Dichondra repens, Persicaria prostrata, Hydrocotyle laxiflora, Geranium solanderi* var. *solanderi, Poranthera microphylla, Rorippa laciniata, Rumex brownii, Urtica incisa, Sigesbeckia australiensis, Veronica plebeia* and *Geranium potentilloides* var. *potentilloides*. The rock fern *Cheilanthes sieberi* subsp. *sieberi* and the tall ferns *Pteridium esculentum* or *Pteris tremula* also occur. The sedge *Carex appressa* and rush *Juncus psammophilus* may be present.

PCT 481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region occurs on alluvial sands or loam soil derived mainly from sandstone in hill or low hill landforms in the upper Hunter Valley mainly in the Sydney Basin Bioregion with small areas in the BBS Bioregion.

PCT 481 is mapped in the subject area at Cope and Uarbry. These areas are sandy plains dominated by distinct stands of *Angophora floribunda* with other eucalypts including *Eucalyptus bridgesiana, Eucalyptus blakelyi* x *tereticornis, Eucalyptus moluccana*, and *Eucalyptus macrorhyncha*. Other tree species including *Allocasuarina littoralis, Brachychiton populneus*, and *Callitris endlicheri* are also common depending on location and influence from adjacent PCTs. The typical shrub species *Styphelia triflora, Hibbertia obtusifolia*, and *Persoonia linearis* are present. The grass species *Arundinella nepalensis* is prevalent in the ground layer with other typical grass species including *Echinopogon caespitosus* and *Imperata cylindrica*. Typical forbs for PCT 481 including *Veronica plebeia* are present along with *Cheilanthes sieberi.*

Table 4-29 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-30 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 481 during the field survey.

Table 4-29 PCT 481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region

PCT ID	481
PCT name	Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region
Vegetation formation	Dry Sclerophyll Forests (shrubby sub-formation)
Vegetation class	North Coast Dry Sclerophyll Forests
Per cent cleared value (%)	28%
Extent within subject land (ha)	31.94 ha

Table 4-30 PCT 481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Angophora floribunda, Eucalyptus bridgesiana, Allocasuarina littoralis, Eucalyptus blakelyi* x *tereticornis, Eucalyptus moluccana, Brachychiton populneus, Callitris endlicheri, Eucalyptus macrorhyncha.*
Shrubs	*Brachyloma daphnoides, Cassinia sifton, Grevillea sericea, Hibbertia obtusifolia, Leptospermum parvifolium, Leucopogon muticus, Persoonia linearis, Styphelia tubiflora, Acacia polybotrya, Hibbertia linearis, Persoonia linearis, Platysace linearifolia, Westringia eremicola, Acacia decora, Acacia implexa, Astroloma humifusum, Exocarpos strictus, Kunzea parvifolia, Lissanthe strigosa, Acacia ausfeldii, Ozothamnus diosmifolius, Solanum cinereum*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida ramosa, Aristida personata, Aristida vagans, Arundinella nepalensis, Austrostipa densiflora, Echinopogon caespitosus, Entolasia marginata, Eragrostis brownii, Eragrostis elongata, Fimbristylis dichotoma, Imperata cylindrica, Lomandra longifolia, Lomandra confertifolia* subsp. *pallida, Lomandra filiformis* subsp. *filiformis, Lomandra multiflora* subsp. *multiflora, Luzula* sp., *Schoenus* sp., *Panicum effusum, Rytidosperma setaceum, Rytidosperma* sp., *Sporobolus creber*
Forbs	*Cyanicula caerulea, Dianella longifolia, Drosera peltata, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Pomax umbellata, Pterostylis concinna, Senecio prenanthoides, Veronica plebeia, Wahlenbergia luteola, Brachyscome* sp., *Lagenophora stipitata, Patersonia* sp., *Wahlenbergia planiflora, Laxmannia gracilis, Stackhousia viminea, Gonocarpus elatus, Goodenia hederacea, Oxytes brachypoda, Senecio* sp., *Swainsona behriana, Wahlenbergia gracilis, Wahlenbergia stricta, Xerochrysum viscosum*
Other	*Cassytha* sp., *Desmodium* sp., *Macrozamia secunda, Macrozamia spiralis, Clematis aristata, Glycine clandestina*

Photo 4-65 PCT 481 at Cope

Photo 4-66 PCT 481 at Cope showing *Angophora floribunda* in the canopy

4.2.14.1 Condition states

Within the subject land PCT 481 is present in the following broad condition state (equivalent to vegetation zones):

- Mod_Good
- Thinned
- Derived Native Grassland.

Photo 4-67 PCT 481 along a drainage line at Cope

Photo 4-68 PT 481 at Plot LC28 at Uarbry

4.2.14.2 Justification of PCT selection

PCT 481 is mapped in the subject area at Cope and Uarbry. These areas are sandy plains dominated by distinct stands of *Angophora floribunda* with other eucalypts including *Eucalyptus bridgesiana, Eucalyptus blakelyi* x *tereticornis, Eucalyptus moluccana,* and *Eucalyptus macrorhyncha*. Other tree species including *Allocasuarina littoralis, Brachychiton populneus,* and *Callitris endlicheri* are also common depending on location and influence from adjacent PCTs. The typical shrub species *Styphelia triflora, Hibbertia obtusifolia,* and *Persoonia linearis* are present. The grass species *Arundinella nepalensis* is prevalent in the ground layer with other typical grass species including *Echinopogon caespitosus* and *Imperata cylindrica*. Typical forbs for PCT 481 including *Veronica plebeia* are present along with *Cheilanthes sieberi*.

This vegetation mapped as PCT 481 is located on sandy plains and is associated with smaller creek lines on Pilliga Sandstone at Uarbry and Ulan Quartz Monzonite and Quaternary Alluvium at Cope.

The SVTM maps some of the vegetation mapped as PCT 481 in this BDAR as follows:

- The vegetation at Uarbry is mapped largely as PCT 477 and PCT 440 which are *Eucalyptus rossii* and *Eucalyptus macrorhyncha* dominated communities.
- The vegetation at Cope is mapped as PCT 1610 which is a *Eucalyptus albens* and *Callitris endlicheri* dominated community.

Of the *Angophora floribunda* dominated PCTs known from the subregions, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 281: Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion. PCT 281 contains a greater compliment of *Eucalyptus albens* and *Eucalyptus melliodora* and is a grassy woodland while the vegetation mapped as PCT 481 in the subject land is a dry sclerophyll forest with distinct dry sclerophyll shrub component.. Otherwise PCT 281 and PCT 481 are similar.

- PCT 599: Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. PCT 599 has a similar canopy species mix to PCT 481. PCT 599 contains a greater compliment of *Eucalyptus blakelyi* and *Eucalyptus melliodora* and is a grassy woodland while the vegetation mapped as PCT 481 in the subject land is a dry sclerophyll forest with distinct dry sclerophyll shrub component.
- PCT 401: Rough-barked Apple – Blakely's Red Gum – Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region. PCT 401 is very similar to PCT 481 but is stated to occur in the Pilliga Scrub forests.

4.2.14.3 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no BC Act listed TEC associated with PCT 481.

4.2.14.4 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no EPBC Act listed EC associated with PCT 481.

4.2.15 PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

4.2.15.1 PCT overview

PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley is described in the BioNet Vegetation Classification database as a mid-high to tall open woodland or woodland dominated by a *Eucalyptus moluccana* x *Eucalyptus albens* hybrid forming an *Eucalyptus albens* <-> *moluccana* intermediate taxon. Few other tree species occur with *Angophora floribunda* and *Eucalyptus melliodora* occurring on footslopes and valley flats. Shrubs are absent or very sparse and include *Sclerolaena muricata, Sida trichopoda* and *Pimelea curviflora* var. *curviflora*. The ground cover is dense after rain but mid-dense to sparse in dry times. Grass species include *Austrostipa bigeniculata, Bothriochloa macra, Austrostipa aristiglumis, Elymus scaber* var. *scaber, Cynodon dactylon* and *Panicum queenslandicum* var. *queenslandicum*. The sedge *Cyperus gracilis* may be present. Forb species include *Boerhavia dominii, Oxalis perennans, Chamaesyce drummondii, Hibiscus trionum, Einadia nutans* subsp. *nutans, Asperula conferta, Rumex brownii, Mentha diemenica, Geranium solanderi* var. *solanderi* and *Calotis lappulacea*.

PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley occurs on brown to black earth, chocolate loam to clay soils derived from basalt on hillslopes, hillcrests, footslopes and valley flats on rolling hills and low hills on the Merriwa Plain and lower southern slopes of the Liverpool Range in the upper Hunter Valley in the far south-eastern corner of the Brigalow Belt South Bioregion.

PCT 483 is mapped in the subject land in the Liverpool Ranges and Pilliga IBRA subregions at Coolah, Cassilis and Turill on the rolling hills on basalt geology with red brown to chocolate soils. The canopy is dominated by trees with intermediate characteristics between *Eucalyptus albens* and *Eucalyptus moluccana* which are considered to be the hybrid *Eucalyptus albens x moluccana*. Other trees that occur scattered throughout include *Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus melliodora,* and *Brachychiton populneus* (stands of *Brachychiton populneus* are common where other trees have been removed). Shrubs were generally sparse given the grazing that occurs in this PCT but species including *Acacia implexa, Acacia penninervis* var. *penninervis, Allocasuarina torulosa, Cassinia sifton, Crassula sieberiana, Indigofera adesmiifolia, Lissanthe strigosa* subsp. *strigosa, Melichrus urceolatus,* and *Myoporum montanum* were present. While these species are not described in the BioNet Vegetation Classification database for PCT 843 it is likely that the original description is based off limited data collected further to the south east of the subject land. The characteristic groundcover species *Asperula conferta, Calotis lappulacea, Einadia nutans, Geranium solanderi* and *Rumex brownii* were present.

Table 4-31 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-32 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 483 during the field survey.

Table 4-31 PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

PCT ID	483
PCT name	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Per cent cleared value (%)	90%
Extent within subject land (ha)	174.09 ha

Table 4-32 PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus albens* x *moluccana, Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus melliodora, Brachychiton populneus*
Shrubs	*Acacia implexa, Acacia penninervis* var. *penninervis, Allocasuarina torulosa, Cassinia sifton, Crassula sieberiana, Indigofera adesmiifolia, Lissanthe strigosa* subsp. *strigosa, Melichrus urceolatus, Myoporum montanum*
Ferns	*Cheilanthes sieberi, Cheilanthes distans*
Grass & grasslike	*Austrostipa aristiglumis, Austrostipa verticillata, Aristida ramosa, Arundinella nepalensis, Juncus usitatus, Microlaena stipoides, Lomandra filiformis* subsp. *filiformis, Lomandra multiflora, Luzula flaccida, Panicum decompositum, Poa* sp., *Schoenus apogon*
Forbs	*Asperula conferta, Calotis lappulacea, Cotula australis, Cymbonotus lawsonianus, Dichondra repens, Einadia nutans, Gahnia aspera, Geranium solanderi, Glossodia major, Hydrocotyle laxiflora, Hydrocotyle tripartita, Hypericum gramineum, Oxalis exilis, Plantago debilis, Rumex brownii, Urtica incisa, Veronica plebeia, Vittadinia* sp., *Wahlenbergia luteola, Wurmbea dioica*
Other	*Hardenbergia violacea*

Photo 4-69 PCT 483 showing *Eucalyptus albens* x *moluccana* hybrid trees on the Liverpool Ranges generator connector

Photo 4-70 PCT 483 on the Liverpool Ranges generator connector showing *Eucalyptus albens* x *moluccana* hybrid trees on basalt hills

4.2.15.2 Condition states

Within the subject land PCT 483 is present in the following broad condition states (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Poor
- Thinned.

Photo 4-71 PCT 483 Thinned condition state on basalt hills in the Liverpool Range IBRA subregion

Photo 4-72 PCT 483 Derived Native Grassland condition state showing dominance of native grasses in the ground layer and open woodland in the distance

Photo 4-73 PCT 483 Moderate_Good condition state at BAM Plot LH37 in the Liverpool Range IBRA subregion

Photo 4-74 PCT 483 Poor condition at Cassilis showing exotic ground layer and poor condition trees

4.2.15.3 Justification of PCT selection

The canopy of the vegetation mapped as PCT 483 in the subject land is dominated by trees with intermediate characteristics between *Eucalyptus albens* and *Eucalyptus moluccana* which are considered to be the hybrid *Eucalyptus albens x moluccana*. Other trees that occur scattered throughout include *Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus melliodora,* and *Brachychiton populneus*. Shrubs are sparse. The characteristic groundcover species *Asperula conferta, Calotis lappulacea, Einadia nutans, Geranium solanderi* and *Rumex brownii* were present.

PCT 483 is mapped in the subject land in the Liverpool Ranges and Pilliga IBRA subregions at Coolah, Cassilis and Turill on the rolling hills on basalt geology with red brown to chocolate soils. This distribution and geology match the description for the PCT in the BioNet Vegetation Classification database.

The SVTM maps some of the vegetation mapped as PCT 483 in this BDAR as follows:

- PCT 483 is mapped by the SVTM at Cassilis in agreeance with the mapping of PCT 483 in this BDAR.
- PCT 434 – White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion is mapped by the SVTM at Cassilis and Coolah in areas mapped as PCT 483 in this BDAR. The presence of the hybrid *Eucalyptus albens x moluccana* and other eucalypt species suggests that presence of PCT 483 rather than PCT 434 although the shrub layer is a good match for PCT 434.
- PCT 433 – White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion is mapped by the SVTM at Coolah. The presence of the hybrid *Eucalyptus albens x moluccana* and other eucalypt species combined with an absence of *Acacia pendula* suggest that the vegetation is a better match for PCT 483.
- PCT 381 – Rough-barked Apple – Yellow Box grass/shrub footslope open forest, Brigalow Belt South Bioregion is mapped by the SVTM at Cassilis and Coolah. Small areas of *Angophora floribunda* and *Eucalyptus melliodora* are present in the areas mapped as PCT 483 but these were small and considered part of natural variation as these species are a characteristic part of PCT 483.
- PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin is mapped by the SVTM at Cassilis. The field survey found these areas to be dominated by the hybrid *Eucalyptus albens x moluccana* and located on basalt derived soil.
- PCT 1611 – Narrow-leaved Ironbark – Black Cypress Pine shrub – grass woodland upper Hunter and northern Wollemi is mapped by the SVTM at Turill. Given the basalt geology mapped in this location the vegetation is likely to be PCT 483.

- PCT 484 – Derived tall spear grass grassland on mainly basalt hills of the Liverpool Plains, Liverpool Range and in the upper Hunter Valley (Merriwa district), south-eastern Brigalow Belt South Bioregion is mapped by the SVTM at Cassilis. The large areas of derived native grassland were assigned to PCT 483 as derived PCTs cannot be used in a BDAR (see BAM Section 4.2.3).
- PCT 1881 is mapped at Cassilis but is no longer an active PCT in the BioNet Vegetation Classification database.

4.2.15.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 483 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

4.2.15.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 483 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

4.2.16 PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

4.2.16.1 PCT overview

PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion is described in the BioNet Vegetation Classification database as a tall woodland dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* often with *Angophora floribunda* on flats or *Eucalyptus albens* on hills. The shrub layer is absent to sparse and includes species such as *Acacia implexa, Olearia elliptica* subsp. *elliptica, Geijera parviflora, Myoporum montanum,* or *Pimelea neo-anglica*. The ground cover is usually mid-dense to dense dominated by grasses and forbs. Grass species include *Aristida personata, Austrostipa verticillata, Themeda australis, Bothriochloa macra* or *Dichanthium sericeum.* Forb species include *Dichondra repens, Geranium solanderi, Hydrocotyle laxiflora, Rumex brownii, Scutellaria humilis, Hypericum gramineum, Senecio quadridentatus, Haloragis heterophylla, Dianella longifolia* var. *longifolia* and *Chrysocephalum apiculatum*. The sedges *Cyperus gracilis* or *Carex inversa* may be present along with the climbers *Glycine tabacina* or *Glycine clandestina*. *Juncus* and other wetland species occur in drainage depressions.

PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion occurs on brown, red to black sandy loam to clay loam soils that may be either alluvial/colluvial or derived from fine-grained sedimentary or metamorphic substrates and sometimes volcanic rocks on valley flats, hillslopes in hills and low hills landform patterns. Widespread in the Nandewar Bioregion and on the eastern edge of the Brigalow Belt South Bioregion.

PCT 599 is mapped in the subject land in the Talbragar Valley IBRA subregion at Dunedoo on the Napperby Formation and Purlawaugh Formation siltstones and basalt on hills, and in the Pilliga and adjoining Kerrabee IBRA subregions at Uarbry on the Purlawaugh Formation siltstones and Pilliga Sandstone. The canopy is dominated by a mix of species with *Eucalyptus albens*, *Eucalyptus blakelyi*, *Eucalyptus melliodora* being most common with *Eucalyptus crebra*, *Acacia linearifolia, Eucalyptus albens x moluccana*, and *Acacia doratoxylon* present depending on location, soil type and adjacent PCT. The shrub layer was variable depending on location, soil type and adjacent PCT but contained the typical species *Acacia implexa* and *Geijera parviflora*. Many of the characteristic groundcover species listed for PCT 599 in the VIS database were present.

Table 4-33 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-34 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 599 during the field survey.

Table 4-33 PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

PCT ID	599
PCT name	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Percent cleared value (%)	80%
Extent within subject land (ha)	19.94 ha

Table 4-34 PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus melliodora, Acacia linearifolia, Eucalyptus albens* x *moluccana, Eucalyptus crebra, Acacia doratoxylon, Brachychiton populneus* subsp. *populneus, Melia azedarach.*
Shrubs	*Acacia implexa, Acacia decora, Acacia neriifolia, Allocasuarina gymnanthera, Cassinia sifton, Daviesia genistifolia, Eremophila debilis, Styphelia triflora, Melaleuca thymifolia, Persoonia linearis, Sannantha cunninghamii, Geijera parviflora.*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Anthosachne scabra, Aristida calycina, Aristida ramosa, Arundinella nepalensis, Austrostipa bigeniculata, Austrostipa scabra, Austrostipa verticillata, Bothriochloa macra, Carex inversa, Cynodon dactylon, Cyperus* sp.*, Cymbopogon refractus, Chloris ventricosa, Digitaria divaricatissima, Digitaria diffusa, Dichelachne micrantha, Echinopogon caespitosus, Eragrostis brownii, Eragrostis leptostachya, Enteropogon acicularis, Gahnia aspera, Juncus australis, Juncus bufonius, Juncus holoschoenus, Juncus flavidus, Lomandra filiformis* subsp. *filiformis, Lomandra confertifolia, Lomandra longifolia, Lomandra multiflora* subsp. *multiflora, Paspalidium distans, Panicum decompositum, Rytidosperma racemosum, Rytidosperma pallidum, Rytidosperma pilosum, Sporobolus creber, Themeda triandra, Luzula densiflora.*
Forbs	*Asperula conferta, Ajuga australis, Arthropodium* sp.*, Alternanthera nana, Bulbine* sp.*, Calotis cuneifolia, Commelina cyanea, Chrysocephalum apiculatum, Cymbonotus lawsonianus, Dichondra repens, Dysphania carinata, Dianella longifolia, Dianella revoluta, Dichondra repens, Einadia nutans* subsp. *nutans, Einadia trigonos, Euchiton involucratus, Gonocarpus tetragynus, Goodenia hederacea, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Laxmannia gracilis, Lagenifera stipitata, Plantago varia, Portulaca oleracea, Scutellaria humilis, Sida corrugata, Vittadinia cuneata, Wahlenbergia gracilis, Oxalis perennans, Rumex brownii, Urtica incisa, Veronica plebeia, Xerochrysum bracteatum,*
Other	*Glycine clandestina, Convolvulus erubescens, Glycine tabacina, Grona varians.*

Photo 4-75 PCT 599 showing canopy of *Eucalyptus albens* on hills along Dapper Rd at Dunedoo

Photo 4-76 PCT 599 showing canopy of *Eucalyptus albens* on hills along Dapper Rd at Dunedoo

4.2.16.2 Condition states

Within the subject land PCT 599 is present in the following broad condition states (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

Photo 4-77 PCT 599 Mod_Good condition state along Dapper Rd Dunedoo in the Talbragar Valley IBRA subregion

Photo 4-78 PCT 599 Derived Native Grassland condition state

4.2.16.3 Justification of PCT selection

The canopy of the vegetation mapped as PCT 599 in the subject land is dominated by various tree species including the species typical of PCT 599 *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens,* and *Brachychiton populneus*. The characteristic shrub species *Acacia implexa, Acacia decora* and *Geijera parviflora* are present. Ground layer species typical of PCT 599 including *Cheilanthes sieberi, Anthosachne scabra, Aristida ramosa, Arundinella nepalensis, Austrostipa scabra, Austrostipa verticillata, Bothriochloa macra, Carex inversa, Chloris ventricosa, Dichelachne micrantha, Eragrostis brownii, Lomandra filiformis, Lomandra longifolia, Rytidosperma racemosum, Themeda triandra, Asperula conferta, Ajuga australis, Chrysocephalum apiculatum, Cymbonotus lawsonianus, Dianella longifolia, Haloragis heterophylla, Hypericum gramineum, Scutellaria humilis, Sida corrugata, Oxalis perennans, Rumex brownii,* and *Glycine clandestina* are present.

PCT 599 is mapped in the subject land in the Talbragar Valley IBRA subregion at Dunedoo on the Napperby Formation and Purlawaugh Formation siltstones and basalt on hills, and in the Pilliga and adjoining Kerrabee IBRA subregions at Uarbry on the Purlawaugh Formation siltstones and Pilliga Sandstone. This matches the description for PCT 599 as it is stated to occur on soils that may be alluvial/colluvial or derived from fine-grained sedimentary or metamorphic substrates and sometimes volcanic rocks. PCT 599 is stated to occur on valley flats, hillslopes in hills and low hills landform patterns. The vegetation mapped as PCT 599 in the subject land occurs on valley flats and low hills. PCT 599 is stated to be widespread in the Nandewar Bioregion and on the eastern edge of the Brigalow Belt South Bioregion. The vegetation mapped as PCT 599 in the subject land occurs in the Brigalow Belt South bioregion and immediately adjacent Sydney Basin bioregion.

The SVTM maps some of the vegetation mapped as PCT 599 in this BDAR as follows:

- PCT 484 is mapped by the SVTM at Uarbry. PCT 484 is Derived tall spear grass grassland on mainly basalt hills of the Liverpool Plains, Liverpool Range and in the upper Hunter Valley (Merriwa district), south-eastern Brigalow Belt South Bioregion. Derived PCTs cannot be used.
- PCT 467 is mapped by the SVTM at Uarbry. PCT 467 is Blue-leaved Ironbark – Black Cypress Pine shrubby sandstone open forest in the southern Brigalow Belt South Bioregion (including Goonoo). This is an ironbark, *Eucalyptus dealbata, Callitris* spp. community. The vegetation mapped as PCT 599 at Uarbry is a *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens* community with some *Eucalyptus crebra*.
- PCT 489 is mapped by the SVTM at Uarbry. PCT 489 is Long-leaved Box +/- Nortons Box – red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion. This is a *Eucalyptus goniocalyx, Eucalyptus nortonii* dominated community. *Eucalyptus goniocalyx* was noted as present outside of BAM plots but the vegetation mapped as PCT 599 at Uarbry is a *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens* community with some *Eucalyptus crebra*.
- PCT 440 is mapped by the SVTM at Uarbry. PCT 440 is Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion. This is a community dominated by *Eucalyptus macrorhyncha, Eucalyptus crebra* and *Callitris endlicheri*. PCT 400 occurs in the subject land to the north of PCT 599. The vegetation mapped as PCT 599 at Uarbry is a *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens* community with some *Eucalyptus crebra*.
- PCT 477 is mapped by the SVTM at Uarbry. PCT 477 is Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion. This PCT is characterised by a canopy of *Eucalyptus rossii* with *Eucalyptus macrorhyncha, Eucalyptus fibrosa* and *Callitris endlicheri*. PCT 477 occurs in the subject land to the north of PCT 599. The vegetation mapped as PCT 599 at Uarbry is a *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens* community with some *Eucalyptus crebra*.

- PCT 479 is mapped by the SVTM at Uarbry. PCT 479 is Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion. PCT 479 is characterised by *Eucalyptus crebra, Callitris endlicheri, Eucalyptus macrorhyncha* with or without *Eucalyptus punctata* and *Acacia linearifolia. Eucalyptus crebra* and *Acacia linearifolia* are present but the vegetation mapped as PCT 599 at Uarbry is a *Eucalyptus blakelyi, Eucalyptus melliodora, Eucalyptus albens* community with some *Eucalyptus crebra* and *Acacia linearifolia*
- PCT 281 is mapped by the SVTM at Dunedoo. PCT 281 is Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion. PCT 281 is characterised by *Angophora floribunda, Eucalyptus blakelyi,* and *Eucalyptus melliodora*. It is a similar PCT to PCT 599. The vegetation mapped as PCT 599 at Dunedoo was done so due to the canopy being dominated by *Eucalyptus albens* and *Eucalyptus blakelyi* and the shrub layer being more like PCT 599 than PCT 281 (e.g. presence of *Geijera parviflora*).
- PCT 277 is mapped by the SVTM at Dunedoo. PCT 277 is Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. It is a similar PCT to PCT 599. The vegetation mapped as PCT 599 at Dunedoo was done so due to the canopy being dominated by *Eucalyptus albens* and *Eucalyptus blakelyi* and the shrub layer being more like PCT 599 than PCT 277 (e.g. presence of *Geijera parviflora*).
- PCT 468 is mapped by the SVTM at Dunedoo. PCT 468 is Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo). The vegetation mapped as PCT 599 at Dunedoo is dominated by *Eucalyptus albens* and *Eucalyptus blakelyi.*

When plots undertaken in the vegetation mapped as PCT 599 were put into the BioNet Vegetation Classification database PCT Filter Tool, the PCT with the most matches and best fit was PCT 3396 – Northwest Flats Box-Blakelys Red Gum Forest. This is a new East Coast PCT which has been derived from PCT 599, PCT 1329, PCT 626 and PCT 437. PCT 3396 is described as a tall sclerophyll open forest with a mid-dense, grassy ground layer that occurs on flats and lower slopes in the North West Slopes, Hunter Valley and the western margin of the New England Tableland of NSW. The canopy very frequently includes box eucalypts (*Eucalyptus melliodora, Eucalyptus albens* or *Eucalyptus moluccana*), commonly in association with *Eucalyptus blakelyi* and occasionally *Angophora floribunda*. This PCT primarily occurs in the Capertee and Goulburn River valleys, along the footslopes of the Liverpool Range, in the Coonabarabran area and around Barraba and Bundarra on sedimentary, volcanic or plutonic substrates. The valleys where it occurs are typically nestled among ranges with quartz rich substrates which contribute a sandy component to the loamy soils of the valley floor. This description fits the vegetation mapped as PCT 599 within the subject land well.

Of the *Eucalyptus blakelyi, Eucalyptus melliodora* and *Eucalyptus albens* dominated PCTs known from the Talbragar Valley, Pilliga and Kerrabee IBRA subregions, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 1329: Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion. This PCT is stated to be restricted to the Nandewar Bioregion so was not considered for the vegetation in the subject land. The shrub layer of the vegetation in the subject land does not match the description for this PCT.
- PCT 437: Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion. This PCT lacks *Eucalyptus albens* or *Eucalyptus albens* x *moluccana* hybrids which are a feature of the vegetation mapped as PCT 599 in the subject land.

4.2.16.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 599 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

4.2.16.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 599 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

4.2.17 PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley

4.2.17.1 PCT overview

PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley is described in the BioNet Vegetation Classification database as a mid-high to tall woodland to open forest dominated by *Eucalyptus albens* x *moluccana* intermediate, *Eucalyptus tereticornis* x *Eucalyptus blakelyi*, *Angophora floribunda* sometimes with *Eucalyptus melliodora*, *Brachychiton populneus* subsp. *populneus*, *Eucalyptus crebra* or *Eucalyptus eugenioides*. Shrubs are absent or very sparse being more common on shallow soils such as on knolls or on small areas of rock scree. Shrub species include *Bursaria spinosa* subsp. *spinosa*, *Acacia implexa*, *Solanum stelligerum*, *Notelaea microcarpa*, *Olearia elliptica* subsp. *elliptica*, *Breynia oblongifolia* and *Pittosporum undulatum*. The vines *Pandorea pandorana* subsp. *pandorana* and *Clematis glycinoides* occur on rocky areas. The ground cover is dense to mid-dense. Grass species include *Cymbopogon refractus*, *Austrodanthonia racemosa*, *Microlaena stipoides* var. *stipoides*, *Sporobolus creber* and *Chloris truncata.* The scrambler *Desmodium varians* and rock fern *Cheilanthes distans* may be present. Forb species include *Vittadinia sulcata*, *Brunoniella australis*, *Scutellaria humilis*, *Pratia purpurascens*, *Geranium solanderi* var. *solanderi*, *Dichondra repens*, *Wahlenbergia communis*, *Mentha satureoides*, *Oxalis exilis*, *Rumex brownii*, *Senecio lautus* var. *dissectifolius*, *Urtica incisa* and *Hydrocotyle laxiflora*.

PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley occurs on clay to loam soils derived from basalt or fine-grained sedimentary substrates on footslopes, hillslopes, hillcrests on the lower slopes of the Liverpool Range and other ranges in the upper Hunter Valley.

PCT 618 is mapped in the subject land in the Kerrabee IBRA subregion at Leadville, Wilpinjong and Wollar. The canopy of this vegetation is composed largely of *Eucalyptus albens*, with some *Eucalyptus albens* x *moluccana* hybrids noted outside of plots, and *Angophora floribunda*, *Brachychiton populneus* subsp. *populneus*, *Eucalyptus blakelyi*, and occasional *Acacia linearifolia*. This canopy is typical for the PCT. The shrub layer of the vegetation in the subject land is heavily grazed and generally absent. The ground layer was composed of grasses and forbs typical of PCT 618 including *Microlaena stipoides*, *Chloris truncata*, *Sporobolus creber*, *Anthosachne scabra*, *Austrostipa scabra*, *Bothriochloa macra*, *Chloris truncata*, *Chloris ventricosa*, *Einadia hastata*, *Urtica incisa*, and *Calotis lappulacea*.

Table 4-35 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-36 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 483 during the field survey.

Table 4-35 PCT 618 White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley

PCT ID	618
PCT name	White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	73.00
Extent within subject land (ha)	169.95 ha

Table 4-36 PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus albens, Angophora floribunda, Brachychiton populneus* subsp. *populneus, Eucalyptus blakelyi, Acacia linearifolia*
Shrubs	*Cassinia aculeata, Eremophila debilis, Solanum cinereum*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Anthosachne scabra, Aristida ramosa, Austrostipa aristiglumis, Austrostipa scabra, Austrostipa verticillata, Bothriochloa decipiens, Bothriochloa macra, Carex inversa, Chloris truncata, Chloris ventricosa, Cynodon dactylon, Cyperus gracilis, Dichelachne micrantha, Eragrostis brownii, Eragrostis leptostachya, Juncus ochrocoleus, Juncus semisolidus, Juncus usitatus, Lachnagrostis filiformis, Lomandra confertifolia, Lomandra filiformis, Microlaena stipoides, Paspalidium constrictum, Paspalidium distans, Rytidosperma fulvum, Rytidosperma setaceum, Sporobolus caroli, Sporobolus creber*
Forbs	*Alternanthera nana, Boerhavia dominii, Brunoniella australis, Calotis cuneifolia, Calotis lappulacea, Dichondra repens, Dysphania cristata, Einadia hastata, Einadia nutans, Euchiton involucratus, Euchiton sphaericus, Hydrocotyle sibthorpioides, Isotoma axillaris, Maireana enchylaenoides, Mentha satureioides, Oxalis perennans, Poranthera microphylla, Rumex brownii, Sida corrugata, Teucrium betchei, Tribulus micrococcus, Urtica incisa, Wahlenbergia gracilis*
Other	*Convolvulus erubescens, Glycine clandestina, Glycine latifolia, Glycine tabacina, Grona varians*

Photo 4-79 PCT 618 at Leadville showing open woodland dominated by *Eucalyptus albens* x *moluccana*

Photo 4-80 PCT 618 north of the Golden Highway at Leadville

4.2.17.2 Condition states

Within the subject land PCT 483 is present in the following broad condition states (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

Photo 4-81 PCT 618 Thinned condition state showing open woodland dominated by *Eucalyptus albens* x *moluccana* on rolling basalt hills

Photo 4-82 PCT 618 Derived Native Grassland condition state showing dominance of native grasses on rolling basalt hills

4.2.17.3 Justification of PCT selection

The canopy of this vegetation is composed largely of *Eucalyptus albens*, with some *Eucalyptus albens* x *moluccana* hybrids noted outside of plots, and *Angophora floribunda*, *Brachychiton populneus* subsp. *populneus*, *Eucalyptus blakelyi*, and occasional *Acacia linearifolia*. This canopy is typical for the PCT. The ground layer species are also typical for the PCT.

PCT 618 is mapped in the subject land in the Kerrabee IBRA subregion at Leadville on rolling hills on basalt geology and basalt enriched Pilliga Sandstone with red brown to chocolate soils. PCT 618 is mapped at Wilpinjong and Wollar on the Illawarra Coal Measures and Shoalhaven Group sandstones. PCT 618 is known to occur on clay to loam soils derived from basalt or fine-grained sedimentary substrates on footslopes, hillslopes, hillcrests so the geology and landscape position of this vegetation fit well.

The SVTM maps some of the vegetation mapped as PCT 618 in this BDAR as follows:

- PCT 3532 is mapped by the SVTM at Wilpinjong and Wollar. PCT 3532 was made from PCT 1610 which is a shrubby dry sclerophyll forest with a significant *Callitris endlicheri* component. The vegetation mapped as PCT 618 in the subject land is an open woodland and lacks *Callitris endlicheri.*
- PCT 3396 is mapped by the SVTM at Leadville. PCT 3396 was made from PCT 599 which is a PCT dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*.

The SVTM mapping is deemed to be incorrect in the locations where PCT 618 is mapped in this BDAR.

PCT 618 is very similar to PCT 483.

4.2.17.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 618 is part of 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. This TEC is listed as Critically Endangered under the BC Act.

4.2.17.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 618 is part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC. This TEC is listed as Critically Endangered under the EPBC Act.

4.2.18 PCT 1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion

4.2.18.1 PCT overview

PCT 1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion is described in the BioNet Vegetation Classification database as having the species *Eucalyptus dawsonii* often prominent at the interface with Permian and Narrabeen Sediments. Occurs in the Kerrabee and northern parts of the Wollemi and Yengo subregions. Also attributed to the Capertee Valley subregion. The BioNet Vegetation Classification database does not provide a lengthy or detailed description of this PCT. The classification confidence level of PCT 1176 in the BioNet Vegetation Classification database is Very Low. The description provided for PCT 1655 (which is considered to be equivalent to PCT 1176) indicates that this PCT is a box woodland to open forest, usually with a sparse shrub mid-stratum. The ground stratum is typically grassy but contains forbs; sub-shrubs and graminoid species. Occurs on rocky; sandstone slopes associated with larger streams in northern Wollemi and Goulburn River National Parks. Elevation is up to 700 m.

The landscape position of PCT 1176 is in gullies and footslopes on Narrabeen Sandstone in the Goulburn River Valley to Denman Area.

PCT 1176 is mapped in the subject land in the Kerrabee IBRA subregion at Wollar. The canopy of this vegetation is dominated by *Eucalyptus dawsonii* with *Eucalyptus albens* at edges. The midstorey contained *Dodonaea viscosa*. The ground layer was sparse but contained species including *Chloris ventricosa*, *Rytidosperma* sp., *Sporobolus creber*, and *Gahnia aspera*.

Table 4-37 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-38 provides a detailed description of each species per growth form recorded during the field survey.

Table 4-37 PCT 1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion

PCT ID	1176
PCT name	Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	40.00%
Extent within subject land (ha)	2.27 ha

Table 4-38 PCT 1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus dawsonii, Eucalyptus albens, Acacia linearifolia*
Shrubs	*Dodonaea viscosa, Cassinia sifton*
Ferns	Not recorded
Grass & grasslike	*Austrostipa* sp., *Austrostipa verticillata, Bothriochloa macra, Carex inversa, Chloris ventricosa, Digitaria ramularis, Eragrostis brownii, Gahnia aspera, Juncus usitatus, Panicum effusum*
Forbs	*Einadia hastata, Opercularia diphylla*
Other	Not recorded

Photo 4-83 PCT 1176 Thinned condition state dominated by a stand of *Eucalyptus dawsonii* in the subject land at Wollar

Photo 4-84 Detail of *Eucalyptus dawsonii* fruit at Wollar

4.2.18.2 Condition states

Within the subject land PCT 1176 is present in the following broad condition state (equivalent to vegetation zones):

- Thinned.

4.2.18.3 Justification of PCT selection

The canopy of this vegetation is dominated by *Eucalyptus dawsonii* (the key characteristic species for this PCT). PCT 1176 is mapped in the subject land in the Kerrabee IBRA subregion at Wollar. This PCT is described as occurring at the interface with Permian and Narrabeen Sediments in gullies and footslopes in the Goulburn River Valley to Denman Area. PCT 1176 is known to occur in the Kerrabee IBRA subregion.

The SVTM maps the vegetation mapped as PCT 1176 in this BDAR as follows:

- PCT 1881 – Western Hunter Flats Rough-barked Apple Forest which is no longer an active PCT in the BioNet Vegetation Classification database.
- PCT 1330 – Yellow Box – Blakelys Red Gum grassy woodland on the tablelands; South Eastern Highlands Bioregion which is a *Eucalyptus melliodora* dominant grassy woodland with other tree species including *Eucalyptus bridgesiana, Eucalyptus blakelyi, Eucalyptus dives, Eucalyptus macrorhyncha, Eucalyptus rubida, Eucalyptus pauciflora, Eucalyptus mannifera,* and *Eucalyptus viminalis*. The canopy of the vegetation mapped in the subject land in this location as PCT 1176 is dominated by *Eucalyptus dawsonii* suggesting that PCT 1176 is a better fit.

Of the PCTs that are *Eucalyptus dawsonii* dominated or known to contain *Eucalyptus dawsonii* from the Kerrabee IBRA subregion (and adjacent subregions), the following PCT options were considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion
- PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion
- PCT 713 – Blue-leaved Ironbark heathy woodland of the southern part of the Brigalow Belt South Bioregion
- PCT 1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion
- PCT 1655 – Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin.

PCT 202 is a *Eucalyptus conica* dominated community found on colluvial and occasionally alluvial sandy loam soils. *Eucalyptus dawsonii* can occur in PCT 202 but not as a dominant species. The vegetation mapped as PCT 1176 in the subject land is dominated by *Eucalyptus dawsonii* and occurs on footslopes on quartz lithic sandstone suggesting that PCT 1176 is a better fit. Additionally, PCT 202 is not known from the Sydney Basin.

Both PCT 713 and PCT 478 contain *Eucalyptus dawsonii* in the canopy but not as a dominant species. PCT 478 is an ironbark dominated PCT characterised by *Eucalyptus fibrosa, Callitris endlicheri* and *Eucalyptus macrorhyncha* and/or *Eucalyptus sparsifolia*. PCT 713 is a *Eucalyptus nubila* dominant community. The vegetation mapped as PCT 1176 in the subject land has a canopy dominated by *Eucalyptus dawsonii* suggesting that PCT 478 or PCT 713 are not a good fit. Additionally, PCT 478 or PCT 713 are not known from the Sydney Basin.

PCT 1177 (as described in Section 4.2.19) is very similar to PCT 1176 which is mapped approximately 57 km to the north west in the subject land, in the adjacent Inland Slopes IBRA subregion. PCT 1177 is characterised by a canopy of *Eucalyptus dawsonii* with *Eucalyptus macrorhyncha, Angophora floribunda, Eucalyptus melliodora,* and *Eucalyptus nortonii* and occurs in the Brigalow Belt South and NSW South Western Slopes IBRA bioregions. Conversely PCT 1176 is characterised by a canopy of *Eucalyptus dawsonii* with the more coastal species *Eucalyptus punctata,* and *Eucalyptus moluccana*.

PCT 1655 was formed from the Greater Hunter Mapping Project. PCT 1176 was split to form PCT 1655 in the Hunter Central Rivers CMA. PCT 1655 is largely equivalent to PCT 1176 and these PCTs are treated as the same entity in this BDAR as PCT 1176.

4.2.18.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database, PCT 1176 is largely equivalent to the BC Act listed Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion TEC.

4.2.18.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database, PCT 1176 is largely equivalent to the EPBC Act listed Central Hunter Valley eucalypt forest and woodland TEC.

4.2.19 PCT 1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion

4.2.19.1 PCT overview

PCT 1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion is not described in detail in the BioNet Vegetation Classification database. The tree layer is described as being composed of *Eucalyptus dawsonii, Eucalyptus macrorhyncha, Angophora floribunda, Eucalyptus melliodora,* and *Eucalyptus nortonii*. The shrub layer is composed of *Cassinia quinquefaria, Hibbertia obtusifolia, Melichrus urceolatus*, and *Olearia elliptica*. The ground layer is described as containing *Cheilanthes sieberi, Clematis glycinoides, Dichondra repens, Hydrocotyle laxiflora,* and *Lomandra filiformis*. The classification confidence level of PCT 1177 in the BioNet Vegetation Classification database is Very Low.

This PCT is described as occurring on loamy soils of moderate fertility in hilly to undulating terrain mainly on the western fall of the tablelands and the Liverpool Range.

PCT 1177 is mapped in the subject land in the Inland Slopes IBRA subregion at Dunedoo. The canopy of this vegetation is dominated by *Eucalyptus dawsonii* with occasional *Eucalyptus macrorhyncha, Eucalyptus sideroxylon,* and *Acacia linearifolia*. *Callitris endlicheri* is also common (but not recorded in BAM Plots to date). Other trees including *Eucalyptus blakelyi* and *Eucalyptus albens* were noted during random meander surveys. The shrub layer is characterised by *Cassinia* spp., *Acacia undulifolia, Lissanthe strigosa, Hibbertia obtusifolia, Acacia spectabilis*, *Pultenaea retusa, Phyllanthus hirtellus, Acacia gladiiformis, Pultenaea* sp., and *Pimelea curviflora*. The ground layer contained the characteristic species *Cheilanthes sieberi, Dichondra repens* and *Hydrocotyle laxiflora*.

Table 4-39 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-40 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 1177 during the field survey.

Table 4-39 PCT 1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion

PCT ID	1177
PCT name	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Southern Tableland Dry Sclerophyll Forests
Per cent cleared value (%)	65.00%
Extent within subject land (ha)	52.18 ha

Table 4-40 PCT 1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Eucalyptus dawsonii, Eucalyptus macrorhyncha, Eucalyptus sideroxylon, Acacia linearifolia*
Shrubs	*Cassinia sifton, Cassinia* sp., *Acacia undulifolia, Lissanthe strigosa, Hibbertia obtusifolia, Acacia spectabilis, Pultenaea retusa, Phyllanthus hirtellus, Acacia gladiiformis, Pultenaea* sp., *Pimelea curviflora*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Microlaena stipoides, Cynodon dactylon, Aristida personata, Lomandra filiformis* subsp. *coriacea, Austrostipa scabra, Sporobolus creber, Poa sieberiana, Juncus* sp., *Lomandra confertifolia, Gahnia aspera, Cyperus gracilis, Lomandra longifolia, Carex appressa, Aristida vagans, Eragrostis* sp., *Carex inversa, Paspalidium* sp.
Forbs	*Dichondra repens, Stypandra glauca, Calotis cuneifolia, Goodenia hederacea, Veronica plebeia, Cymbonotus lawsonianus, Einadia nutans, Einadia* sp., *Brachyscome* sp., *Geranium solanderi, Solanum* sp., *Drosera pygmaea, Gonocarpus elatus, Wahlenbergia* sp., *Einadia polygonoides, Wahlenbergia planiflora, Pomax umbellata, Hydrocotyle laxiflora*
Other	*Amyema pendula, Glycine tabacina, Amyema miquelii*

Photo 4-85 PCT 1177 showing dominance of *Eucalyptus dawsonii* in the canopy east of Tucklan State Forest

Photo 4-86 PCT 1177 on Tucklan Formation geology showing dominance of *Eucalyptus dawsonii* in the canopy

4.2.19.2 Condition states

Within the subject land PCT 1177 is present in the following broad condition states (equivalent to vegetation zones):

- Derived Native Grassland
- Derived Native Shrubland
- Mod_Good
- Thinned.

Photo 4-87 PCT 1177 Moderate_Good condition

Photo 4-88 PCT 1177 Thinned showing young trees regrowing after past thinning

Photo 4-89 PCT 1177 Derived Native Grassland

Photo 4-90 PCT 1177 Derived Native Shrubland

4.2.19.3 Justification of PCT selection

The canopy of this vegetation is dominated by *Eucalyptus dawsonii* with occasional *Eucalyptus macrorhyncha*, *Eucalyptus sideroxylon*, and *Acacia linearifolia*. *Callitris endlicheri* is also common (but not recorded in BAM Plots to date). Other trees including *Eucalyptus blakelyi* and *Eucalyptus albens* were noted during random meander surveys. The shrub layer is characterised by *Cassinia* spp., *Acacia undulifolia*, *Lissanthe strigosa*, *Hibbertia obtusifolia*, *Acacia spectabilis*, *Pultenaea retusa*, *Phyllanthus hirtellus*, *Acacia gladiiformis*, *Pultenaea* sp., and *Pimelea curviflora*. The ground layer contained the characteristic species *Cheilanthes sieberi*, *Dichondra repens* and *Hydrocotyle laxiflora*. This combination of species is unlike any other in the subject land and most closely resembles the description of PCT 1177.

PCT 1177 is mapped in the subject land in the Inland Slopes IBRA subregion at Dunedoo. This PCT is described as occurring mainly on the western fall of the tablelands and the Liverpool Range. This occurrence of PCT 1177 would be near the western limit for this PCT.

The SVTM maps some of the vegetation mapped as PCT 1177 in this BDAR as follows:

- PCT 468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo) in the area mapped is dominated by a canopy of *Eucalyptus dawsonii* suggesting the vegetation is a better match for PCT 1177.
- PCT 511 – Queensland Bluegrass – Redleg Grass – Rats Tail Grass – spear grass – panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion. Derived PCTs cannot be used (see BAM Section 4.2.3) so PCT 511 has not been used in this BDAR.

Of the *Eucalyptus dawsonii* dominated PCTs known from the Inland Slopes IBRA subregion, the following PCT options were also considered for this vegetation (derived from the BioNet Vegetation Classification database PCT Filter Tool):

- PCT 713 – Blue-leaved Ironbark heathy woodland of the southern part of the Brigalow Belt South Bioregion.
- PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion.

Both PCT 713 and PCT 478 contain *Eucalyptus dawsonii* in the canopy but not as a dominant species. PCT 478 is an ironbark dominated PCT characterised by *Eucalyptus fibrosa, Callitris endlicheri* and *Eucalyptus macrorhyncha* and/or *Eucalyptus sparsifolia*. PCT 713 is a *Eucalyptus nubila* dominant community. The vegetation mapped as PCT 1177 in the subject land has a canopy dominated by *Eucalyptus dawsonii* suggesting that PCT 478 or PCT 713 are not a good fit.

4.2.19.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 1177.

4.2.19.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no TEC associated with PCT 1177.

4.2.20 PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes

4.2.20.1 PCT overview

PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes is described in the BioNet Vegetation Classification database as a woodland characterised by a canopy strongly dominated by *Eucalyptus albens* in association with *Callitris endlicheri*. The mid-storey consists of an open shrub layer. The ground layer is typically a mix of grasses with various forbs and graminoids.

This PCT occurs on the lower slopes and flats of the Central Western Slopes and is associated with the Inland Slopes, Kerrabee, Liverpool Range, Lower Slopes, Pilliga, Talbragar Valley, and Wollemi IBRA subregions.

Due to land access restrictions, field verification of this PCT has not been completed by WSP. Associated vegetation mapping and the descriptions provided below has been take from Moolarben BDAR completed by Niche in 2022 and Moolarben FFA competed by Biota in 2006.

Table 4-41 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-42 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 1610 during the field survey.

Table 4-41 PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes

PCT ID	1610
PCT name	White Box – Black Cypress Pine shrubby woodland of the Western Slopes
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	67.00 %
Extent within subject land (ha)	72.74 ha

Table 4-42 PCT 1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes

Growth form	Species recorded
Trees	Dominated by *Eucalyptus albens* and *Callitris endlicheri* with *Allocasuarina verticillata*, *Eucalyptus crebra* and *Acacia linearifolia*
Shrubs	*Acacia uncinata*, *Acacia verniciflua*, *Cassinia quinquefaria*, *Cassinia sifton*, *Dodonaea viscosa*, *Eremophila debilis*, *Goodenia ovata*, *Lissanthe strigosa*
Ferns	*Cheilanthes sieberi*
Grass & grass like	*Austrostipa scabra*, *Dichelachne micrantha*, *Eragrostis leptostachya*, *Gahnia aspera*, *Lomandra filiformis*, *Rytidosperma* sp.
Forbs	*Calotis cuneifolia*, *Calotis lappulacea*, *Dichondra repens*, *Euchiton sphaericus*, *Solanum* sp.
Other	*Clematis glycinoides*, *Amyema miquelii*, *Amyema quandang* var. *quandang*

Photo 4-91 Example of remnant PCT 1610 Mod_Good condition from Wollar

Photo 4-92 PCT 1610 at Wollar

4.2.20.2 Condition states

Within the subject land PCT 1610 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

4.2.20.3 Justification of PCT selection

PCT 1610 is described in the BioNet Vegetation Classification database as a woodland dominated by *Eucalyptus albens* in association with *Callitris endlicheri* with an open shrub layer and varying ground layer. This vegetation type is known to occur on lower and mid slopes in the Kerrabee subregion. In the Moolarben FFA, vegetation within and adjoining the subject site has been mapped as Vegetation code 37 – Shrubby White Box Open Forest which is listed to be an *E. albens* dominated community with *Acrotriche rigida* and *Lissanthe strigosa* as common shrubs and a sparse groundcover that is not indicative of a grassy woodland. Several species listed as diagnostic species of PCT 1610 in BioNet were recorded within the FFA including *Austrostipa scabra, Aristida ramosa, Dichondra repens* and *Cheilanthes sieberi* (SOURCE). An additional, diagnostic species, being *Microlaena stipoides,* was recorded to occur within mapped PCT 1610 for the Moolarben BDAR.

The SVTM maps the area as 1610 in agreeance with the mapping in this BDAR. PCT 618 is similar to this vegetation but is a grassy woodland. The vegetation assigned to PCT 1610 in the subject land is a shrubby dry sclerophyll forest.

Given the landscape position, characteristic species in both upper, mid and ground stratum and IBRA subregion PCT 1610 was determined to be the most suitable PCT for the associated vegetation. PCT 1610 was mapped on lower and mid slopes within the Moolarben and Wilpinjong Coal mines. PCT mapping of PCT 1610 for this BDAR aligns with some areas of SVTM mapping of PCT 1610 within the subject land.

4.2.20.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no BC Act listed TEC associated with PCT 1610.

4.2.20.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no EPBC Act listed TEC associated with PCT 1610.

4.2.21 PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

4.2.21.1 PCT overview

PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin is described in the BioNet Vegetation Classification database as an ironbark open forest with a moderately dense to sparse mid-stratum and a grass/forb ground stratum that occurs on sandstone hills in the Cassilis, Merriwa and Scone area at elevations from about 250 to 500 m. The upper stratum is dominated by *Eucalyptus crebra* and *Callitris endlicheri* with the mid-dense characterised by *Cassinia arcuata*, *Leucopogon muticus*, *Phyllanthus hirtellus* and *Melichrus urceolatus*. Characteristic forb and grass species are listed as *Pomax umbellata*, *Goodenia hederacea*, *Lomandra multiflora*, *Cheilanthes sieberi*, *Gahnia aspera*, *Platysace ericoides*, *Joycea pallida* and *Microlaena stipoides*.

In the study area, this PCT occurs on the hills to the west of Durridgere SCA and west of Cassilis. The underlying geology includes the Narrabeen Group (sandstone, conglomeratic sandstone, red-brown and green mudstone, shale) and Pilliga sandstone (quartz sandstone, conglomerate, siltstone and shale). Common soils are earthy siliceous sands, yellow solodics and red earths.

The vegetation within the subject land that is assigned to PCT 1661 recorded *Eucalyptus crebra* as the dominant tree. *Angophora floribunda* and *Allocasuarina torulosa* are occasional. The dominant shrubs found were *Acacia gladiiformis*, *Acacia implexa* and *Acacia myrtifolia*. The ground cover is very grassy, with *Aristida ramosa, Microlaena stipoides* and *Themeda triandra* most common. Less common forbs found included *Calotis cuneifolia, Wahlenbergia luteola, Lepidosperma laterale, Lomandra confertifolia* subsp. *pallida* and *Lomandra multiflora*.

Table 4-43 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-44 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 1674 during the field survey.

Table 4-43 PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

PCT ID	1661
PCT name	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	50.00 %
Extent within subject land (ha)	40.44 ha

Table 4-44 PCT 1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

Growth form	Species recorded
Trees	*Eucalyptus crebra, Angophora floribunda, Allocasuarina torulosa*
Shrubs	*Acacia myrtifolia, Acacia gladiiformis, Acacia implexa, Pultenaea cinerascens, Bursaria spinosa, Melichrus urceolatus, Hardenbergia violacea, Acacia gunnii, Indigofera adesmiifolia, Lissanthe strigosa* subsp. *strigosa, Cassinia sifton*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Microlaena stipoides, Aristida ramosa, Lepidosperma laterale, Themeda triandra, Lomandra confertifolia* subsp. *pallida, Lomandra multiflora, Echinopogon caespitosus, Luzula flaccida, Lomandra filiformis*
Forbs	*Calotis cuneifolia, Calotis lappulacea, Wahlenbergia luteola, Cotula australis, Wurmbea dioica, Dianella caerulea, Hypericum gramineum, Hardenbergia violacea, Gonocarpus elatus, Goodenia hederacea* subsp. *hederacea*
Other	*Glycine clandestina*

Photo 4-93 PCT 1661 at BAM Plot LH33

Photo 4-94 PCT 1661 at Cassilis showing canopy of *Eucalyptus crebra*

4.2.21.2 Condition states

Within the subject land PCT 1661 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland
- Mod_Good
- Thinned.

4.2.21.3 Justification of PCT selection

PCT 1661 is described in the BioNet Vegetation Classification database as an ironbark open forest with a moderately dense to sparse mid-stratum and a grass/forb ground stratum that occurs on sandstone hills in the Cassilis, Merriwa and Scone area at elevations from about 250 to 500 m. The vegetation within the subject land that is assigned to PCT 1661 is an ironbark dominated (*Eucalyptus crebra*) community located on Pilliga Sandstone at Cassilis at approximately 450 m elevation.

The characteristic tree species *Eucalyptus crebra* and the shrub *Melichrus urceolatus* are present along with the ground layer species typical of this PCT including *Cheilanthes sieberi, Microlaena stipoides, Lomandra multiflora* and *Goodenia hederacea*.

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 1661.

4.2.21.5 Alignment with EPBC Act listed ECs

As outlined in the BioNet Vegetation Classification database there is no EPBC Act listed TEC associated with PCT 1661.

4.2.22 *PCT 1674 – Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin*

4.2.22.1 PCT overview

PCT 1674 – Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin is described in the BioNet Vegetation Classification database as an ironbark open forest dominated by *Eucalyptus fibrosa*, in which *Corymbia trachyphloia* and *Callitris endlicheri* may be co-dominant. This PCT is common on dissected sandstones at elevations between 250 and 550 m. The mid-stratum is patchy and typically comprises small trees and shrubs in two strata. Species typical of the mid-strata are *Allocasuarina gymnanthera*, *Leucopogon muticus*, *Calytrix tetragona*, *Leptospermum parvifolium*, *Dodonaea triangularis*, *Persoonia linearis*, *Phyllanthus hirtellus*, *Grevillea sericea* and *Hibbertia circumdans*. The ground stratum is sparse comprising mixed graminoids and forbs with *Lomandra glauca*, *Pomax umbellata*, *Cleistochloa rigida*, *Lomandra filiformis*, *Lomandra confertifolia* and *Patersonia sericea* listed as typical.

In the subject land, this community has limited distribution in the Ulan area on low hills and rises south of Goulburn River NP and Durridgere SCA, in which PCT 1674 are known to occur. The underlying geology includes the Narrabeen Group (Wollar sandstone, conglomeratic sandstone, red-brown and green mudstone) and Illawarra Coal Measures (shale, conglomerate, chert, coal and torbanite). Soils range from shallow siliceous sands on upper slopes with rocky outcrops to yellow and brown earths, loams and podzolics on lower slopes.

Due to land access restrictions, field verification of this PCT has not been completed for this BDAR.

Table 4-45 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database.

Table 4-45 PCT 1674 – Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin

PCT ID	1674
PCT name	Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forests
Per cent cleared value (%)	19.00 %
Extent within subject land (ha)	11.82 ha

4.2.22.2 Condition states

Within the subject land PCT 1674 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland.
- Mod_Good.

4.2.22.3 Justification of PCT selection

PCT 1674 has been mapped within the Moolarben Coal mine on hillslopes composed of sandstone. Areas where this community has been mapped have not been field validated as there was no access available during the survey program. The mapping of this PCT aligns with areas mapped as PCT 1674 by the Upper Hunter STVM mapping (DPE 2019). The polygons of PCT 1674 were refined slightly taking into consideration topographical maps of the locality and field verified vegetation mapping completed as part of the Flora, Fauna and Aquatic Ecology Assessment prepared for the Moolarben Coal Project (Moolarben Biota 2006) and the characteristics of PCT 1674 detailed in the BioNet Vegetation Classification Database.

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 1674.

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 1674.

4.2.23 PCT 1696 – Blakely’s Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter

4.2.23.1 PCT overview

PCT 1696 – Blakely’s Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter, is described in the BioNet Vegetation Classification database as an open forest or woodland characterised by an upper stratum of *Eucalyptus blakelyi*, *Angophora floribunda* and/or *Eucalyptus crebra*. It is typically found on sandstone hills from Goulburn River National Park to near Bulga at elevations of between 50 and 300m. A mid-stratum is usually present and well developed, comprising a variety of shrubs. The ground stratum is typically grassy with a mix of forbs.

In the study area, this PCT occurs at Turill and in the Durridgere SCA. The underlying geology is Pilliga Sandstone.

The vegetation within the subject land that is assigned to PCT 1696 contains a canopy of *Angophora floribunda*, *Eucalyptus blakelyi*, and *Eucalyptus crebra* which are the characteristic species of PCT 1696. The ground layer contains the characteristic species *Cheilanthes sieberi*, *Aristida vagans*, *Microlaena stipoides* and *Glycine clandestina*.

Table 4-46 provides an overview of the PCT as outlined in the BioNet Vegetation Classification database. Table 4-47 provides a detailed description of each species per growth form recorded from BAM plots undertaken in PCT 1696 during the field survey.

Table 4-46 PCT 1696 – Blakely’s Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter

PCT ID	1696
PCT name	Blakely’s Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	46.00 %
Extent within subject land (ha)	6.14 ha

Table 4-47 PCT 1696 – Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter characteristic floristic composition and structure

Growth form	Species recorded
Trees	*Angophora floribunda, Eucalyptus blakelyi, Eucalyptus crebra, Acacia linearifolia*
Shrubs	*Acacia hakeoides, Astroloma humifusum, Brachyloma daphnoides, Cassinia sifton, Hibbertia* sp., *Melichrus urceolatus*
Ferns	*Cheilanthes sieberi*
Grass & grasslike	*Aristida ramosa, Aristida vagans, Arundinella nepalensis, Austrostipa scabra, Dichelachne micrantha, Digitaria ramularis, Echinopogon caespitosus, Eragrostis brownii, Gahnia aspera, Lomandra confertifolia* subsp. *pallida, Lomandra filiformis* subsp. *filiformis, Lomandra multiflora* subsp. *multiflora, Microlaena stipoides, Rytidosperma* sp.
Forbs	*Calotis cuneifolia, Dichondra repens, Goodenia hederacea, Laxmannia gracilis, Pomax umbellata, Vittadinia cervicularis, Wahlenbergia communis*
Other	*Glycine clandestina*

Photo 4-95 PCT 1696 in Durridgere SCA

Photo 4-96 PCT 1696 in Durridgere SCA showing dense shrub layer

4.2.23.2 Condition states

Within the subject land PCT 1696 is present in the following broad condition state (equivalent to vegetation zones):

- Derived Native Grassland.
- Moderate/Good.
- Thinned.

Photo 4-97 PCT 1696 in Mod_Good condition in Durridgere SCA

Photo 4-98 PCT 1696 in Mod_Good condition in Durridgere SCA showing more open shrub layer

4.2.23.3 Justification of PCT selection

The vegetation within the subject land that is assigned to PCT 1696 contains a canopy of *Angophora floribunda, Eucalyptus blakelyi,* and *Eucalyptus crebra* which are the characteristic species of PCT 1696. The ground layer contains the characteristic species *Cheilanthes sieberi, Aristida vagans, Microlaena stipoides* and *Glycine clandestina*.

The other *Angophora floribunda* and *Eucalyptus blakelyi* dominated PCTs in the subject land include PCT 281 and PCT 481. PCT 281 is an open grassy woodland and lacks *Eucalyptus crebra*. PCT 481 is very similar to PCT 1696 and may potentially be the describing the same vegetation type. PCT 1696 is mapped in the area adjacent to Ulan Rd so the assignment pf PCT 1696 to the vegetation follows the SVTM.

4.2.23.4 Alignment with TECs

As outlined in the BioNet Vegetation Classification database there is no BC Act listed TEC associated with PCT 1696. The BioNet Vegetation Classification database states that the TEC listing was removed as part of 2012 GHMP workshop review.

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 1696.

4.3 Threatened ecological communities

4.3.1 *BC Act listed threatened ecological communities*

The BC Act listed TECs identified within the subject land are listed in Table 4-48 and their extent is shown on Figure 14-11 Threatened ecological communities and ECs.

Table 4-48 BC Act listed TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha) (includes the full extent of mapped hazard tree zone)
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	20130	V	CE	PCT 1176 (Thinned)	2.27 ha
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	20072	E	E	PCT 81 (Derived Native Grassland, Derived Native Shrubland, Mod_Good, Thinned)	49.46 ha 6.95 ha (14%) of the TEC within the subject land is wooded. 42.51 ha (86%) of the TEC within the subject land is relatively poor condition Derived Native Grassland (agricultural paddocks) which is not limiting in the subregion.
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	10335	E	Not listed	PCT 202 (Mod_Good Thinned)	3.38 ha
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	10837	CE	CE	PCT 266, 277, 281, 483, 599 & 618 (all vegetation zones – Derived Native Grassland, Derived Native Shrubland, Mod_Good, Poor, Thinned)	1,068.50 ha 329.67 ha (31%) of the TEC within the subject land is wooded 738.83 ha (69%) of the TEC within the subject land is relatively poor condition Derived Native Grassland (agricultural paddocks) which is not limiting in the subregion.

4.3.1.1 Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion

PCT 1176 is largely equivalent to the Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion TEC listed under the BC Act. This TEC is listed as a Vulnerable Ecological Community under the BC Act.

Assignment of PCT 1176 to this TEC is deemed suitable given the dominance of *Eucalyptus dawsonii* in the canopy of this small patch of vegetation. This patch of *Eucalyptus dawsonii* dominated vegetation is located on the footslopes of sedimentary geology at Wollar in the Sydney Basin bioregion (Hunter catchment) within the known distribution of this TEC.

No other BC Act listed TEC is a suitable match for PCT 1176 given its distinct dominance of *Eucalyptus dawsonii*.

All occurrence of PCT 1176 within the subject land are part of the BC Act listed Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion TEC. The NSW Scientific Committee (2011a) does not specifically exclude disturbed areas, areas in poor condition or derived native grasslands from the TEC. As such, all PCT 1176 vegetation zones are all considered to be part of this BC Act listed TEC for the purpose of this BDAR.

A very similar PCT dominated by *Eucalyptus dawsonii* (PCT 1177) is present in the Inland Slopes IBRA subregion approximately 57 km to the north west in the subject land, in the adjacent Inland Slopes IBRA subregion. As this PCT is present in the Macquarie catchment and NSW South West Slopes IBRA region it is not considered part of the BC Act listed Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion TEC. The NSW Scientific Committee (2011a) states that the TEC occurs in the Hunter Valley and that all sites are within the Sydney Basin Bioregion.

4.3.1.2 Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions

PCT 81 is part of the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC listed under the BC Act. This TEC is listed as an Endangered Ecological Community under the BC Act.

Assignment of PCT 81 to this TEC is deemed suitable given the dominance of *Eucalyptus microcarpa* in the tree layer, the presence of other characteristic species such as *Callitris endlicheri, Angophora floribunda, Brachychiton populneus* (see NSW Scientific Committee, 2011b), and the presence of this PCT on the relatively fertile alluvial soils associated with the Laheys Creek floodplain. Within the subject land PCT 81 is within the Brigalow Belt South Bioregion. The field assessment results from survey plots undertaken within PCT 81 are provided in Appendix D.

There are two other BC Act listed TECs present in the subject land that intergrade with Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC including:

- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- 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.

The dominance of *Eucalyptus microcarpa* in the tree layer as opposed to *Eucalyptus conica* or *Eucalyptus albens, Eucalyptus blakelyi* and/or *Eucalyptus melliodora* suggest that PCT 81 is more aligned with the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC than other TECs that may be found in similar landscape positions.

All occurrence of PCT 81 within the subject land are part of the BC Act listed Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC. The NSW Scientific Committee (2011b) does not specifically exclude disturbed areas, areas in poor condition or derived native grasslands from the TEC. As such, all PCT 81 vegetation zones are all considered to be part of this BC Act listed TEC for the purpose of this BDAR.

Derived Native Grasslands are considered to be part of the TEC. Within the subject land, 86% of the TEC (42.51 ha) is relatively poor condition Derived Native Grassland (agricultural paddocks) which is not limiting in the subregion. The impacts to more intact examples of the TEC (Derived Native Shrubland, Mod_Good, Thinned vegetation zones) is limited to 6.95 ha.

4.3.1.3 Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions

As outlined in the BioNet Vegetation Classification database, PCT 202 is equivalent to the BC Act listed Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions TEC. This TEC is listed as Endangered under the BC Act.

Assignment of PCT 202 to this TEC is deemed suitable given the dominance of *Eucalyptus conica* in the tree layer with *Eucalyptus melliodora* also present. The characteristic shrubs *Acacia penninervis* and *Maireana microphylla* are present. The ground layer contains the characteristic species *Calotis cuneifolia, Sida corrugata, Dianella revoluta, Dichondra repens, Einadia nutans, Xerochrysum viscosum* (syn. *Bracteantha viscosa*), *Austrostipa densiflora, Austrostipa verticillata, Aristida ramosa, Austrostipa scabra, Bulbine bulbosa, Carex appressa, Rytidosperma setaceum* (syn. *Austrodanthonia setacea*), *Themeda triandra* (syn. *Themeda australis*) and *Glycine clandestina* (see NSW Scientific Committee, 2011c). The field assessment results from survey plots undertaken within PCT 202 are provided in Appendix D.

PCT 202 is present on brown loam or clay, alluvial soils on the floodplain and colluvial soils on lower slopes and on valley flats. PCT 202 in the subject land is west of the Great Dividing Range and in the Brigalow Belt South Bioregion.

There are two other BC Act listed TECs present in the subject land that intergrade with Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions TEC including:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- 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.

The dominance of *Eucalyptus conica* in the tree layer as opposed to dominance of *Eucalyptus microcarpa* or *Eucalyptus albens, Eucalyptus blakelyi* and/or *Eucalyptus melliodora* suggest that PCT 202 is more aligned with the Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions TEC than other TECs that may be found in similar landscape positions.

All occurrence of PCT 202 within the subject land are part of the BC Act listed Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions TEC. The NSW Scientific Committee (2011c) does not specifically exclude disturbed areas, areas in poor condition or derived native grasslands from the TEC. As such, all PCT 202 vegetation zones are considered to be part of this BC Act listed TEC for the purpose of this BDAR.

4.3.1.4 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 266, PCT 277, PCT 281, PCT 483, PCT 599 and PCT 618 are part of 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. This TEC is listed as Critically Endangered under the BC Act.

Assignment of PCT 266, PCT 277, PCT 281, PCT 483, PCT 599 and PCT 618 to this TEC is deemed suitable given the dominance of *Eucalyptus albens, Eucalyptus blakelyi*, and/or *Eucalyptus melliodora* with *Angophora floribunda* and *Brachychiton* also present which are part of the assemblage of species for this TEC listed by the NSW Scientific Committee (2020). The commonly occurring shrubs *Acacia implexa* and *Lissanthe strigosa* are also part of the assemblage of species for this TEC listed by the NSW Scientific Committee (2020). The ground layer generally contains the characteristic species *Aristida ramosa, Asperula conferta, Austrostipa scabra, Bothriochloa macra, Cheilanthes sieberi, Cymbonotus lawsonianus, Dichondra repens, Euchiton sphaericus, Hydrocotyle laxiflora, Oxalis perennans, Rumex brownii, Wahlenbergia luteola, Glycine tabacina, Lomandra filiformis, Panicum effusum, Poa sieberiana,* and *Sporobolus creber* (see NSW Scientific Committee, 2020). The field assessment results from survey plots undertaken within PCT 266, PCT 277, PCT 281, PCT 483, PCT 599 and PCT 618 are provided in Appendix D.

There are two other BC Act listed TECs present in the subject land that intergrade with 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 including:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.

The dominance of *Eucalyptus albens Eucalyptus blakelyi* and/or *Eucalyptus melliodora* in the tree layer as opposed to dominance of *Eucalyptus microcarpa* or *Eucalyptus conica* suggest that these PCTs are more aligned with the 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 than any other TEC that may be found in similar landscape positions. There are significant areas of PCT 281 that are dominated by *Angophora floribunda* but using a conservative approach these have been included as part of the TEC.

All occurrence of PCT 266, PCT 277, PCT 281, and PCT 483, PCT 599, and PCT 618 within the subject land are part of 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. The NSW Scientific Committee (2020) does not exclude disturbed areas or areas in poor condition from the TEC. Derived native grasslands are specifically included as part of the TEC. As such, PCT 266, PCT 277, PCT 281, PCT 483, PCT 599 and PCT 618 vegetation zones are considered to be part of this BC Act listed TEC for the purpose of this BDAR.

Derived Native Grasslands are considered to be part of the TEC. Within the subject land, 69% of the TEC (738.83 ha) is relatively poor condition Derived Native Grassland (agricultural paddocks) which is not limiting in the subregion. The inclusion of Derived Native Grassland (agricultural paddocks) as part of the TEC inflates the impact to the TEC and does not provide a realistic assessment of impacts to the more valuable components of the TEC that are structurally intact or relatively structurally intact. The impacts to more intact examples of the TEC (Derived Native Shrubland, Mod_Good, Thinned vegetation zones) is limited to 329.67 ha (31% of the TEC extent in the subject land).

4.3.2 EPBC Act listed threatened ecological communities

Based on the results of the PMST, there are nine EPBC Act listed TECs that may occur or are likely to occur in the search area. These include:

- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Critically Endangered)
- Poplar Box Grassy Woodland on Alluvial Plains (Endangered)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered)
- Weeping Myall Woodlands (Endangered)
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Critically Endangered)
- Central Hunter Valley eucalypt forest and woodland (Critically Endangered)

- Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered)
- Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (Endangered).

Of these nine EPBC Act listed TECs, two were recorded in the subject land (see Table 4-49).

Table 4-49 EPBC Act listed TECs within the subject land

TEC name	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha) (includes the full extent of mapped hazard tree zone)
Central Hunter Valley eucalypt forest and woodland	CE	1176 (Thinned)	2.27
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	81 (Moderate/Good, Thinned)	6.92
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	266 (Moderate/Good, Thinned) 277 (Moderate_Good) 281 (Moderate_Good, Thinned) 483 (Moderate_Good, Thinned) 599 (Moderate_Good, Thinned) 618 (Moderate_Good, Thinned	304.78

4.3.2.1 Central Hunter Valley eucalypt forest and woodland

PCT 1176 is largely equivalent to 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: Department of the Environment 2015. Available from: http://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 PCT 1176 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 north east of the Sydney Basin IBRA Bioregion (Department of the Environment, 2015). Within the Sydney Basin Bioregion the ecological community occurs mainly in the Hunter Valley IBRA subregion and also occurs in subregions adjacent to the Hunter Valley IBRA subregion; for example, in the Goulburn Valley in the Kerrabee IBRA subregion and in 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 at the western edge of the distribution for the TEC (see Figure 4-2 for the mapped distribution of the TEC).

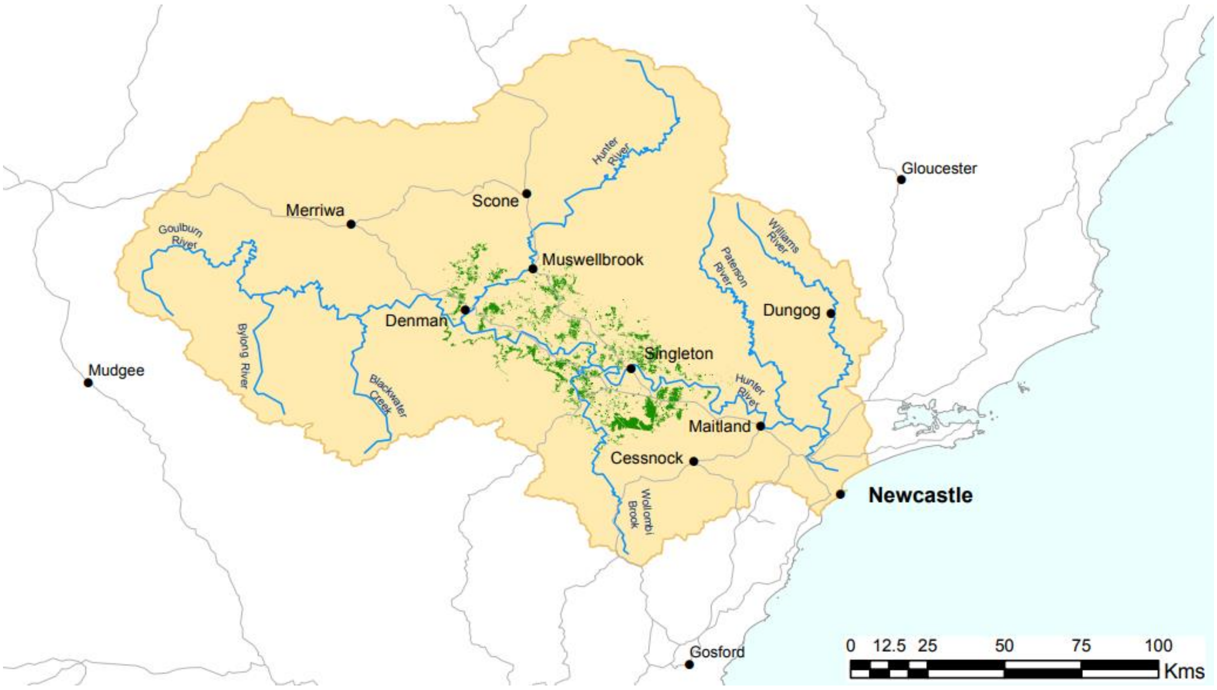


Figure 4-2 Distribution of the Central Hunter Valley eucalypt forest and woodland ecological community (Department of the Environment and Energy, 2016). Green polygons show core distribution (most likely to be present). The yellow polygon shoes the area within which the TEC may occur

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 (Department of the Environment, 2015).

The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia maculata* (syn. *E. maculata*) (spotted gum), *E. dawsonii* (slaty gum) and *E. moluccana* (grey box) (Department of the Environment, 2015). Under certain circumstances a fifth species, *Allocasuarina luehmannii* (or buloke), may be part of the mix of dominants, in sites previously dominated by one or more of the above four eucalypt species (Department of the Environment, 2015). Derived native grasslands and shrublands are not included in the nationally protected ecological community (Department of the Environment, 2015).

The listed ecological community comprises patches that meet the key diagnostic characteristics and also meet at least the minimum Condition thresholds for one of the Moderate quality condition classes.

Key diagnostic characteristics

The Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community (Department of the Environment, 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 one metre in height; AND

- the canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia maculata* (syn. *E. maculata*) (spotted gum), *E. dawsonii* (slaty gum) and *E. moluccana* (grey box); OR
  - a fifth species, *Allocasuarina luehmannii* (buloke) dominates in combination with one or more of the above four eucalypt species, in sites previously dominated by one or more of the above four eucalypt species; AND
- *Allocasuarina torulosa* (forest oak/ she-oak, rose she-oak/oak), *Eucalyptus acmenoides* (white mahogany) and *E. 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.

The patch of PCT 1176 within the subject land meets the key diagnostic characteristics for the EPBC Act listed Central Hunter Valley eucalypt forest and woodland ecological community.

The patch of PCT 1176 within the subject land occurs in the Hunter River catchment at Wollar. It is located on Permian sedimentary rocks (Illawarra Coal Measures – Quartz-lithic sandstone, mudstone (sporadically carbonaceous), claystone, coal, torbanite, rhyolitic tuff, sporadic lenses of polymictic conglomerate). The patch would meet the canopy cover and tree density requirements. The canopy is dominated by the characteristic species *Eucalyptus dawsonii*. *Allocasuarina torulosa*, *Eucalyptus acmenoides* and *Eucalyptus fibrosa* are absent from the canopy. A ground layer is present as a sparse layer of native grasses and other native herbs and/or native shrubs.

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 4-50.

Based on qualitative survey (Rapid data points) the patch of PCT 1176 within the subject land is likely to meet the condition threshold of a Class B High quality condition (e.g. a patch with high quality native understorey). The patch size is 2.13 ha AND ≥ 70% of perennial vegetative cover in each layer present is likely to be native (based on Rapid Data Points). The patch is likely to contain at least 12 native understorey species but this has not been measured. Taking a precautionary approach the patch of PCT 1176 is considered likely to be at maximum a Class B patch.

Table 4-50 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 1176 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 understorey vegetative cover is native; AND the patch contains at least 12 native understorey species.	No. Patch size is 2.13 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 understorey species.	Possibly. Patch size is 2.13 ha AND ≥ 70% of perennial vegetative cover in each layer present is likely to be native (based on Rapid Data Points). The patch is likely to contain at least 12 native understorey species but this has not been measured. Taking a precautionary approach the patch of PCT 1176 is considered likely to be a Class B patch qualitatively.

Category and rationale	Thresholds	Does PCT 1176 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.	Likely to meet this criteria based on Rapid data point observations.
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 The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area OR The patch has at least one large locally indigenous tree (≥ 60 cm DBH), or at least one tree with hollows	Likely to meet this criteria based on Rapid data point observations.

4.3.2.2 Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

PCT 81 is part of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC listed under the EPBC Act.

A summary of the relevant Commonwealth guidelines and policy statements available for this TEC is as follows:

- Relevant listing advice: Commonwealth Listing Advice on Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Threatened Species Scientific Committee, 2010). In effect under the EPBC Act from 01-Apr-2010.
- Approved conservation advice: Approved Conservation Advice for the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-east Australia (Department of the Environment Water Heritage and the Arts, 2010a). In effect under the EPBC Act from 01-Apr-2010.

This listing advice and conservation advice has been applied to PCT 81 to determine whether this vegetation within the subject land is part of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC listed under the EPBC Act.

Description

The Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC occupies a position in the landscape that is transitional between the temperate woodlands and forests of the lower slopes and tablelands of south-eastern Australia, and the semi-arid communities further inland. The ecological community typically occurs in landscapes of low-relief on productive soils derived from alluvial or colluvial materials but may occur on a range of substrates. The ecological community tends to occupy drier sites of the belt of grassy woodlands in south-eastern Australia, within a rainfall zone of 375–700 mm/year (Department of the Environment Water Heritage and the Arts, 2010).

This community includes those woodlands in which the dominant tree species is *Eucalyptus microcarpa* (Inland Grey Box) and is often found in association with *Eucalyptus populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *Eucalyptus melliodora* (Yellow Box), and sometimes with *Eucalyptus albens* (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally occurs as an open woodland 15–25 m tall, but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey (Department of the Environment Water Heritage and the Arts, 2010a; Threatened Species Scientific Committee, 2010).

The vegetation mapped as PCT 81 meets the general description of the TEC.

Key diagnostic characteristics

The Commonwealth Listing Advice on Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Threatened Species Scientific Committee, 2010) provides key diagnostic characteristics for the TEC which are:

- The ecological community occurs on low slopes and plains from central NSW, through northern and central Victoria into South Australia. Disjunct occurrences are known from near Melbourne and in the Flinders-Lofty Block Bioregion of South Australia.
- The vegetation structure of the ecological community is typically a woodland to open forest.
- The tree canopy is dominated (≥ 50% canopy crown cover) by *Eucalyptus microcarpa* (Grey Box). Other tree species may be present in the canopy and, in certain circumstances, may be co-dominant with Grey Box but are never dominant on their own. These associated species are listed in Appendix A.
- The mid layer comprises shrubs of variable composition and cover, from absent to moderately dense. The mid layer usually has a crown cover of less than 30% with local patches up to 40% crown cover.
- The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: *Austrodanthonia, Austrostipa, Elymus, Enteropogon, Dianella* and *Lomandra*; and one or more of the chenopod genera: *Atriplex, Chenopodium, Einadia, Enchylaena, Maireana, Salsola* and *Sclerolaena*.
- Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.

PCT 81 within the subject land meets the key diagnostic characteristics for the TEC. The vegetation structure varies from woodland to open forest. The tree canopy is dominated (≥ 50% canopy crown cover) by *Eucalyptus microcarpa*. The mid layer comprises shrubs of variable composition and cover, from absent to moderately dense. The ecological community is present on low slopes and plains in central NSW. Within the subject land the TEC occurs in the NSW South Western Slopes IBRA region (Inland Slopes subregion), the Brigalow Belt South IBRA region (Talbragar Valley subregion).

Condition thresholds

Condition thresholds are intended to function as a set of criteria that assists in identifying when the EPBC Act is likely to apply to an ecological community. They provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under the EPBC Act (Threatened Species Scientific Committee, 2010). This means that the protection provisions of the EPBC Act are focussed on the most valuable elements of Australia’s natural environment, while heavily degraded patches, which do not trigger the “significance test” of the EPBC Act will be largely excluded (Threatened Species Scientific Committee, 2010).

A patch is defined as a discrete and continuous area that comprises the ecological community (Threatened Species Scientific Committee, 2010). It does not comprise substantial elements of other ecological communities such as woodlands dominated by other tree species but a patch may include small-scale disturbances, such as tracks or breaks (including exposed soil, leaf litter, cryptogams) or small-scale variations in vegetation that do not significantly alter its overall functionality, for instance the easy movement of wildlife or dispersal of plant propagules (Threatened Species Scientific Committee, 2010).

The Commonwealth Listing Advice on Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Threatened Species Scientific Committee, 2010) provides condition thresholds for the TEC which are outlined in Table 4-51.

The PCT 81 Moderate_Good vegetation zone meet the condition thresholds. The PCT 81 Thinned vegetation zone is variable in terms of native species in the mid and ground layers but when considered as a patch overall would likely meet the additional criteria that apply to smaller woodland patches (0.5 to <2 ha in area) with tree crown cover >10% (see Table 4-51). A cautious approach has been taken with the inclusion of PCT 81 Thinned as part of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC.

Based on the field data collected during the surveys, the Derived Native Grassland condition state of PCT 81 would not meet the condition thresholds to be considered part of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC as there were less than 12 native species present in the ground layer at the time of survey (see Table 4-51).

Table 4-51 Condition thresholds for the Grey Box (*E. microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia ecological community (adapted from Table 1 in Threatened Species Scientific Committee (2010)

Category and rationale	Thresholds	Does PCT 81 meet the threshold?
Criteria that are broadly applicable	1a. The minimum patch[1] size is 0.5 hectare; AND 1b. The canopy layer contains Grey Box (*E. microcarpa*) as the dominant or co-dominant tree species; AND 1c. The vegetative cover[2] of non-grass weed[3] species in the ground layer is less than 30% at any time of the year.	Yes. The broadly applicable criteria are met. The patches of PCT 81 Moderate/Good and Thinned are >0.5 ha in size AND The canopy is dominated by *E. microcarpa*. AND The vegetative cover of non-grass weed species was less than 30% at the time of sampling.
Additional criteria that apply to smaller woodland patches (0.5 to <2 ha in area) with tree crown cover >10%	2a. At least 50% of the vegetative cover in the ground layer comprises perennial native species at any time of the year; AND 2b. 8 or more perennial native species[4] (6 or more in the Flinders Lofty Block Bioregion of South Australia) are present in the mid and ground layers at any time of the year.	Yes. PCT 81 Thinned meets the threshold for this category. The patch is approximately 1.17 ha in size. Up to 70% of the ground cover was made up of the perennial native grass *Austrostipa verticillata* and more than 8 perennial native species were recorded in the mid and ground layers.

Category and rationale	Thresholds	Does PCT 81 meet the threshold?
Additional criteria that apply to larger woodland patches with a well-developed canopy (2 ha or more in area)	3a. At least 8 trees/ha are hollow bearing or have a diameter at breast height of 60 cm or more[5]; AND 3b. at least 10% of the vegetative ground cover comprises perennial native grasses at any time of the year;	Not applicable.
	OR	
	4a. At least 20 trees/ha have a diameter at breast height of 12 cm or more; AND 4b. at least 50% of the vegetative cover in the ground layer comprises perennial native species.	Not applicable.
Additional criteria that apply to patches where the canopy is less developed or absent (derived grassland) (≥0.5 ha in area)	5a. Woodland density does not meet criteria 3a or 4a, or is a derived grassland with clear evidence that the site formerly was a woodland with a tree canopy dominated or co-dominated by *E. microcarpa*; AND 5b. At least 50% of the vegetative cover in the ground layer is made up of perennial native species at any time of the year; AND 5c. 12 or more native species are present in the ground layer at any time of the year.	Derived Native Grassland areas are present in the subject land but they do not meet the condition thresholds. These areas are derived grasslands, cleared for agriculture (no natural grasslands are present in the locality), and given the landscape position would have been originally dominated or co-dominated by *E. microcarpa*. AND At least 50% of the vegetative cover in the ground layer is made up of perennial native species (particularly Sporobolus creber) at the time of survey; AND Based on the BAM Plots undertaken in PCT 81 derived native grassland there were less than 12 native species present in the ground layer at the time of survey.

(1) A patch is defined as a discrete and continuous area that comprises the ecological community as identified in the Description. It does not comprise substantial elements of other ecological communities such as woodlands dominated by other tree species. However, a patch may include small-scale disturbances, such as tracks or breaks (including exposed soil, leaf litter, cryptogams) or small-scale variations in vegetation that do not significantly alter its overall functionality, for instance the easy movement of wildlife or dispersal of plant propagules.

(2) Vegetative cover excludes mosses and lichens. Patches of bare ground or leaf litter are also not included.

(3) A weed is defined here as a plant species that is not native to Australia and the species has established viable self-sustaining populations in a region.

(4) Relevant growth-forms to include are: grasses, other graminoids, forbs and shrubs less than 4 metres tall. Shrubs that are 4 metres or more in height and non-vascular plants (mosses and lichens) are not included.

(5) Dead trees are included, if present up to 50% of the total tree count.

Conditions states that form part of the TEC

The Moderate/Good and Thinned broad condition states within the NSW South West Slopes and Brigalow Belt South IBRA regions meet the key diagnostic characteristics and condition thresholds to be part of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC.

The Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC includes patches of derived grassland (Threatened Species Scientific Committee, 2010). However, the Derived Native Grassland condition state of PCT 81 does not contain the requisite number of native species present in the ground layer at the time of survey (see BAM Plots LH20, LH21 and LH23) so does not form part of the EPBC Act listed TEC.

4.3.2.3 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

As outlined in the BioNet Vegetation Classification database, the following PCTs are part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC:

- PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley
- PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
- PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley.

This TEC is listed as Critically Endangered under the EPBC Act.

A summary of the relevant Commonwealth guidelines and policy statements available for this TEC is as follows:

- 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). 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 (Department of the Environment and Heritage, 2006a).

This listing advice has been applied to the PCTs within the subject land to determine whether this vegetation 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

The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is broadly characterised by a species-rich understorey of native tussock grasses, herbs and scattered 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 Scientific Committee, 2006). This ecological community occurs in areas where rainfall is between 400 and 1,200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1,200 metres (NSW Scientific Committee, 2020).

The vegetation mapped as PCT 266, PCT 277, PCT 281, PCT 483, PCT 599 and PCT 618 meet the general description of the TEC.

Condition classes

The Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee, 2006) provides condition classes for the TEC which include the following three states:

- an overstorey of eucalypt trees exists, but there is no substantial native understorey
- a native understorey exists, but the trees have been cleared
- a native understorey and an overstorey of eucalypts exist in conjunction.

The Threatened Species Scientific Committee considers that areas in which an overstorey exists without a substantially native understorey are degraded and are no longer a viable part of the ecological community (Threatened Species Scientific Committee, 2006). In order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey (Threatened Species Scientific Committee, 2006).

In order to be the listed TEC, an understorey patch, in the absence of overstorey trees, must have a high level of native floral species diversity, but only needs to be 0.1 hectares or greater in size (Threatened Species Scientific Committee, 2006).

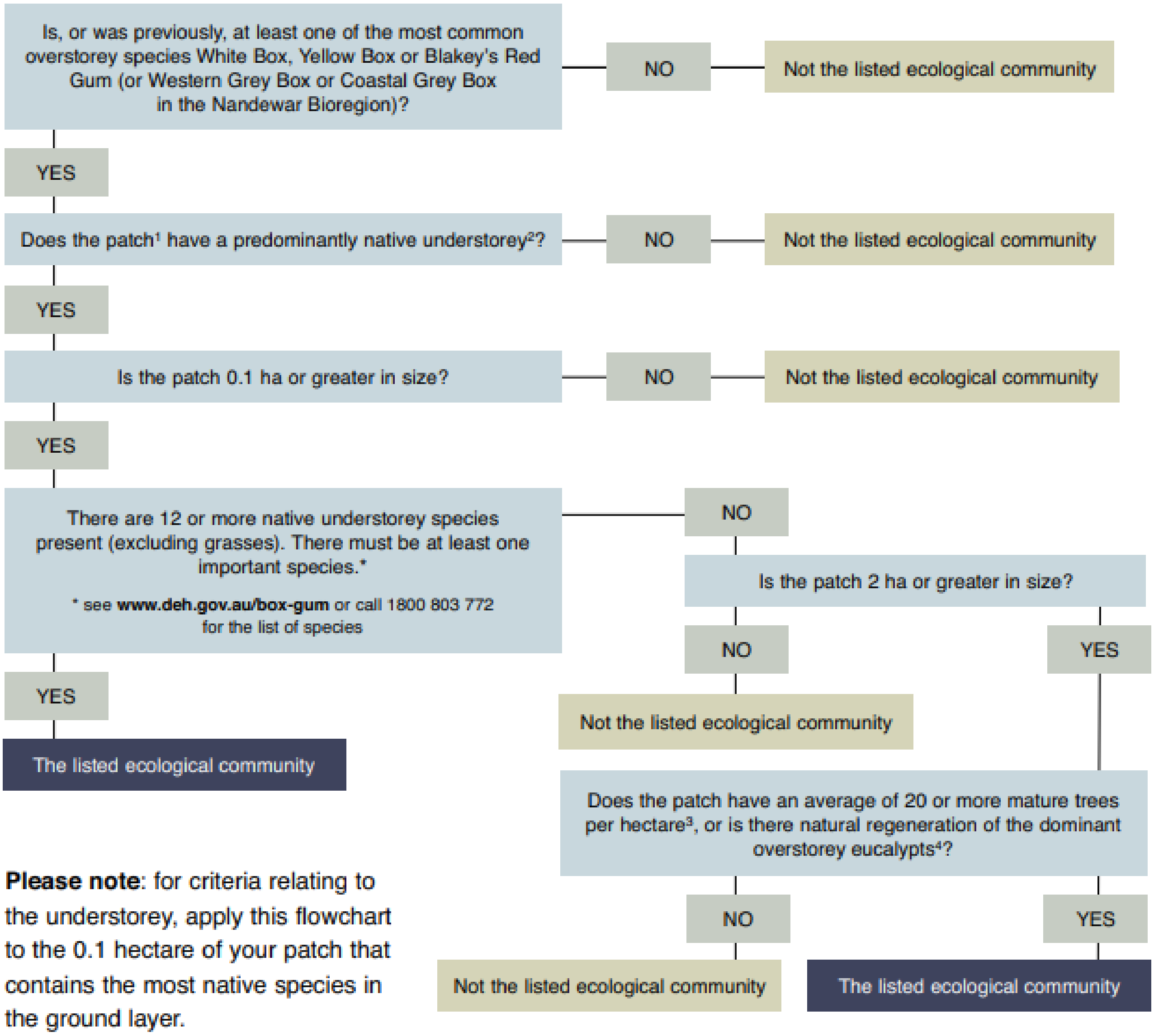
A patch in which the perennial vegetation of the ground layer is dominated by native species, and which contains at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges) is considered to have a sufficiently high level of native diversity to be the listed TEC (Threatened Species Scientific Committee, 2006). At least one of the understorey species should be an important species (e.g. grazing-sensitive, regionally significant or uncommon species, such as Kangaroo Grass or orchids) in order to indicate a reasonable condition (Threatened Species Scientific Committee, 2006).

Areas with both an overstorey and understorey present are also considered of sufficiently good condition to be part of the listed ecological community if the understorey meets any of the conditions above, or if they have a predominantly native understorey, are two hectares or above in size, and have either natural regeneration of the overstorey species or 20 or more mature trees per hectare (Threatened Species Scientific Committee, 2006).

The condition criteria outlined above are the minimum level at which patches are to be included in the listed ecological community (Threatened Species Scientific Committee, 2006).

Based on analysis of 78 BAM vegetation integrity plots completed within derived native grassland vegetation zones with the subject land, these areas do not meet the thresholds to be part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland community. The areas of DNG either do not have a predominantly native understorey or do not contain at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges) or lack the required tree regeneration.

The data from the BAM plots undertaken within the Poor condition state vegetation show that these areas would not meet the thresholds to be part of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland community due to a lack of predominantly native understorey and/or these areas do not contain at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges).



[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
- an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
- the area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha (1000m²) or greater.

[2] A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily.)

[3] Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.

[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Figure 4-3 Determining if the land has an area of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC (Source: Department of the Environment and Heritage, 2006a)

Table 4-52 Vegetation assessment against White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands EPBC Act listing advice criteria

Key characteristics and condition thresholds	**PCT 266**	**PCT 277**	**PCT 281**	**PCT 483**	**PCT 599**	**PCT 618**
Does the patch occur along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria including the Brigalow Belt South, Nandewar, New England Tableland, South Eastern Queensland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes, Victorian Midlands and Riverina Bioregions.	Yes Recorded to occur in the NSW South Western Slopes and Brigalow Belt South IBRA Bioregions.	Yes Recorded to occur in the NSW South Western Slopes and Sydney Basin IBRA Bioregions.	Yes Recorded to occur in the NSW South Western Slopes and Sydney Basin IBRA Bioregions.	Yes Recorded to occur in the NSW South Western Slopes, Brigalow Belt South and Sydney Basin IBRA Bioregions.	Yes Recorded to occur in the NSW South Western Slopes, Brigalow Belt South and Sydney Basin IBRA Bioregions.	Yes Recorded to occur in the Sydney Basin IBRA Bioregion.

Key characteristics and condition thresholds	PCT 266	PCT 277	PCT 281	PCT 483	PCT 599	PCT 618
Is the patch dominated, co-dominated or used to be dominated by White Box, Yellow Box or Blakely's Red Gum?	Yes Patch is dominated by *Eucalyptus albens* and *Eucalyptus blakelyi* with *Angophora floribunda, Brachychiton populneus.*	Yes Patch is dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora* with *Angophora floribunda, Brachychiton populneus, Eucalyptus microcarpa, Eucalyptus albens.*	Yes Patch is co-dominated by *Angophora floribunda, Eucalyptus blakelyi, Eucalyptus melliodora,* with *Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus albens, Allocasuarina luehmannii, Callitris glaucophylla, Eucalyptus conica, Eucalyptus microcarpa, Casuarina cunninghamiana.* Some patches are mostly dominated by *Angophora floribunda* regrowth but these areas were once likely to have been co-dominated by *Eucalyptus blakelyi* and *Eucalyptus melliodora*.	Yes Patch is dominated by a *Eucalyptus albens* x *moluccana* hybrid with *Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus melliodora* and *Brachychiton populneus*. The presence of natural hybrids within any ecological community currently listed under the EPBC Act does not render the areas of the ecological community in which hybrids occur ineligible for protection (see Threatened Species Scientific Committee, 2011).	Yes Patch is dominated by *Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus melliodora,* with *Acacia linearifolia, Eucalyptus albens* x *moluccana, Eucalyptus crebra, Acacia doratoxylon, Brachychiton populneus* subsp. *populneus*, and *Melia azedarach.*	Yes Patch is dominated by a *Eucalyptus albens* x *moluccana* hybrid with *Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus melliodora* and *Brachychiton populneus*. The presence of natural hybrids within any ecological community currently listed under the EPBC Act does not render the areas of the ecological community in which hybrids occur ineligible for protection (see Threatened Species Scientific Committee, 2011a).

Key characteristics and condition thresholds	PCT 266	PCT 277	PCT 281	PCT 483	PCT 599	PCT 618
Does the patch have a predominately native understorey (i.e. more than 50% of the perennial vegetative groundlayer must comprise native species)?	Variable depending on condition class. PCT 266 Mod_Good condition BAM plots (DL6 and MSCW_38) show >50% cover of native species in the understorey. PCT 266 Thinned plot MSCW_40 shows >50% cover of native species in the understorey. PCT 266 Thinned plot DL9 shows <50% cover of native species in the understorey. The areas of PCT 266 DNG sampled during the survey show that the ground layer is composed of <50% native understorey species (see BAM plots TSCW-04, TSCW-05, TSCW-06, TSCW-05, SMTS3, SMTS4) and these plots are excluded from the EC. The PCT 266 DNG BAM plots MSCW_41 and SMTS5 have >50% cover of native species in the understorey.	Variable depending on condition class. PCT 277 Mod_Good condition BAM plots (with the exception of plot MSCW-30 at 49.1% cover) show >50% cover of native species in the understorey. PCT 277 Thinned plot DL4 shows >50% cover of native species in the understorey. PCT 277 Thinned plot Q38_NE shows <50% cover of native species in the understorey. The areas of PCT 277 DNG sampled during the survey show that the ground layer is composed of >50% native understorey species, with the exception of BAM plots LH29 and SMTS30.	Variable in all condition classes. PCT 281 Mod_Good condition BAM plots show variability in understorey. Most BAM plots done in PCT 281 Mod_Good condition show >50% cover of native species in the understorey. However, plots LC44, LC55, MSCW-15, and CWO_600 show <50% cover of native species in the understorey. PCT 281 Thinned is variable. Ten of the 26 BAM plots show <50% cover of native species in the understorey. The areas of PCT 281 DNG sampled during the survey show that the ground layer is composed of >50% native understorey species. Plot BSF_27 from the Birriwa Solar Farm BDAR shows the ground layer is composed of <50% native understorey species.	Variable in all condition classes. PCT 843 Mod_Good condition BAM plots show >50% cover of native species in the understorey. However, plots LH37 and IMCP1 show <50% cover of native species in the understorey. The six BAM plots done in PCT 483 Poor condition all show <50% cover of native species in the understorey. Most PCT 843 Thinned condition BAM plots show >50% cover of native species in the understorey except for BAM plots CWO_618CWO_619 that show <50% cover of native species in the understorey. The areas of PCT 483 DNG sampled during the survey show that the ground layer is composed of >50% native understorey species, with the exception of BAM plots CWO_604 Q1-NE and SMTS16.	Variable in all condition classes. PCT 599 Mod_Good condition BAM plots show >50% cover of native species in the understorey, with the exception of two plots MSCW-27 and MSCW-24. The areas of PCT 599 Thinned sampled during the survey show that the ground layer in three out of the six plots is composed of >50% native understorey species and three out of the six plots is composed of <50% native understorey species. The areas of PCT 599 DNG sampled during the survey show that the ground layer in three out of the six plots is composed of >50% native understorey species and three out of the six plots is composed of <50% native understorey species.	Variable in all condition classes. PCT 618 Mod_Good condition BAM plots show >50% cover of native species in the understorey, with the exception of one plot Q43_NE. Two out of the six BAM plots done in PCT 618 Thinned (IM6 and MSCW-10) show cover of <50% native understorey species. The areas of PCT 618 DNG sampled during the survey show that the ground layer in 10 out of the 14 plots is composed of >50% native understorey species.

Key characteristics and condition thresholds	**PCT 266**	**PCT 277**	**PCT 281**	**PCT 483**	**PCT 599**	**PCT 618**
				The area of PCT 483 DNS sampled during the survey show that the ground layer is composed of >50% native understorey species.		
For patches of high quality including those without an existing canopy. 1a. Is the patch > 0.1 ha in size? AND 1b. Does the patch contain at least 12 native, non-grass understorey species? AND 1c. Does the patch contain at least one listed important understorey species (i.e. grazing-sensitive, regionally significant or uncommon species)?	1a. Patches are >0.1 ha (up to 20 ha). 1b. Yes. The Mod_Good condition patch (incl. DLQ6) contains a total of 16 understorey species (excluding grass species). The Thinned condition patch contains at least 12 native, non-grass understorey species. The PCT 266 DNG BAM plots MSCW_41 and SMTS5 do not contain at least 12 native, non-grass understorey species. DNS plot MSCW_39 contains at least 12 native, non-grass understorey species. 1c. Mod_Good (DLQ6) and Thinned (DLQ9) condition patches both contain at least 1 important species.	1a. Patches from all conditions (Mod_Good, DNG & Thinned) are >0.1 ha, (up to 171.54 ha). 1b. All plots within the Mod_Good patches contain at least 12 native, non-grass understorey species. No plots within DNG or Thinned condition contained at least 12 native, non-grass understorey species. Therefore they are not part of the EC. 1c. All plots within Mod_Good contained at least 1 important species.	1a. Patches from all conditions (Mod_Good, DNG, DNS & Thinned) are >0.1 ha, (up to 85.31 ha). 1b. Most plots within Mod_Good patches contain at least 12 native, non-grass understorey species. Most plots within Thinned do not contain at least 12 native, non-grass understorey species with the exception of LC58 and LC40. Two plots within DNG (SMTS28 and IM10) contain at least 12 native, non-grass understorey species. The remainder are excluded from the EC at this step.	1a. Patches from all conditions (Mod_Good, DNG & Thinned) are >0.1 ha, (up to 37.6 ha). 1b. Mod_Good (incl. 2 plots LH37 & P_4859a_62) patches <u>do not</u> contain >12 native, non-grass understorey species. Thinned (incl. 2 plots IM9 & P_4859a_61) patches <u>do not</u> contain >12 native, non-grass understorey species. DNG (incl. 2 plots LH35 & LH36) patches <u>do not</u> contain >12 native, non-grass understorey species. No data in poor condition patches has been included to date.	1a. Patches from all conditions (Mod_Good, DNG & Thinned) up to 11.7 ha. 1b. 3 of 7 Mod_Good plots (LC59, MSCW-27, and LH13) contain at least 12 native, non-grass understorey species. Plots within DNG patches do not contain at least 12 native, non-grass understorey species. DNG patches are addressed below. 1 of 6 Thinned plots (LM14) was found to have at least 12 native, non-grass understorey species. 1c. All Mod_Good plots contained at least 1 important understorey species.	1a. Patches in Mod_Good & DNG conditions are >0.1 ha, (up to 174.9 ha). 1b. 1 of 2 plots (LH41) within Mod_Good patches contain at least 12 native, non-grass understorey species. Plot LH42 within this same patch contained <12 and is addressed below. Plots within DNG patches <u>do not</u> contain at least 12 native, non-grass understorey species. DNG patches are addressed below. No data in Thinned condition patches has been included to date. 1c. All Mod_Good plots contained at least 1 important understorey species.

Key characteristics and condition thresholds	PCT 266	PCT 277	PCT 281	PCT 483	PCT 599	PCT 618
			1c. All Mod_Good plots contained at least 1 important understorey species. All Thinned plots contained at least 1 important understorey species.	1c. Plots that do have >12 native, non-grass understorey species, incl. LH32 (located in a Mod_Good patch). LH32 does contained at least 1 important understorey species.	3 of 6 plots in DNG patches (DL15, MSCW-22, TSCW-02) contained at least 1 important understorey species. 4 of 6 plots in Thinned condition patches (DL13, IM14, LH14, LH15, LH18) contained at least 1 important understorey species.	2 of 3 plots in DNG patches (CW_203 & IM6) contained at least 1 important understorey species. No data in Thinned condition patches has been included to date.
For patches of lower quality that have retained an overstorey. 2a. Is the patch size >2 ha in size? AND 2b. Does the patch have either natural regeneration of the overstorey species OR 2c. 20 or more mature trees/hectare?	Both the Mod_Good and Thinned condition patches meet the definition of this TEC based on information provided above. The PCT 266 DNG BAM plots MSCW_41 and SMTS5 and DNS condition do not contain 20 or more mature trees/hectare.	2a. DNG and Thinned condition patches are all >2 ha. 2b. Plots within DNG (LC4, LH02 & LH26) contain no evidence of regeneration of overstorey species. The plot within Thinned (DLQ4) does not contain regeneration of trees in the required size range. 2b. Plot DL4 does not contain 20 or more mature trees/hectare.	2a. The patches are >2 ha. 2b. Plot LC40 has the appropriate overstorey species regeneration present.	2a. The Thinned condition patch (containing plots IM9 & P_4859a_61) is <2 ha and therefore does not meet this ecological community definition. 2b. Mod_Good (LH37 & P_4859a_62) patches that are >2 ha, the following have natural regeneration: — Mod_Good (P_4859a_62). DNG (LH35 & LH36) & Mod_Good (LH37) did not contain evidence of natural regeneration and therefore do not meet this ecological community definition.	2a. Mod_Good, DNG and Thinned condition patches are all >2 ha 2b. No DNG Plots contain no evidence of regeneration of overstorey species. 2c. all Mod_Good and Thinned conditioned plots have 20 or more mature trees/hectare.	2a. The Mod_Good condition patch containing plot LH42 is >2 ha. The DNG condition patches containing plots CW_202, CW203 and IM6 do not contain an overstorey. 2b. The Mod_Good condition patch containing plot LH42 does contain evidence of regeneration.

Key characteristics and condition thresholds	PCT 266	PCT 277	PCT 281	PCT 483	PCT 599	PCT 618
Outcome	**PCT 266 Mod_Good and Thinned patches meet the key characteristics and condition thresholds and therefore form part of the ecological community.**	**PCT 277 Mod_Good patches meet the key characteristics and condition threshold and therefore form part of the ecological community.**	**PCT 281 Mod_Good and Thinned condition states are deemed to meet the key characteristics and condition thresholds and therefore form part of the ecological community.**	**PCT 483 Mod_Good and Thinned condition states are deemed to meet the key characteristics and condition thresholds and therefore form part of the ecological community.**	**PCT 599 Mod_Good and Thinned condition states are deemed to meet the key characteristics and condition thresholds and therefore form part of the ecological community.**	**PCT 618 Mod_Good and Thinned condition states are deemed to meet the key characteristics and condition thresholds and therefore form part of the ecological community.**

4.4 Vegetation zones

The vegetation within the subject land was firstly assessed 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 4-53.

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 m from the next area of native vegetation (or ≤ 30 m 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 ha in size. As such, each vegetation zone has been assigned to the ≥ 100 ha class.

Vegetation zones are illustrated in Figure 14-12.

Table 4-54 to Table 4-64 outline the vegetation zones and patch size for each vegetation zone mapped in each IBRA subregion.

Table 4-53 Native vegetation broad condition states

Category and rationale	Thresholds
Moderate_Good	Native vegetation is relatively intact with all structural layers present. Exotic weed cover is generally low. This condition state represents the best condition vegetation within the subject land.
Thinned	Native vegetation that has been subject to canopy removal or ‘thinning’ of a structural layer but otherwise retains native species.
Poor	Vegetation has retained a native canopy or the canopy cover is showing signs of regeneration. The understorey and groundcover layers are generally 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.
Derived Native Shrubland	Shrublands that are derived or secondary forms resulting from clearing of a PCT. These areas generally lack a native over-storey and possess a very dense mid stratum dominated by regrowth pioneer shrubs most notably *Acacia* sp. These areas can contain small areas of scattered trees. 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.
Derived Native Grassland	Grasslands that contain native species but are derived or secondary forms resulting from clearing of a PCT. These areas generally lack a native over-storey and mid stratum but can contain small areas of shrubs or scattered trees. 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).

Table 4-54 Vegetation zones and patch sizes within the Inland Slopes IBRA subregion – CFG Connection to Tallawang Stage

Vegetation zone ID	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
1	81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Thinned	0.16	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	LC3 CWREZ_504
2	202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Thinned	0.18	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	LH44 IM15
3	277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	6.61	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	9	9	LH26 LH25 LH29 SMTS21 SMTS31 SMTS33 SMTS20 SMTS30 SMTS32

Vegetation zone ID	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		Thinned	0.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	Q38_NE DL4
5	281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	DNG	26.2	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13 BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10

Vegetation zone ID	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
								LH11 Q22_NE Q21_NE SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
6		Mod_Good	0.63	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15 CWO_600

Vegetation zone ID	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
								LC35 P_4859_038 MSCW-12 LH05
7		Thinned	12.6	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636

Vegetation zone ID	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
								LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38

Table 4-55 Vegetation zones and patch sizes within the Inland Slopes IBRA subregion – RNI1 Stage

Vegetation zone ID	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
1	81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	DNG	4.36	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	4	4	LH20 LH21 DL33 Q18_NE
2		Mod_Good	2.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	MSCW_35 CWREZ_502
3		Thinned	0.63	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	LC3 CWREZ_504

Vegetation zone ID	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	266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	DNG	16.65	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	9	9	MSCW_41 TSCW-03 TSCW-04 TSCW-05 TSCW-06 SMTS5 TSCW-05 SMTS3 SMTS4
5		DNS	0.49	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	MSCW_37 MSCW_39

Vegetation zone ID	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		Mod_Good	5.2	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	DL6 MSCW_38 DL6 MSCW_38
7		Thinned	7.14	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	DL9 MSCW_40 DL9 MSCW_40
8	277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	56.9	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	9	9	LH26 LH25 LH29 SMTS21 SMTS31 SMTS33 SMTS20 SMTS30 SMTS32

Vegetation zone ID	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		Mod_Good	6.03	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	6	6	LH06 LC6 LC10 IM11 MSCW-30 DL5
10		Thinned	7.92	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	Q38_NE DL4 Q38_NE DL4
11	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	56.9	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13

Vegetation zone ID	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
								BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10 LH11 Q22_NE Q21_NE SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28

Vegetation zone ID	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		Mod_Good	4.89	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15 CWO_600 LC35 P_4859_038 MSCW-12 LH05

Vegetation zone ID	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
13		Poor	0.11	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	26 (plots from PCT 281 Thinned used in BAM-C)	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624

Vegetation zone ID	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
								CWO_623 CWO_625 DL16 CWO_603 LH38
14		Thinned	26.78	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01

Vegetation zone ID	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
								CWO_636 LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38
15	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	13.07	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE
16		DNS	0.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	IM2 Q24_NE Q26_NE

Vegetation zone ID	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
17		Mod_Good	29.37	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2
18		Poor	0.86	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	IM4

Vegetation zone ID	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
19		Thinned	7.06	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE
20	461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	DNG	0.33	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWREZ_510 LH19
21		Mod_Good	6.11	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	9	9	MSCW-16 LC26 DL10 LC50 CWO_609 LC49 CWO_607 CWO_610 CWO_611

Vegetation zone ID	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
22		Thinned	0.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWO_612 CWO_608
23	478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Mod_Good	0.24	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	8	8	Q25_NE Q23_NE DL31 CWO_644 LC18 Q11-NE MSCW_43 Q10-NE
24		Thinned	0.21	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	8 (plots from PCT 478 Mod_Good used in the BAM-C)	Q25_NE Q23_NE DL31 CWO_644 LC18 Q11-NE MSCW_43 Q10-NE

Vegetation zone ID	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
25	479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	DNG	3.19	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	9	9	CWO_622 CWO_621 Cworez_519 Q30_NE Q31_NE Q32_NE Q37_NE Q7-NE Q9-NE

Vegetation zone ID	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
26		Mod_Good	10.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	16	16	LC46 LH04 LC37 DL20 LC54 LC56 P_4859_063 LC48 P_4859_036 Q36_NE P_4859_075 LH30 IM5 Q8-NE CWOrez_520 CwoRez_521

Vegetation zone ID	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
27		Thinned	5.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	7	7	LH40 LH39 IM12 LC8 LC7 LH31 LC25
28	481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Mod_Good	6.27	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	8	8	LC28 LC21 DL1 IM13 LC20 P_4859_064 P_4859_065 CWO_613
29		Thinned	3.22	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	3	3	LC47 CWO_648 CWO_646

Vegetation zone ID	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
30	1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	DNG	0.93	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	MSCW_34 MSCW_32
31		DNS	1	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	MSCW_31
32		Mod_Good	37.08	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	4	4	Q14-NE DL7 LC34 DL8
33		Thinned	2.73	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	MSCW_33 MSCW_42

Table 4-56 Vegetation zones and patch sizes within the Inland Slopes IBRA subregion – Stubbo Stage

Vegetation zone ID	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
1	277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Mod_Good	0.51	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	LH06 LC6 LC10 IM11 MSCW-30 DL5
2	281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	DNG	0.73	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13 BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512

Vegetation zone ID	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
								CWOREZ_514 LH10 LH11 Q22_NE Q21_NE SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
3		Mod_Good	1.71	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15

Vegetation zone ID	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
								CWO_600 LC35 P_4859_038 MSCW-12 LH05
4		Thinned	2.22	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01

Vegetation zone ID	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
								CWO_636 LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38
5	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	0.03	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE
6		DNS	1.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	IM2 Q24_NE Q26_NE

Vegetation zone ID	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
7		Mod_Good	3.55	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2
8		Thinned	0.73	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE

Vegetation zone ID	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	478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Mod_Good	0.15	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	8	8	Q25_NE Q23_NE DL31 CWO_644 LC18 Q11-NE MSCW_43 Q10-NE

Table 4-57 Vegetation zones and patch sizes within the Kerrabee IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	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
1	42 – River Red Gum/ River Oak riparian woodland wetland in the Hunter Valley	DNG	0.18	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (modified benchmark used)	Modified benchmark
2		Thinned	0.62	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (modified benchmark used)	Modified benchmark
3	277 – Blakely's Red Gum -– Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Mod_Good	0.14	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	LH06 LC6 LC10 IM11 MSCW-30 DL5

Vegetation zone ID	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	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Mod_Good	6.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15 CWO_600 LC35 P_4859_038 MSCW-12 LH05

Vegetation zone ID	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		Thinned	6.88	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624

Vegetation zone ID	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
								CWO_623 CWO_625 DL16 CWO_603 LH38
6	440 –Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Mod_Good	0.78	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2

Vegetation zone ID	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
7		Thinned	0.03	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE
8	479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	DNG	0.16	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	9	9	CWO_622 CWO_621 Cworez_519 Q30_NE Q31_NE Q32_NE Q37_NE Q7-NE Q9-NE

Vegetation zone ID	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		Mod_Good	8.85	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	16	16	LC46 LH04 LC37 DL20 LC54 LC56 P_4859_063 LC48 P_4859_036 Q36_NE P_4859_075 LH30 IM5 Q8-NE CWOrez_520 CwoRez_521

Vegetation zone ID	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
10		Thinned	2.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	7	7	LH40 LH39 IM12 LC8 LC7 LH31 LC25
11	481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	DNG	0.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (modified benchmark used)	Modified benchmark
12		Thinned	0.12	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	LC47 CWO_648 CWO_646

Vegetation zone ID	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
13	599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	DNG	1.68	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	MSCW-22 DL14 DL15 MSCW-23 MSCW-26 TSCW-02
14		Mod_Good	1.5	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC59 MSCW-25 MSCW-27 MSCW-24 LH13 MSCW-28 LH17
15		Thinned	2.06	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	6	6	LH15 DL13 IM14 MSCW-29 LH18 LH14

Vegetation zone ID	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	618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	DNG	9.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	14	14	CWO_629 LC53 MSCW-06 MSCW-07 MSCW-08 MSCW-11 Q42_NE Q44_NE SMTS15 SMTS25 SMTS27 SMTS14 SMTS24 SMTS26
17		Mod_Good	7.37	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	DL37 LH41 MSCW-09 LH42 Q43_NE

Vegetation zone ID	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
18		Thinned	11.25	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	IM6 LC51 CWO_628 MSCW-10 LC52

Table 4-58 Vegetation zones and patch sizes within the Kerrabee IBRA subregion – Liverpool Range Stage

Vegetation zone ID	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
1	281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	DNG	1.44	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13 BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10 LH11 Q22_NE Q21_NE

Vegetation zone ID	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
								SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
2		Thinned	0.38	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647

Vegetation zone ID	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
								DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38
3	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	0.15	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE

Vegetation zone ID	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		Mod_Good	1.26	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2
5		Thinned	0.03	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE

Vegetation zone ID	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	477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	DNG	0.94	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	CWO_639
7		Mod_Good	12.41	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	IM18 LH43 CWORez_516 CWO_638
8		Thinned	2.04	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	0	4 (plots from PCT 477 Mod_Good used in BAM-C)	IM18 LH43 CWORez_516 CWO_638

Vegetation zone ID	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	479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	DNG	0.44	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	9	9	CWO_622 CWO_621 Cworez_519 Q30_NE Q31_NE Q32_NE Q37_NE Q7-NE Q9-NE
10		Mod_Good	22.89		4	16	16	LC46 LH04 LC37 DL20 LC54 LC56 P_4859_063 LC48 P_4859_036 Q36_NE P_4859_075 LH30

Vegetation zone ID	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
								IM5 Q8-NE CWOrez_520 CwoRez_521
11	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	DNG	0.87	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	13	13	CWO_604 CWO_615 IMCP3 LH35 LH36 Q1-NE Q3-NE IMCP5 SMTS17 SMTS19 SMTS16 SMTS18 SMTS13

Vegetation zone ID	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	1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	DNG	2	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	5	5	CWO_602 CWO_606 DL21 DL22 DL24
13		Thinned	0.76	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	DL27 CWO_605 CWO_617

Table 4-59 Vegetation zones and patch sizes within the Kerrabee IBRA subregion – RNI1 Stage

Vegetation zone ID	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
1	277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Mod_Good	0.17	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	LH06 LC6 LC10 IM11 MSCW-30 DL5
2		Thinned	0.85	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	Q38_NE DL4
3	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	26.51	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13

Vegetation zone ID	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
								BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10 LH11 Q22_NE Q21_NE SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
4		DNS	1.08	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	1 (modified benchmark used)	Modified benchmark

Vegetation zone ID	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		Mod_Good	40.26	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15 CWO_600 LC35 P_4859_038 MSCW-12 LH05
6		Poor	0.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	26	26	LC43 DL3 LC42 LH12 DL19 IM7

Vegetation zone ID	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
								LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38

Vegetation zone ID	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
7		Thinned	42.82	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	0	26 (plots from PCT 281 Mod_Good used in the BAM-C)	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624

Vegetation zone ID	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
								CWO_623 CWO_625 DL16 CWO_603 LH38
8	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	1.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE

Vegetation zone ID	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		Mod_Good	2.18	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2

Vegetation zone ID	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
10	461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Mod_Good	30.28	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	9	9	MSCW-16 LC26 DL10 LC50 CWO_609 LC49 CWO_607 CWO_610 CWO_611
11		Thinned	0.13	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWO_612 CWO_608
12	477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Thinned	0.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	4 (plots from PCT 477 Mod_Good used in BAM-C)	IM18 LH43 CWORez_516 CWO_638

Vegetation zone ID	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
13	478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	DNG	0.61	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	MSCW-17
14		Mod_Good	6.27	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	8	8	Q25_NE Q23_NE DL31 CWO_644 LC18 Q11-NE MSCW_43 Q10-NE
15		Thinned	0.15	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	8 (plots from PCT 478 Mod_Good used in BAM-C)	Q25_NE Q23_NE DL31 CWO_644 LC18 Q11-NE MSCW_43 Q10-NE

Vegetation zone ID	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	479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	DNG	7.35	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	9	9	CWO_622 CWO_621 Cworez_519 Q30_NE Q31_NE Q32_NE Q37_NE Q7-NE Q9-NE
17		DNS	0.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	LC45 Q6-NE Cworez_518
18		Mod_Good	9.29	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	16	16	LC46 LH04 LC37 DL20 LC54 LC56 P_4859_063 LC48

Vegetation zone ID	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
								P_4859_036 Q36_NE P_4859_075 LH30 IM5 Q8-NE CWOrez_520 CwoRez_521
19		Thinned	16.71	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	7	7	LH40 LH39 IM12 LC8 LC7 LH31 LC25

Vegetation zone ID	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	481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Mod_Good	2.54	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	8	8	LC28 LC21 DL1 IM13 LC20 P_4859_064 P_4859_065 CWO_613
21		Thinned	9.2	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	LC47 CWO_648 CWO_646

Vegetation zone ID	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
22	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	DNG	1.45	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	13	13	CWO_604 CWO_615 IMCP3 LH35 LH36 Q1-NE Q3-NE IMCP5 SMTS17 SMTS19 SMTS16 SMTS18 SMTS13

Vegetation zone ID	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
23		Thinned	2.73	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	11	11	DL23 DL35 IMCP2 IM9 CWO_614 IMCP4 CWO_619 Q2-NE CWO_616 CWO_620 CWO_618

Vegetation zone ID	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	618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	DNG	42.03	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	14	14	CWO_629 LC53 MSCW-06 MSCW-07 MSCW-08 MSCW-11 Q42_NE Q44_NE SMTS15 SMTS25 SMTS27 SMTS14 SMTS24 SMTS26
25		Mod_Good	8.17	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	DL37 LH41 MSCW-09 LH42 Q43_NE

Vegetation zone ID	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
26		Thinned	9.91	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	IM6 LC51 CWO_628 MSCW-10 LC52
27	1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	Thinned	1.95	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWO_630 CWO_627
28	1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes	DNG	1.18	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	CWO_632
29		Mod_Good	56.37	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	4	6 (plots duplicated in BAM-C to account for shortfall)	CWO_631 CWO_649 CWO_631 CWO_649 CWO_631 CWO_649

Vegetation zone ID	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
30		Thinned	4.48	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	CWO_631 CWO_649
31	1674 – Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	DNG	0.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	CWO_641
32		Mod_Good	10.74	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	1	3 (plots duplicated in BAM-C to account for shortfall)	CWO_640 CWO_640 CWO_640

Table 4-60 Vegetation zones and patch sizes within the Liverpool Ranges IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	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
1	281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	DNG	0.13	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13 BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10 LH11 Q22_NE Q21_NE

Vegetation zone ID	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
								SMTS7 SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
2		Thinned	0.52	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647

Vegetation zone ID	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
								DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624 CWO_623 CWO_625 DL16 CWO_603 LH38
3	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	0.38	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE

Vegetation zone ID	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		Thinned	0.74	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE
5	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	DNG	2.31	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	13	13	CWO_604 CWO_615 IMCP3 LH35 LH36 Q1-NE Q3-NE IMCP5 SMTS17 SMTS19 SMTS16 SMTS18 SMTS13

Vegetation zone ID	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		Thinned	5.58	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	11	11	DL23 DL35 IMCP2 IM9 CWO_614 IMCP4 CWO_619 Q2-NE CWO_616 CWO_620 CWO_618

Table 4-61 Vegetation zones and patch sizes within the Liverpool Ranges IBRA subregion – Liverpool Range Stage

Vegetation zone ID	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
1	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	DNG	16.47	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	13	13	CWO_604 CWO_615 IMCP3 LH35 LH36 Q1-NE Q3-NE IMCP5 SMTS17 SMTS19 SMTS16 SMTS18 SMTS13

Vegetation zone ID	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		Mod_Good	13.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	10	10	LC31 LC24 LC23 LC22 P_4859_062 LC30 LC29 LH37 LH32 IMCP1
3		Poor	6.48	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	6	6	P_4859_022 P_4859_061 P_4859_079 P_4859_077 DL34 P_4859_025

Vegetation zone ID	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		Thinned	24.32	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	11	11	DL23 DL35 IMCP2 IM9 CWO_614 IMCP4 CWO_619 Q2-NE CWO_616 CWO_620 CWO_618

Table 4-62 Vegetation zones and patch sizes within the Pilliga IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	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
1	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	0.2	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE
2		Mod_Good	7.98	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33 Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2

Vegetation zone ID	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
3		Thinned	1.42	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE
4	477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Mod_Good	0.18	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	4	4	IM18 LH43 CWORez_516 CWO_638
5	481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Mod_Good	5.94	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	8	8	LC28 LC21 DL1 IM13 LC20 P_4859_064 P_4859_065 CWO_613

Vegetation zone ID	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		Thinned	0.88	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	LC47 CWO_648 CWO_646
7	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Mod_Good	0.94	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	10	10	LC31 LC24 LC23 LC22 P_4859_062 LC30 LC29 LH37 LH32 IMCP1
8	599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	DNG	1.62	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	MSCW-22 DL14 DL15 MSCW-23 MSCW-26 TSCW-02

Vegetation zone ID	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		Mod_Good	1.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC59 MSCW-25 MSCW-27 MSCW-24 LH13 MSCW-28 LH17
10		Thinned	0.61	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	LH15 DL13 IM14 MSCW-29 LH18 LH14

Table 4-63 Vegetation zones and patch sizes within the Pilliga IBRA subregion – Liverpool Range Stage

Vegetation zone ID	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
1	281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	0.87	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	27	27	CWORez_513 CWO_637 MSCW_36a DL28 DL29 LH07 LH23 MSCW-05 Q12-NE BSF_13 BSF_24 BSF_25 BSF_26 BSF_27 CWORez_512 CWOREZ_514 LH10 LH11 Q22_NE Q21_NE SMTS7

Vegetation zone ID	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
								SMTS23 SMTS29 IM10 SMTS6 SMTS22 SMTS28
2		Mod_Good	0.82	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	15	15	LC44 LH01 DL26 LC55 LH34 MSCW-14 MSCW-13 LH16 LC57 MSCW-15 CWO_600 LC35 P_4859_038 MSCW-12 LH05

Vegetation zone ID	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
3		Thinned	6.29	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	26	26	LC43 DL3 LC42 LH12 DL19 IM7 LH27 CW_201 LC5 LC40 CWO_626 LH28 MSCW_36b CWO_647 DL18 TSCW-01 CWO_636 LC58 LC41 MSCW-19 CWO_624

Vegetation zone ID	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
								CWO_623 CWO_625 DL16 CWO_603 LH38
4	477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Mod_Good	2.15	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	4	4	IM18 LH43 CWORez_516 CWO_638
5		Thinned	0.05	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	0	4 (plots from PCT 477 Mod_Good used in the BAM-C)	IM18 LH43 CWORez_516 CWO_638

Vegetation zone ID	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	479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	DNG	7.25	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	9	9	CWO_622 CWO_621 Cworez_519 Q30_NE Q31_NE Q32_NE Q37_NE Q7-NE Q9-NE
7		Mod_Good	8.4	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	16	16	LC46 LH04 LC37 DL20 LC54 LC56 P_4859_063 LC48 P_4859_036 Q36_NE P_4859_075 LH30

Vegetation zone ID	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
								IM5 Q8-NE CWOrez_520 CwoRez_521
8		Thinned	0.04	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LH40 LH39 IM12 LC8 LC7 LH31 LC25

Vegetation zone ID	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	483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	DNG	14.07	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	13	13	CWO_604 CWO_615 IMCP3 LH35 LH36 Q1-NE Q3-NE IMCP5 SMTS17 SMTS19 SMTS16 SMTS18 SMTS13
10		DNS	0.06	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	Q5-NE

Vegetation zone ID	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		Mod_Good	0.63	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	10	10	LC31 LC24 LC23 LC22 P_4859_062 LC30 LC29 LH37 LH32 IMCP1
12		Poor	0.3	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	P_4859_022 P_4859_061 P_4859_079 P_4859_077 DL34 P_4859_025

Vegetation zone ID	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
13		Thinned	20.43	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	11	11	DL23 DL35 IMCP2 IM9 CWO_614 IMCP4 CWO_619 Q2-NE CWO_616 CWO_620 CWO_618

Vegetation zone ID	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	618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	DNG	1	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	14	14	CWO_629 LC53 MSCW-06 MSCW-07 MSCW-08 MSCW-11 Q42_NE Q44_NE SMTS15 SMTS25 SMTS27 SMTS14 SMTS24 SMTS26
15		Mod_Good	2.13	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	5	5	DL37 LH41 MSCW-09 LH42 Q43_NE

Vegetation zone ID	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	1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	DNG	5.23	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	CWO_602 CWO_606 DL21 DL22 DL24
17		Mod_Good	15.88	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	8	8	IM17 LH33 MSCW-03 CWO_635 Q4-NE P_4859_047 CWORez_515 DL25
18		Thinned	4.61	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	3	3	DL27 CWO_605 CWO_617

Vegetation zone ID	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
19	1696 – Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	DNG	0.92	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	CWO_650 CWO_652 CWO_651
20		DNS	0.67	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	CWO_653
21		Mod_Good	1.99	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWO_633 CWO_634

Table 4-64 Vegetation zones and patch sizes within the Talbragar Valley IBRA subregion – CFG connection to Spicers Creek wind farm Stage

Vegetation zone ID	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
1	81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	DNG	0.04	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	4	4	LH20 LH21 DL33 Q18_NE
2	202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Thinned	0.21	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	LH44 IM15
3	277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Mod_Good	0.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	LH06 LC6 LC10 IM11 MSCW-30 DL5
4	599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	DNG	0.98	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	6	6	MSCW-22 DL14 DL15 MSCW-23 MSCW-26 TSCW-02

Vegetation zone ID	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		Mod_Good	1.01	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	7	7	LC59 MSCW-25 MSCW-27 MSCW-24 LH13 MSCW-28 LH17
6		Thinned	2.11	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	6	6	LH15 DL13 IM14 MSCW-29 LH18 LH14

Table 4-65 Vegetation zones and patch sizes within the Talbragar Valley IBRA subregion – RNI1 Stage

Vegetation zone ID	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
1	81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	DNG	9.89	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	4	LH20 LH21 DL33 Q18_NE
2		Mod_Good	0.82	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	MSCW_35 CWREZ_502
3		Thinned	2.09	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	2	2	LC3 CWREZ_504

Vegetation zone ID	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	202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Mod_Good	1.98	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	3	3	IM16 LC36 CWREZ_501
5		Thinned	0.62	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	LH44 IM15
6	440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	DNG	5.02	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	5	5	Q27_NE Q28_NE Q39_NE Q40_NE Q41_NE
7		Mod_Good	4.97	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	14	14	IM8 LC19 IM1 LC27 IM3 LC32 LC33

Vegetation zone ID	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
								Q13-NE LC2 LH03 LC38 LH24 CWO_601 DL2
8		Thinned	3.12	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	7	7	LC9 LC1 DL11 DL12 Q34_NE Q29_NE Q33_NE

Vegetation zone ID	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	461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Mod_Good	2.57	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2	9	9	MSCW-16 LC26 DL10 LC50 CWO_609 LC49 CWO_607 CWO_610 CWO_611
10		Thinned	0.6	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	CWO_612 CWO_608
11	468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	Thinned	0.12	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	CWREZ_507

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

There were 322 vegetation integrity plots completed during the survey from July 2022 to March 2023 over 215 field team days. The location of vegetation integrity plots are shown in Figure 14-7.

Table 4-54 to Table 4-65 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 is particularly prevalent in the Pilliga, Liverpool Range and Inland Slopes IBRA subregions. Where there was a shortfall in BAM plots for a vegetation zone in a IBRA subregion, data collected from the same PCT and condition state in the adjacent IBRA subregion was used. This approach is considered appropriate as the data was collected from the subject land from same PCT and broad condition state and there is no sharp boundary between IBRA subregions. There is no obvious species change or structural change between PCTs of the same type in the Pilliga, Liverpool Range, Kerrabee, Talbragar Valley or Inland Slopes IBRA subregions.

Where possible, local 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 as follows:

- Inland Slopes RNI1 Stage – PCT 478 Thinned was unable to be surveyed due to lack of property access. Data from PCT 478 Mod_Good has been used in the BAM-C for this vegetation zone.
- Inland Slopes RNI1 Stage – PCT 281 Poor was unable to be surveyed due to lack of property access. Data from PCT 281 Thinned has been used in the BAM-C for this vegetation zone.
- Inland Slopes RNI1 Stage – PCT 266 Mod_Good, PCT 266 Thinned, and PCT 277 Thinned used duplicated plots in the BAM-C To make up for a shortfall caused by lack of property access.
- Kerrabee RNI1 Stage – PCT 1610 Mod_Good, and PCT 1674 Mod_Good used duplicated plots in the BAM-C to make up for a shortfall caused by lack of property access.
- Kerrabee RNI1 Stage – PCT 477 Thinned was unable to be surveyed due to lack of property access. Data from PCT 477 Mod_Good has been used in the BAM-C for this vegetation zone.
- Kerrabee RNI1 Stage – PCT 478 Thinned was unable to be surveyed due to lack of property access. Data from PCT 478 Mod_Good has been used in the BAM-C for this vegetation zone.
- Kerrabee RNI1 Stage – PCT 1610 Thinned was unable to be surveyed due to lack of property access. Data from PCT 1610 Mod_Good has been used in the BAM-C for this vegetation zone.
- Kerrabee RNI1 Stage – PCT 281 Poor was unable to be surveyed due to lack of property access. Data from PCT 281 Thinned has been used in the BAM-C for this vegetation zone.
- Kerrabee Liverpool Range Stage – PCT 477 Thinned was unable to be surveyed due to lack of property access. Data from PCT 477 Mod_Good has been used in the BAM-C for this vegetation zone.
- Pilliga Liverpool Range Stage – PCT 477 Thinned was unable to be surveyed due to lack of property access. Data from PCT 477 Mod_Good has been used in the BAM-C for this vegetation zone.

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. Benchmark data was used for the following vegetation zones:

- Kerrabee RNI1 Stage – PCT 281 Derived Native Shrubland.
- Kerrabee Valley of the Winds Stage – PCT 42 Derived Native Grassland, PCT 42 Thinned, and PCT 481 Derived Native Grassland.

The following approach was used to apply benchmark data for a PCT from the BioNet Vegetation Classification (from a wet rainfall year) to the vegetation zones lacking data in the BAM-C:

- Thinned vegetation zones were allocated benchmark scores for each composition, structure and function variable reflecting the condition of the vegetation with modifications made to Tree scores to reflect the condition of the vegetation as follows:
  - The scores for Tree composition and Tree structure were modified in line with average scores from other Thinned vegetation zones recorded from within the subject land. The average Tree composition score for Thinned vegetation zones was 1.8 (rounded to 2 species for use in the BAM-C) and the average Tree structure score was 21.2% (see Table 4-66).
  - The score for number of large trees was taken to be the average of scores across the Thinned vegetation zone at 1 large tree (see Table 4-66).
  - Mean No. Hollow-bearing Trees was taken to be the average of scores across the Thinned vegetation zone at 1 hollow-bearing tree (see Table 4-66).
  - The litter cover score was taken to be the average of scores across the Thinned vegetation zone at 28.2% (see Table 4-66).
  - Length of Fallen Logs was taken to be the average of scores across the Thinned vegetation zone at 27 m (see Table 4-66).
  - All Tree Stem Size Classes with the exception of 5-9 cm were assumed present reflecting the average of scores across the Thinned vegetation zone (see Table 4-66).
  - Tree species regeneration was assumed to be present reflecting the average of scores across the Thinned vegetation zone (see Table 4-66).
  - High Threat Exotic species cover was taken to be the average of scores across the Thinned vegetation zone at 5.7% cover (see Table 4-66).
- Derived Native Shrubland vegetation zones were allocated benchmark scores for each composition, structure and function variable reflecting the condition of the vegetation with modifications made to scores to reflect the condition of the vegetation as follows:
  - The scores for Tree composition and Tree structure were modified in line with average scores from other Derived Native Shrubland vegetation zones recorded from within the subject land. The average Tree composition score for Derived Native Shrubland vegetation zones was 0.9 (rounded to 1 species for use in the BAM-C) and the average Tree structure score was 0.9% (see Table 4-66).
  - The score for number of large trees was taken to be the average of scores across the Derived Native Shrubland vegetation zone with no large trees present (see Table 4-66).
  - Mean No. Hollow-bearing Trees was taken to be the average of scores across the Derived Native Shrubland vegetation zone with no hollow-bearing trees present (see Table 4-66).
  - The litter cover score was taken to be the average of scores across the Derived Native Shrubland vegetation zone at 16.0% (see Table 4-66).
  - Length of Fallen Logs was taken to be the average of scores across the Derived Native Shrubland vegetation zone at 0.6 m (see Table 4-66).
  - All Tree Stem Size Classes were assumed absent reflecting the average of scores across the Derived Native Shrubland vegetation zone (see Table 4-66).
  - Tree species regeneration was assumed to be absent reflecting the average of scores across the Derived Native Shrubland vegetation zone (see Table 4-66).

— High Threat Exotic species cover was taken to be the average of scores across the Derived Native Shrubland vegetation zone at 0.3% cover (see Table 4-66).

— Derived Native Grassland vegetation zones were allocated benchmark scores for each composition, structure and function variable reflecting the condition of the vegetation with modifications made to Tree scores and Shrub scores to reflect the condition of the vegetation.

  — The scores for Tree composition and Tree structure were modified in line with average scores from other Derived Native Grassland vegetation zones recorded from within the subject land. The average Tree composition score for Derived Native Grassland vegetation zones was 0.1 (rounded to 0 species for use in the BAM-C) and the average Tree structure score was 0.4% (rounded to 0% for use in the BAM-C) (see Table 4-66).

  — The scores for Shrub composition and Shrub structure were modified in line with average scores from other Derived Native Grassland vegetation zones recorded from within the subject land. The average Shrub composition score for Derived Native Grassland vegetation zones was 0.5 (rounded to 1 species for use in the BAM-C) and the average Shrub structure score was 0.9% (see Table 4-66).

  — The score for number of large trees was taken to be the average of scores across the Derived Native Grassland vegetation zone with no large trees present (see Table 4-66).

  — Mean No. Hollow-bearing Trees was taken to be the average of scores across the Derived Native Grassland vegetation zone with no hollow-bearing trees present (see Table 4-66).

  — The litter cover score was taken to be the average of scores across the Derived Native Grassland vegetation zone at 9.4% (see Table 4-66).

  — Length of Fallen Logs was taken to be the average of scores across the Derived Native Grassland vegetation zone at 1.3 m (see Table 4-66).

  — All Tree Stem Size Classes were assumed absent reflecting the average of scores across the Derived Native Grassland vegetation zone (see Table 4-66).

  — Tree species regeneration was assumed to be absent reflecting the average of scores across the Derived Native Grassland vegetation zone (see Table 4-66).

  — High Threat Exotic species cover was taken to be the average of scores across the Derived Native Grassland vegetation zone at 6.4% cover (see Table 4-66).

Table 4-66 Mean composition, structure and function scores for DNG, DNS and Thinned vegetation zones recorded during the survey

Variable	**Condition state**		
	Derived Native Grassland	**Derived Native Shrubland**	**Thinned**
Mean Tree Composition score (No. species)	0.1 (rounded to 0)	0.9 (rounded to 1)	1.8 (rounded to 2)
Mean Tree Structure score (% cover)	0.4 (rounded to 0)	0.9	21.2
Mean Shrub Composition score (No. species)	0.5 (rounded to 1)	Not calculated	Not calculated
Mean Shrub Structure score (% cover)	0.9	Not calculated	Not calculated
Mean No. Large Trees (>50 cm DBH)	0	0	1
Mean No. Hollow-bearing Trees	0	0	1
Mean Litter Cover (%)	9.4	16.0	28.2
Mean Length of Fallen Logs (m)	1.3	0.6	27.0
Mean Tree Stem Size Class 5-9 cm presence	Absent	Absent	Absent

Variable	Condition state		
	Derived Native Grassland	Derived Native Shrubland	Thinned
Mean Tree Stem Size Class 10-19 cm presence	Absent	Absent	Present
Mean Tree Stem Size Class 20-29 cm presence	Absent	Absent	Present
Mean Tree Stem Size Class 30-49 cm presence	Absent	Absent	Present
Mean Tree Stem Size Class 50-79 cm presence	Absent	Absent	Present
Mean Presence of Tree Regeneration	Absent	Absent	Present
Mean High Threat Exotic species score (% cover)	6.4	0.3	5.7

4.5.2 *Vegetation integrity scores*

The vegetation integrity scores for each vegetation zone in each IBRA subregion are outlined below in Table 4-67 to Table 4-78.

Table 4-67 Vegetation integrity scores for the Inland Slopes IBRA subregion – CFG Connection to Tallawang Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	81_Thinned	88.5	100	44.7	73.4
2	202_Thinned	35.3	39.4	66.4	45.2
3	277_DNG	43.6	56.6	1.9	16.7
4	277_Thinned	70.6	84.9	32.1	57.7
5	281_DNG	49.4	67.2	3.6	22.9
6	281_Mod_Good	98.3	100	75.4	90.5
7	281_Thinned	89.8	99.1	61.8	81.9

Table 4-68 Vegetation integrity scores for the Inland Slopes IBRA subregion – RNI1 Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	81_DNG	28.4	40.4	2	13.2
2	81_Mod_Good	100	100	51.9	80.4
3	81_Thinned	88.5	100	44.7	73.4
4	266_DNG	72.2	57.6	1.5	18.4
5	266_DNS	87.2	59.1	9.3	36.3
6	266_Mod_Good	98.4	100	59.4	83.6
7	266_Thinned	85.4	99.2	20.3	55.6
8	277_DNG	43.6	56.6	1.9	16.7
9	277_Mod_Good	99.7	100	61.6	85
10	277_Thinned	70.6	84.9	32.1	57.7
11	281_DNG	49.4	67.2	3.6	22.9
12	281_Mod_Good	98.3	100	75.4	90.5

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
13	281_Poor	89.8	99.1	61.8	81.9
14	281_Thinned	89.8	99.1	61.8	81.9
15	440_DNG	29	19.4	0.8	7.6
16	440_DNS	49	32.6	8	23.4
17	440_Mod_Good	94.7	91.4	86.6	90.8
18	440_Poor	29.8	48.2	11	25.1
19	440_Thinned	69.7	53.8	78.3	66.5
20	461_DNG	55.8	60.3	6.9	28.5
21	461_Mod_Good	100	100	57.9	83.3
22	461_Thinned	99.4	77.7	49.7	72.7
23	478_Mod_Good	93.6	71	78.8	80.6
24	478_Thinned	93.6	71	78.8	80.6
25	479_DNG	34.6	21.4	1.3	9.8
26	479_Mod_Good	97.3	79.5	95.5	90.4
27	479_Thinned	92.3	68.9	77.4	79
28	481_Mod_Good	93.4	89.5	57.6	78.4
29	481_Thinned	97.6	80.4	79.7	85.5
30	1177_DNG	51.4	30.9	8.9	24.1
31	1177_DNS	82.9	32.4	17.5	36.1
32	1177_Mod_Good	74.2	53.8	78.9	68
33	1177_Thinned	87.2	37.3	36.6	49.2

Table 4-69 Vegetation integrity scores for the Inland Slopes IBRA subregion – Stubbo Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	277_Mod_Good	99.7	100	61.6	85
2	281_DNG	49.4	67.2	3.6	22.9
3	281_Mod_Good	98.3	100	75.4	90.5
4	281_Thinned	89.8	99.1	61.8	81.9
5	440_DNG	29	19.4	0.8	7.6
6	440_DNS	49	32.6	8	23.4
7	440_Mod_Good	94.7	91.4	86.6	90.8
8	440_Thinned	69.7	53.8	78.3	66.5
9	478_Mod_Good	93.6	71	78.8	80.6

Table 4-70 Vegetation integrity scores for the Kerrabee IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	42_DNG	86.8	53.9	34.5	54.4
2	42_Thinned	97.1	95.3	99.5	97.3
3	277_Mod_Good	93.1	98.7	78.7	89.7
4	281_Mod_Good	86.1	99	96.2	93.6
5	281_Thinned	71.3	93.7	88.6	84
6	440_Mod_Good	71.3	60.4	87.2	72.1
7	440_Thinned	52.5	51.8	81.1	60.4
8	479_DNG	27.5	17.6	1.4	8.8
9	479_Mod_Good	81.9	55.2	96.4	75.8
10	479_Thinned	70.6	42.6	80.8	62.4
11	481_DNG	57.6	33.1	0.6	10.5
12	481_Thinned	86	61.4	85.9	76.8
13	599_DNG	30.9	58.1	1.6	14.1
14	599_Mod_Good	90.6	97.1	66.2	83.5
15	599_Thinned	58.1	87.1	28.9	52.7
16	618_DNG	35.2	42.3	2.9	16.3
17	618_Mod_Good	56.8	77.8	61.7	64.8
18	618_Thinned	52.1	45.6	36.5	44.3

Table 4-71 Vegetation integrity scores for the Kerrabee IBRA subregion – Liverpool Range Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	281_DNG	40	66.8	6.8	26.3
2	281_Thinned	71.3	93.7	88.6	84
3	440_DNG	25.6	15.2	0.9	7
4	440_Mod_Good	71.3	60.4	87.2	72.1
5	440_Thinned	52.5	51.8	81.1	60.4
6	477_DNG	73.6	35.9	17.9	36.2
7	477_Mod_Good	92.1	45.7	75.2	68.1
8	477_Thinned	92.1	45.7	75.2	68.1
9	479_DNG	27.5	17.6	1.4	8.8
10	479_Mod_Good	81.9	55.2	96.4	75.8
11	483_DNG	45.4	58.7	7.5	27.2
12	1661_DNG	24.8	14.1	5	12
13	1661_Thinned	64.9	24.1	88.1	51.7

Table 4-72 Vegetation integrity scores for the Kerrabee IBRA subregion – RNI1 Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	277_Mod_Good	93.1	98.7	78.7	89.7
2	277_Thinned	60.8	82.1	41.7	59.3
3	281_DNG	40	66.8	6.8	26.3
4	281_DNS	91.2	73.1	7.7	37.1
5	281_Mod_Good	86.1	99	96.2	93.6
6	281_Poor	71.3	93.7	88.6	84
7	281_Thinned	71.3	93.7	88.6	84
8	440_DNG	25.6	15.2	0.9	7
9	440_Mod_Good	71.3	60.4	87.2	72.1
10	461_Mod_Good	98.9	98.8	64.1	85.6
11	461_Thinned	97.3	77.6	57.2	75.6
12	477_Thinned	92.1	45.7	75.2	68.1
13	478_DNG	43.1	15.3	0	2.4
14	478_Mod_Good	74.5	42.1	81.2	63.4
15	478_Thinned	74.5	42.1	81.2	63.4
16	479_DNG	27.5	17.6	1.4	8.8
17	479_DNS	63.4	30.4	4.6	20.6
18	479_Mod_Good	81.9	55.2	96.4	75.8
19	479_Thinned	70.6	42.6	80.8	62.4
20	481_Mod_Good	73.1	70.3	62.5	68.5
21	481_Thinned	86	61.4	85.9	76.8
22	483_DNG	45.4	58.7	7.5	27.2
23	483_Thinned	71	90.9	68.2	76.1
24	618_DNG	36.1	43.2	2.9	16.6
25	618_Mod_Good	58.4	78.8	61.7	65.7
26	618_Thinned	53.9	46.3	36.5	45
27	1176_Thinned	51.1	16.4	89.4	42.2
28	1610_DNG	42.9	17.2	15.9	22.7
29	1610_Mod_Good	88.4	53.8	72.7	70.2
30	1610_Thinned	88.4	53.8	72.7	70.2
31	1674_DNG	53.6	29.2	17.9	30.4
32	1674_Mod_Good	39.2	29	45.1	37.1

Table 4-73 Vegetation integrity scores for the Liverpool Ranges IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	281_DNG	42.2	72.8	8.4	29.6
2	281_Thinned	78.7	96.7	86.4	87
3	440_DNG	30.1	20.6	0.7	7.5
4	440_Thinned	65.3	63.4	79.5	69.1
5	483_DNG	47.2	65	9.6	30.9
6	483_Thinned	78.4	92.5	66.2	78.3

Table 4-74 Vegetation integrity scores for the Liverpool Ranges IBRA subregion – Liverpool Range Stage

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
1	483_DNG	47.2	65	9.6	30.9
2	483_Mod_Good	80.2	98.6	77.8	85.1
3	483_Poor	19.1	50.9	39.9	33.9
4	483_Thinned	78.4	92.5	66.2	78.3

Table 4-75 Vegetation integrity scores for the Pilliga IBRA subregion – Valley of the Winds Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	440_DNG	30.1	20.6	0.7	7.5
2	440_Mod_Good	87.4	91.1	86	88.2
3	440_Thinned	65.3	63.4	79.5	69.1
4	477_Mod_Good	95.8	67.8	73.8	78.2
5	481_Mod_Good	91.8	96.1	70.2	85.2
6	481_Thinned	98.2	88.3	91.9	92.7
7	483_Mod_Good	80.2	98.6	77.8	85.1
8	599_DNG	36.1	63.3	1.9	16.3
9	599_Mod_Good	96.3	97.9	63.6	84.3
10	599_Thinned	70.3	92.8	28.7	57.2

Table 4-76 Vegetation integrity scores for the Pilliga IBRA subregion – Liverpool Range Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	281_DNG	42.2	72.8	8.4	29.6
2	281_Mod_Good	93.9	98.9	96.5	96.4
3	281_Thinned	78.7	96.7	86.4	87
4	477_Mod_Good	95.8	67.8	73.8	78.2
5	477_Thinned	95.8	67.8	73.8	78.2
6	479_DNG	32.9	23.2	1.3	10
7	479_Mod_Good	94.8	82.6	95.1	90.6
8	479_Thinned	87.5	70	78.1	78.2
9	483_DNG	47.2	65	9.6	30.9
10	483_DNS	44.8	63.6	0	14.2
11	483_Mod_Good	80.2	98.6	77.8	85.1
12	483_Poor	19.1	50.9	39.9	33.9
13	483_Thinned	78.4	92.5	66.2	78.3
14	618_DNG	41.8	48.8	2	15.9
15	618_Mod_Good	70.9	89.5	58.8	72
16	1661_DNG	29.3	19.2	4	13.1
17	1661_Mod_Good	92.9	65	82	79.1
18	1661_Thinned	81.8	42	85.5	66.5
19	1696_DNG	35.5	51.6	0.9	12
20	1696_DNS	52.2	44	26	39.1
21	1696_Mod_Good	93.1	51.5	56	64.5

Table 4-77 Vegetation integrity scores for the Talbragar Valley IBRA subregion – CFG connection to Spicers Creek wind farm Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	81_DNG	27.8	47.5	2.4	14.7
2	202_Thinned	23.7	29.2	67.8	36.1
3	277_Mod_Good	97.9	98.7	79.3	91.5
4	599_DNG	36.1	63.3	1.9	16.3
5	599_Mod_Good	96.3	97.9	63.6	84.3
6	599_Thinned	70.3	92.8	28.7	57.2

Table 4-78 Vegetation integrity scores for the Talbragar Valley IBRA subregion – RNI1 Stage

Vegetation zone ID	Vegetation zone name	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	81_DNG	27.8	47.5	2.4	14.7
2	81_Mod_Good	100	99.8	53.6	81.2
3	81_Thinned	84.4	98.6	45.9	72.6
4	202_Mod_Good	95	74.2	97.2	88.2
5	202_Thinned	23.7	29.2	67.8	36.1
6	440_DNG	30.1	20.6	0.7	7.5
7	440_Mod_Good	87.4	91.1	86	88.2
8	440_Thinned	65.3	63.4	79.5	69.1
9	461_Mod_Good	100	98.7	65	86.2
10	461_Thinned	97	81	57.3	76.6
11	468_Thinned	91.1	57.9	88.2	77.5

4.5.3 Use of benchmark data

Version 1.2 benchmarks as of 31 January 2023 were used to assess vegetation integrity attributes in each zone.

Where plot data was unavailable for a vegetation zone due to lack of property access, benchmark data was used to inform the assessment.

4.6 Scattered trees assessment

One hundred and ninety four scattered 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 4-79 to Table 4-88.

The location of each recorded scattered tree is shown in Figure 14-10 in Chapter 14.

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 4-89 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 an SAII are present (nor are likely to be present) the scattered tree module can be applied.

Table 4-79 Assessment of scattered trees in the Inland Slopes IBRA subregion CFG Connection to Tallawang stage

Class	Species	Number of trees	Contain hollows
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion			
3	*Eucalyptus* sp.	7	Yes

Table 4-80 Assessment of scattered trees in the Inland Slopes IBRA subregion RNI1 stage

Class	Species	Number of trees	Contain hollows
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion			
3	*Allocasuarina luehmannii*	1	Yes
2	*Casuarina cunninghamiana* subsp. *cunninghamiana*	1	Yes
3	*Eucalyptus albens*	1	Yes
3	*Eucalyptus goniocalyx*	1	Yes
3	*Eucalyptus microcarpa*	1	Yes
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion			
3	*Eucalyptus* sp.	14	Yes
2	*Eucalyptus* sp.	6	No
3	*Eucalyptus* sp.	6	Yes
3	*Eucalyptus* sp.	66	Yes

Table 4-81 Assessment of scattered trees in the Inland Slopes IBRA subregion Stubbo stage

Class	Species	Number of trees	Contain hollows
PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion			
3	*Eucalyptus* sp.	3	Yes

Table 4-82 Assessment of scattered trees in the Kerrabee IBRA subregion Liverpool Range stage

Class	Species	Number of trees	Contain hollows
PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion			
3	*Eucalyptus* sp.	2	Yes

Table 4-83 Assessment of scattered trees in the Kerrabee IBRA subregion Valley of the Winds stage

Class	Species	Number of trees	Contain hollows
PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion			
3	*Eucalyptus* sp.	7	Yes
PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley			
3	*Eucalyptus albens*	2	Yes

Table 4-84 Assessment of scattered trees in the Kerrabee IBRA subregion RNI1 stage

Class	Species	Number of trees	Contain hollows
PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion			
3	*Eucalyptus* sp.	9	Yes
3	*Eucalyptus fibrosa*	3	Yes

Table 4-85 Assessment of scattered trees in the Liverpool Range IBRA subregion Valley of the Winds stage

Class	Species	Number of trees	Contain hollows
PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley			
3	*Eucalyptus* sp.	2	Yes

Table 4-86 Assessment of scattered trees in the Pilliga IBRA subregion Liverpool Range stage

Class	Species	Number of trees	Contain hollows
PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley			
3	*Eucalyptus* sp.	1	Yes
PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion			
3	*Eucalyptus crebra*	1	Yes

Table 4-87 Assessment of scattered trees in the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Class	Species	Number of trees	Contain hollows
PCT 599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion			
3	*Eucalyptus* sp.	30	Yes
PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion			
3	*Eucalyptus* sp.	6	Yes

Table 4-88 Assessment of scattered trees in the Talbragar Valley IBRA subregion RNI1 stage

Class	Species	Number of trees	Contain hollows
PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion			
2	*Eucalyptus* sp.	1	Yes
3	*Eucalyptus* sp.	12	Yes
2	*Eucalyptus microcarpa*	3	Yes
2	*Eucalyptus blakelyi*	1	No
2	*Eucalyptus blakelyi*	4	Yes
3	*Eucalyptus camaldulensis*	1	Yes
3	*Eucalyptus melliodora*	2	Yes
3	*Eucalyptus microcarpa*	1	Yes

Table 4-89 Threatened species removed from the Scattered Tree assessments

Species type	Species	Assessment
Habitat suitability: Predicted species	All species	Retained
Habitat suitability: Candidate species	Regent Honeyeater (Breeding)	Removed Removed from areas not on Important Habitat Map
	Swift Parrot (Breeding)	Removed Subject land not included on Important Habitat Map
	Prasophyllum sp. Wybong	Removed. Synonym of *Prasophyllum petilum.* Habitat degraded. Scattered trees are in Cat 1 land, ground disturbance suggests habitat is degraded and not suitable for this species.

4.7 Groundwater dependent ecosystems

Impacts to groundwater and Groundwater Dependent Ecosystems (GDEs) have been assessed as part of the Technical paper 17 – Groundwater (WSP, 2023). This report undertook a GDE search by reviewing the relevant water sharing plan documents and accessing the Bureau of Meteorology's Groundwater Dependent Ecosystems Atlas (GDE Atlas). The GDE Atlas was developed as a national dataset of Australian GDEs to inform groundwater planning and management. This database search identified 17 unique high priority terrestrial GDEs (that occur in 316 locations) and five high priority aquatic GDEs, occurring in nine locations (three in the Macquarie-Bogan River catchment and two in the Hunter River catchment). Terrestrial native vegetation high priority GDEs generally comprise of Grassy Woodland and Forested Wetland vegetation formation. A summary of these high priority GDEs within the study area are provided in Table 4-90 and shown on Figure 14-20.

Table 4-90 High priority GDE's (BoM 2022)

Type	GDE name	Catchment	Area (ha)
Terrestrial	*Angophora floribunda, Eucalyptus blakelyi, Eucalyptus melliodora, Acacia implexa, Dodonaea viscosa*	Macquarie-Bogan Rivers	61.5
Terrestrial	*Angophora floribunda, Eucalyptus melliodora, Brachychiton populneus subsp. populneus, Callitris endlicheri*	Hunter River	0.7
Terrestrial	*Angophora floribunda, Eucalyptus melliodora, Brachychiton populneus subsp. populneus, Callitris endlicheri*	Macquarie-Bogan Rivers	6.6
Terrestrial	Black Sallee – Tussock Grass open woodland of the South Eastern Highlands Bioregion	Macquarie-Bogan Rivers	0.1
Terrestrial	Blakelys Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	Hunter River	42.9
Terrestrial	Blakelys Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	Macquarie-Bogan Rivers	37.0
Terrestrial	Blakelys Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Macquarie-Bogan Rivers	21.5
Terrestrial	*Eucalyptus blakelyi , Eucalyptus melliodora , Eucalyptus bridgesiana / Acacia dealbata / Themeda triandra*	Macquarie-Bogan Rivers	7.9
Terrestrial	*Eucalyptus camaldulensis, Casuarina cunninghamiana, Callistemon sieberi, Leptospermum polygalifolia*	Macquarie-Bogan Rivers	9.3
Terrestrial	*Eucalyptus conica, Eucalyptus blakelyi, Eucalyptus melliodora, Callitris glaucophylla, Acacia decora*	Macquarie-Bogan Rivers	15.6
Terrestrial	*Eucalyptus fibrosa, Callitris endlicheri, Eucalyptus sparsifolia, Acacia linearifolia, Phyllanthus hirtellus*	Macquarie-Bogan Rivers	2.0
Terrestrial	*Eucalyptus melliodora, Eucalyptus blakelyi , Angophora floribunda / Acacia implexa , Geijera parviflora*	Macquarie-Bogan Rivers	5.3
Terrestrial	*Eucalyptus melliodora, Acacia decora, Maireana microphylla, Bothriochloa macra, Austrostipa bigeniculata*	Macquarie-Bogan Rivers	0.2
Terrestrial	*Eucalyptus melliodora, Pimelea curviflora var. curviflora, Acacia implexa, Acacia decora*	Macquarie-Bogan Rivers	5.2

Type	GDE name	Catchment	Area (ha)
Terrestrial	*Eucalyptus microcarpa, Callitris glaucophylla, Allocasuarina luehmannii, Maireana microphylla*	Macquarie-Bogan Rivers	42.7
Terrestrial	River Oak/Purple Wiregrass/ Plains Grass grassy riparian forest of the Merriwa Plateau	Hunter River	3.1
Terrestrial	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Be	Macquarie-Bogan Rivers	11.7
Terrestrial	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in	Hunter River	18.6
Terrestrial	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in	Macquarie-Bogan Rivers	2.4
Terrestrial	Western Hunter Flats Rough-barked Apple Forest	Hunter River	238.9
Terrestrial	Western Hunter Flats Rough-barked Apple Forest	Macquarie-Bogan Rivers	7.5
Aquatic	Rouses	Hunter River	0.03
Aquatic	Sportsmans Hollow	Hunter River	4.1
Aquatic	Sportsmans Hollow	Hunter River	6.9
Aquatic	Stubbo	Macquarie-Bogan Rivers	0.7
Aquatic	Talbragar River	Macquarie-Bogan Rivers	5.1
Aquatic	Talbragar River	Macquarie-Bogan Rivers	3.4
Aquatic	Talbragar River	Macquarie-Bogan Rivers	1.4
Aquatic	Talbragar River	Macquarie-Bogan Rivers	1.6
Aquatic	Tallawang	Macquarie-Bogan Rivers	4.7

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. 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 ausfeldii	Habitat constraint being footslopes and low rises on sandstone	Footslopes and low rises on sandstone are present within the subject land. The Gulgong 100K Rock Unit, Gilgandra 250K Rock Unit and Cobbora 100K Rock Unit layers were used in a GIS to identify areas likely to be sandstone. This species also occurs on areas of Alluvium and Ulan Quartz Monzonite (igneous rock which underlies Narrabeen Sandstone) at Highett Road Cope so the habitat constraint for this species identified in the BAM-C was not considered limiting. *Acacia ausfeldii* was retained as a candidate species based on habitat constraints being met.
Ammobium craspedioides	Geographic limitation being south of Cowra.	The subject land is north of Cowra. The subject land was located with reference to Cowra in a GIS. As such, *Ammobium craspedioides* was removed from further consideration as a candidate species based on this geographic limitation not being met.
Androcalva procumbens (syn. *Commersonia procumbens*)	Habitat constraint being Pilliga sandstone.	The Gulgong 100K Rock Unit, Gilgandra 250K Rock Unit and Cobbora 100K Rock Unit layers were used in a GIS to identify areas of Pilliga Sandstone. Areas of Pilliga Sandstone were confirmed on site during the field surveys. The subject land contains areas of Pilliga Sandstone in the Kerrabee, Liverpool Range, and Pilliga IBRA subregions. The assessment of *Androcalva procumbens* was limited to areas of habitat on Pilliga Sandstone geology.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Eucalyptus camaldulensis population in the Hunter catchment	Habitat constraint of floodplains of watercourses, including rivers, creeks, intermittent streams or billabongs. Geographic limitation of Hunter catchment as per the Determination.	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. 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 Department of Planning and Environment, 2010) layer in a GIS. The *Eucalyptus camaldulensis* endangered population was only considered in areas within the Hunter River Catchment.
Lasiopetalum longistamineum	Species listed to have a habitat constraint being enriched alluvial gullies or with 200 m.	A GIS with topographic maps, aerial photographs, and geology mapping was used to locate areas of enriched alluvial gullies or areas within 200 m within the Kerrabee IBRA subregion (this species is limited to the Sydney Basin). These areas were confirmed on site during the field surveys. The subject land in the Kerrabee IBRA subregion does contain alluvium so the habitat constraint is considered to be met for this species.
Pomaderris cotoneaster	Geographic limitation being east of Tumut.	Note that this geographic constraint is currently in the BAM-C for this species. However, this species was recorded from Moolarben mine site in 2021 (see Niche Environment and Heritage, 2022). As such, this species was added for consideration in the Kerrabee IBRA subregion RNI1 Stage.
Prasophyllum petilum	Geographic limitation being east of Binalong, south and east of Boorowa (for Inland Slopes IBRA subregion).	The subject land is not east of Binalong, south and east of Boorowa. The geographic limitation set for this species is not met. This geographic limitation has likely arisen due to taxonomic uncertainty surrounding this species with some authorities believing *Prasophyllum petilum* to be restricted to the southern tablelands and western slopes of New South Wales and the Australian Capital Territory. The NSW Herbarium treats *Prasophyllum* sp. Wybong (C. Phelps ORG 5269) as a synonym of *Prasophyllum petilum* but this has not been accepted by the Australian Plant Census. While the geographic limitation is not met for this species it is retained as a candidate species for assessment as this species is not likely to be limited to the area east of Binalong, south and east of Boorowa.

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. Important Habitat Map covers parts of the subject land in the Kerrabee and Inland Slopes IBRA subregions. Excluded from areas outside of the Important Habitat Map. This species was therefore retained as a candidate species for Important Habitat Mapped areas only.
Sloane's Froglet *(Crinia sloanei)*	Habitat constraints being semi-permanent/ephemeral areas containing relatively shallow sections with submergent and emergent vegetation, or within 500 m of wet areas, swamps – within 500 m of swamps, and waterbodies – within 500 m of a waterbody.	Habitat constraints met. The subject land contains semi-permanent/ephemeral areas containing relatively shallow sections with submergent and emergent vegetation and waterbodies. This species was therefore retained as a candidate species based on habitat constraints being met.
Pink-tailed Legless Lizard *(Aprasia parapulchella)*	Habitat constraints being rocky areas or within 50 m of rocky areas.	Habitat constraints met. The subject land contains rocky areas. This species was therefore retained as a candidate species based on habitat constraints being met.
Pale-headed Snake (*Hoplocephalus bitorquatus*)	Habitat constraints being within 500 m of moderate to good vegetation.	Habitat constraints met. The subject land contains moderate to good vegetation. This species was therefore retained as a candidate species based on habitat constraints being met.
Broad-headed Snake (*Hoplocephalus bungaroides*)	Habitat constraints include rocky areas, including escarpments, outcrops and pagodas within the Sydney Sandstone geologies.	Habitat constraints met. The subject land contains rocky areas, including escarpments, outcrops and pagodas within the Sydney Sandstone geologies (Kerrabee IBRA subregion). This species was therefore retained in the Kerrabee IBRA subregion as a candidate species based on habitat constraints being met.
Bush Stone-curlew (*Burhinus grallarius*)	Habitat constraints being fallen/standing dead timber including logs.	Habitat constraints met. The subject land contains fallen/standing dead timber including logs. This species was therefore retained as a candidate species based on habitat constraints being met.
Gang-gang Cockatoo (*Callocephalon fimbriatum*) (Breeding)	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.	Habitat constraints met. 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 present in subject land. This species was therefore retained as a candidate species based on habitat constraints being met.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Glossy Black-Cockatoo (*Calyptorhynchus lathami*) (Breeding)	Habitat constraints being Hollow bearing trees and living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground.	Habitat constraints met. Hollow bearing trees and living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground present in subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Striped Legless Lizard (*Delma impar*)	Geographic constraint – South of the Mid-Western Highway (Inland Slopes IBRA subregion)	Geographic constraint not met. Excluded based on the subject land being north of the Mid-Western Highway. This species was therefore removed from further consideration as a candidate species based on this geographic limitation not being met.
White-bellied Sea Eagle (*Haliaeetus leucogaster*) (Breeding)	Habitat constraints being living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines.	Habitat constraints met. Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Little Eagle (*Hieraaetus morphnoides*) (Breeding)	Habitat constraints being nest trees – live (occasionally dead) large old trees within vegetation.	Habitat constraints met. Live (occasionally dead) large old trees within vegetation are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Swift Parrot (*Lathamus discolor*) (Breeding)	Habitat constraints being as per Important Habitat Map.	Habitat constraints not met. There is no mapped important habitat in the subject land. This species was therefore removed from further consideration as a candidate species based on no Important Habitat being present.
Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) (Breeding)	Habitat constraints being hollow bearing trees and living or dead tree with hollows greater than 10 cm diameter.	Habitat constraints met. Hollow bearing trees and living or dead tree with hollows greater than 10 cm diameter are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Square-tailed Kite (*Lophoictinia isura*) (Breeding)	Habitat constraints being nest trees.	Habitat constraints potentially met. This species was therefore retained as a candidate species based on habitat constraints being potentially met.
Barking Owl (*Ninox connivens*) (Breeding)	Habitat constraints include hollow bearing trees, living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	Habitat constraints met. Hollow bearing trees, living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.

Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Powerful Owl (*Ninox strenua*) (Breeding)	Habitat constraints include hollow bearing trees, living or dead trees with hollow greater than 20 cm diameter.	Habitat constraints met. Hollow bearing trees, living or dead trees with hollows greater than 20 cm diameter are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Superb Parrot (*Polytelis swainsonii*) (Breeding)	Habitat constraints being hollow bearing trees, living or dead *E. blakelyi*, *E. melliodora*, *E. albens*, *E. camaldulensis*, *E. microcarpa*, *E. polyanthemos*, *E. mannifera*, *E. intertexta* with hollows greater than 5 cm diameter greater than 4 m above ground or trees with a DBH of greater than 30 cm.	Habitat constraints met. Hollow bearing trees, including *E. blakelyi*, *E. melliodora*, *E. albens*, *E. camaldulensis,* and *E. microcarpa* with hollows greater than 5 cm diameter greater than 4m above ground or trees with a DBH of greater than 30cm are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Masked Owl (*Tyto novaehollandiae*) (Breeding)	Habitat constraints being hollow bearing trees, living or dead trees with hollows greater than 20 cm diameter.	Habitat constraints met. Hollow bearing trees, living or dead trees with hollows greater than 20 cm diameter are present in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Habitat constraints being cliffs or within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices or within two kilometres of old mines or tunnels.	Habitat constraints met. Sections of the subject land are within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices. This species was therefore retained as a candidate species based on habitat constraints being met.
Little Bent-winged Bat (*Miniopterus australis*)	Habitat constraints being caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding including species records in BioNet with microhabitat code ‘IC – in cave’; observation type code ‘E nest-roost’; with numbers of individuals >500; or from the scientific literature	Habitat constraints not met. The subject land itself does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding by this species. This species was therefore removed from further consideration as a candidate species based on absence of breeding habitat.

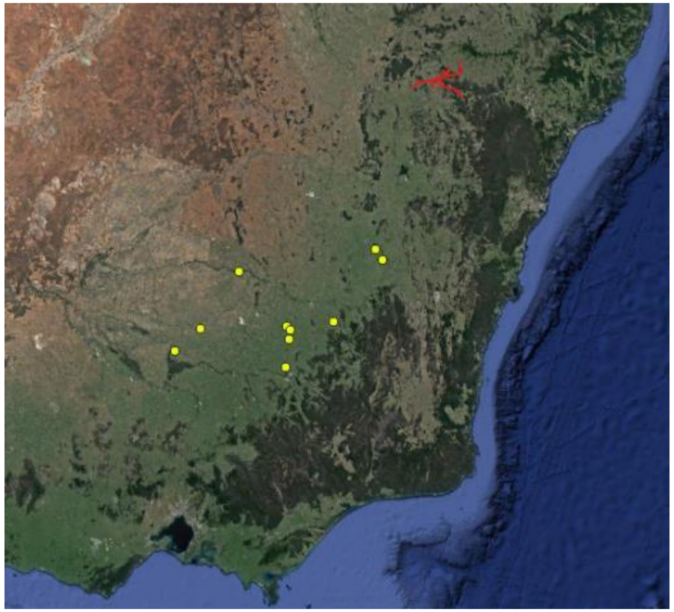
Species name	Geographic limitation/habitat constraint assessed	Presence in the subject land
Large Bent-winged Bat (*Miniopterus orianae oceanensis*)	Habitat constraints being caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	Habitat constraints not met. The subject land itself does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding by this species. This species was therefore removed from further consideration as a candidate species based on absence of breeding habitat.
Brush-tailed Rock Wallaby (*Petrogale penicillata*)	Habitat constraints being land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	Habitat constraints met. Sections of the subject land in the Kerrabee and Inland Slopes IBRA subregions are within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines. This species was therefore retained as a candidate species based on habitat constraints being met.
Koala (*Phascolarctos cinereus*)	Habitat constraints being Presence of koala use trees – refer to Survey Comments field in TBDC.	Habitat constraints met. Koala use trees are common in the subject land. This species was therefore retained as a candidate species based on habitat constraints being met.
Grey-headed Flying-fox (*Pteropus poliocephalus*) (Breeding)	Habitat constraints being breeding camps.	Habitat constraints not met. There are no known Grey-headed Flying-fox breeding camps in the subject land. This species was therefore removed from further consideration as a candidate species based on absence of breeding camps.
Golden Sun Moth (*Synemon plana*)	Habitat constraints being Wallaby grass (*Rytidosperma* sp.), Speargrass (*Austrostipa* sp.) or Chilean needlegrass (*Nassella neesiana*)). Geographic constraints being – South of Mid-Western Highway.	Habitat constraints met. The subject land contains large areas of paddocks with Wallaby grass (*Rytidosperma* sp.) and Speargrass (*Austrostipa* sp.). Species excluded as geographic constraints not met. The subject land is north of the Mid-Western Highway.
Eastern Cave Bat (*Vespadelus troughtoni*)	Habitat constraints being caves, or within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within 2 km of old mines, tunnels, old buildings or sheds.	Habitat constraints met. The subject land is within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles.

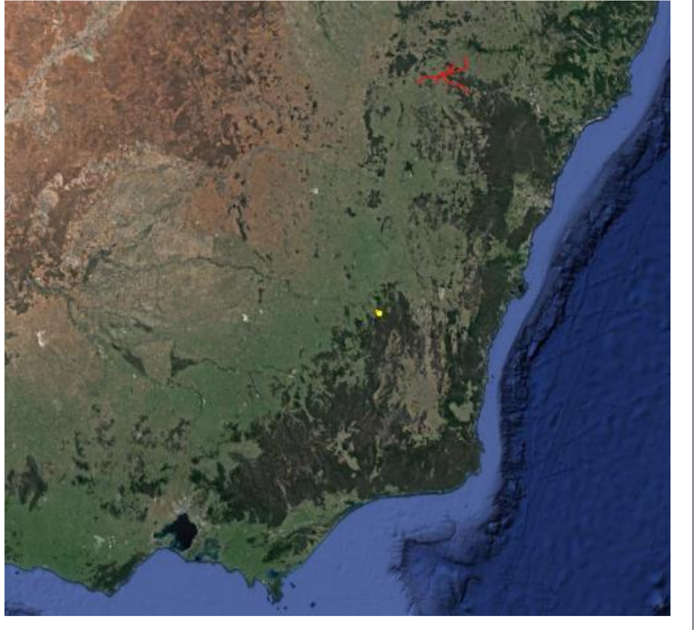
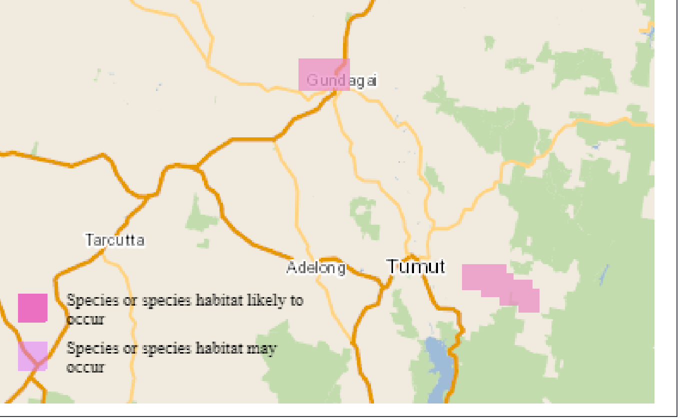
5.1.2 Vagrant species

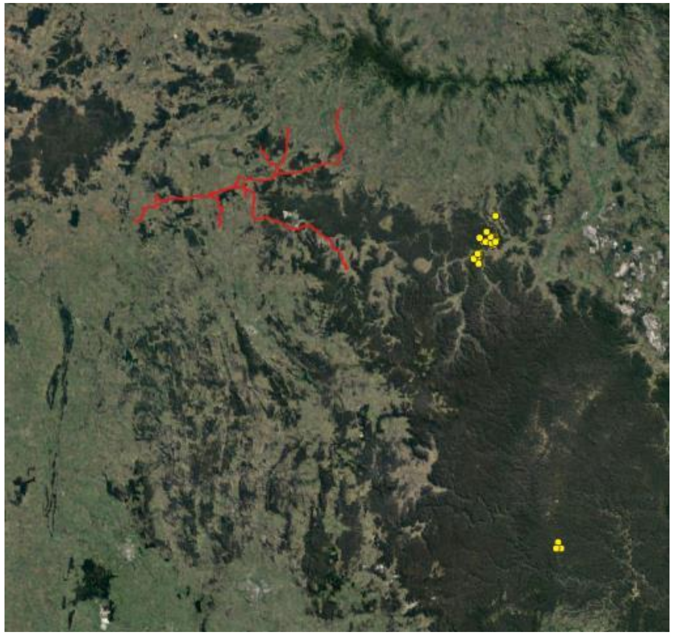
According to BAM Section 5.2.2(2c) an assessor may consider that a threatened species is unlikely to occur on the subject land or in a vegetation zone if the species is a vagrant in the IBRA subregion. No further assessment of the species is required in this case. As defined in the BAM, a vagrant species refers to occasional records of species in NSW that are outside their normal distribution or habitat.

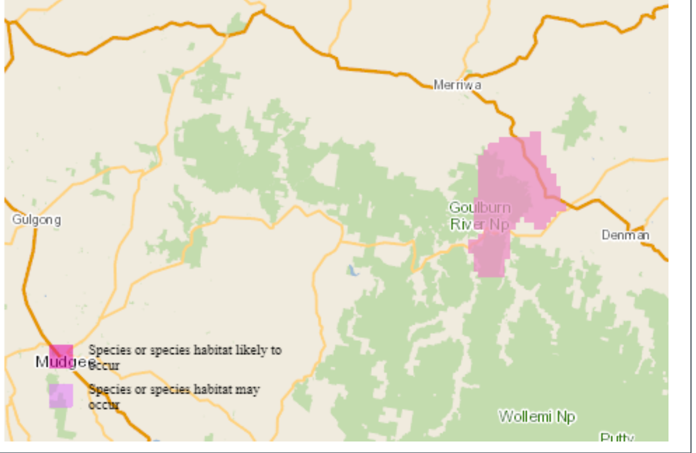
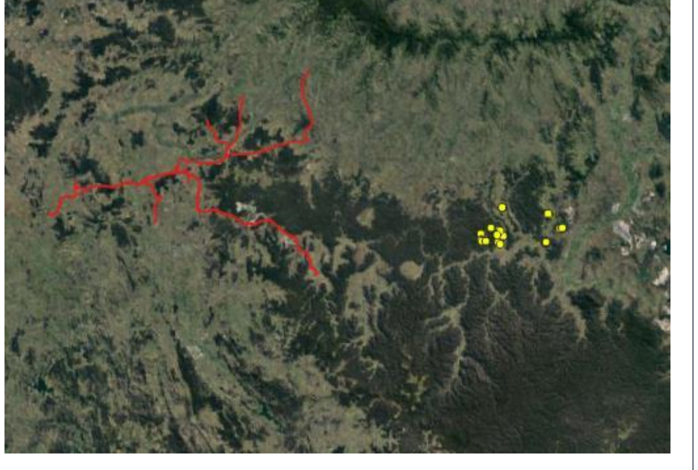
There were 11 threatened plant species and four threatened fauna returned as potential candidate species by the BAM-C that are considered to be vagrant species for the purposes of this assessment. The reasons for this assessment are outlined below in Table 5-3. This assessment has been made based on the latest scientific evidence provided in the TBDC, BioNet, and other databases including the Commonwealth Species Profile and Threats Database and Birdlife International.

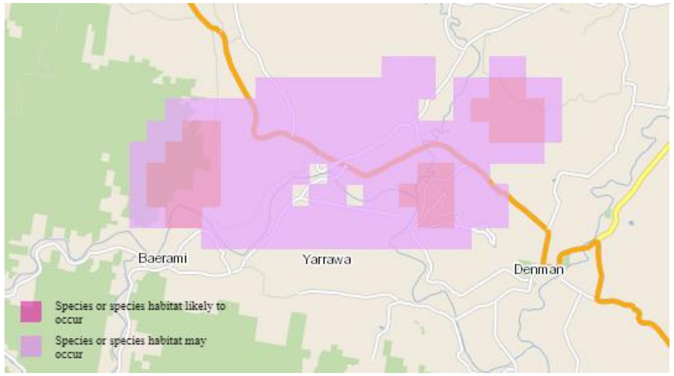
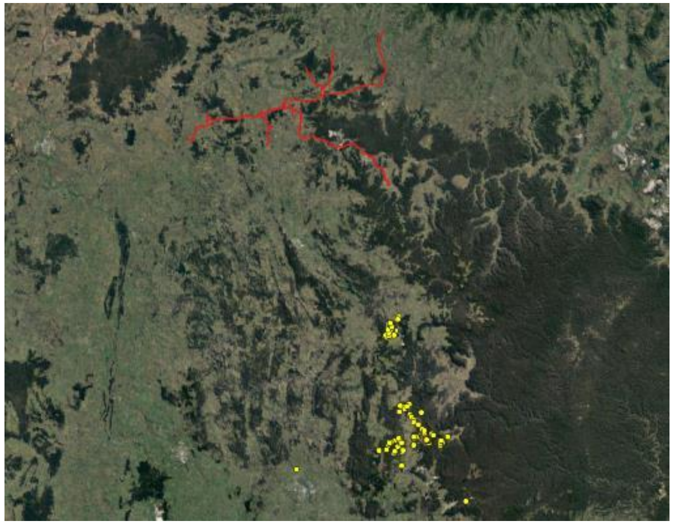
Table 5-3 Threatened species returned by the BAM-C considered to be vagrant

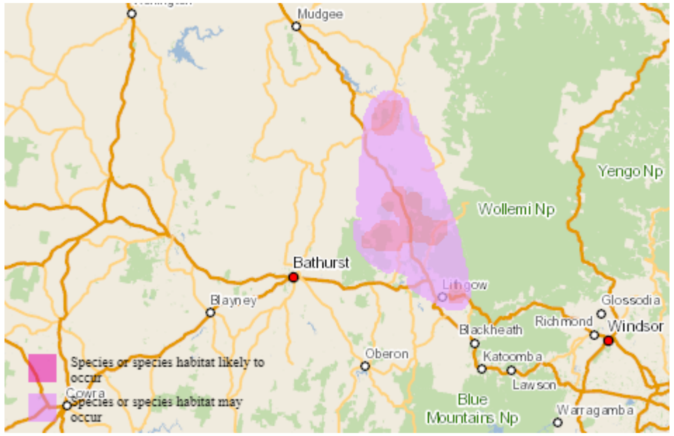
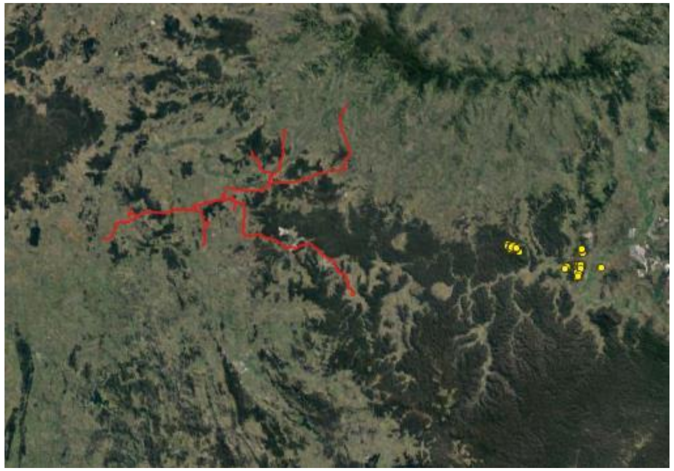
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Cullen parvum	In NSW *Cullen parvum* is found in the Riverina, NSW South Western Slopes and South Eastern Highlands IBRA regions (Threatened Species Scientific Committee, 2005). BIOCLIM modelling (map not available) has been used to estimate the potential distribution of *Cullen parvum*. The resulting distribution was used as a surrogate for the species' extent of occurrence as the modelled distribution closely aligns with recent known locations of the species (Threatened Species Scientific Committee, 2005). *Cullen parvum* is known to be associated with PCT 277. However, the nearest records of *Cullen parvum* to the subject land are from Galong and Barwang southeast of Young approximately 260 km to the southwest of the subject land (see adjacent map). This species has not been recorded in the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Cullen parvum*.	

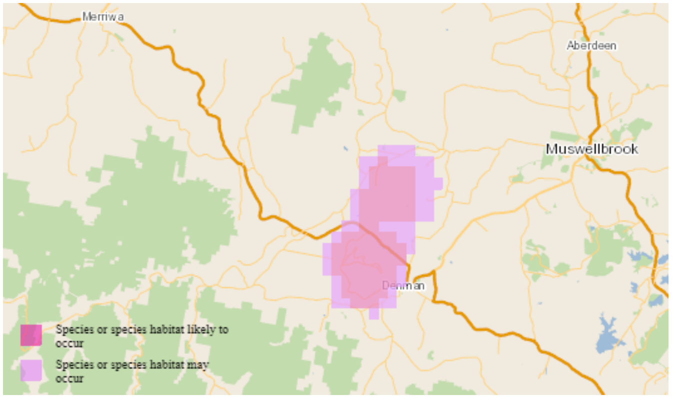
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Grevillea wilkinsonii	*Grevillea wilkinsonii* occurs primarily in southeast NSW where it is restricted to a 20 km stretch of the Goobarragandra River, 18 km southeast of Tumut (Briggs & Wright 1998; Makinson, 1993, Makinson, 2000). The species appears to be a narrow range endemic. *Grevillea wilkinsonii* is known to be associated with PCT 277. However, the only records of *Grevillea wilkinsonii* are from east of Tumut, approximately 350 km to the southwest of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Grevillea wilkinsonii* with the only identified potential habitat areas being the 20 km stretch of the Goobarragandra River, 18 km southeast of Tumut and a small area at Gundagai (see Department of the Environment, 2023a and adjacent map). This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Grevillea wilkinsonii*.	 

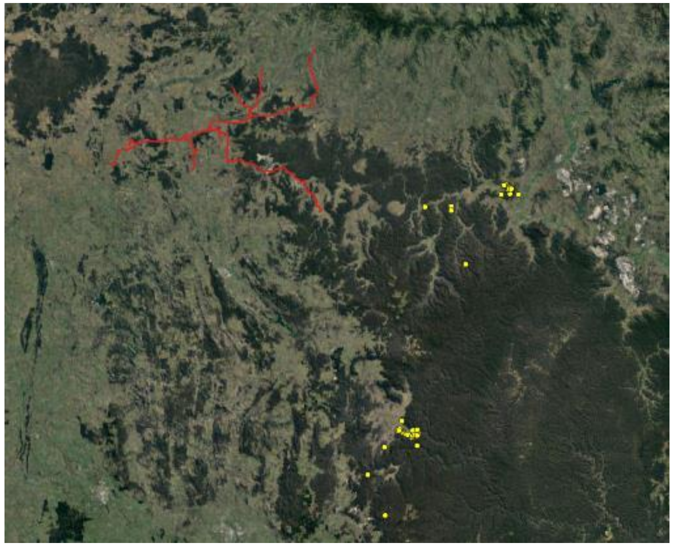
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Kennedia retrorsa	*Kennedia retrorsa* is believed to be restricted to the Mount Dangar area and the adjacent Goulburn River Valley near Putty, NSW (Department of the Environment, Water, Heritage and the Arts, 2008a). The species appears to be a narrow range endemic. The only records of *Kennedia retrorsa* are from the Mount Dangar area and the adjacent Goulburn River Valley, approximately 43 km to the east of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Kennedia retrorsa* with the only identified potential habitat areas being the Mount Dangar area and the adjacent Goulburn River Valley (see Department of the Environment and Heritage (2006b) and adjacent map). One PCT mapped by the SVTM, and present in the subject land at Moolarben, is listed as associated with *Kennedia retrorsa* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date, but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be in the usual distribution of habitat of *Kennedia retrorsa*.	

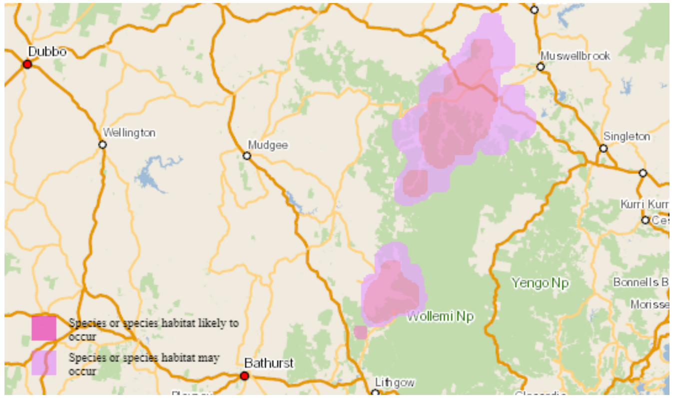
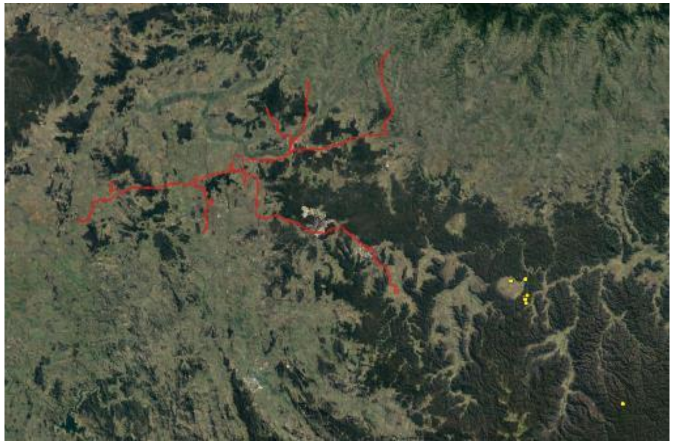
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
		
Lasiopetalum longistamineum	*Lasiopetalum longistamineum* is restricted to Gungal–Mt Dangar area between Merriwa and Muswellbrook (Department of the Environment, Water, Heritage and the Arts, 2008b). The species appears to be a narrow range endemic. The only records of *Lasiopetalum longistamineum* are from the Gungal–Mt Dangar area approximately 46 km to the east of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Lasiopetalum longistamineum* with the only identified potential habitat areas located in the Gungal–Mt Dangar area (see Department of the Environment (2023b) and adjacent map). One PCT mapped by the SVTM as present in the subject land at Moolarben is listed as being associated with *Lasiopetalum longistamineum* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date, but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality.	

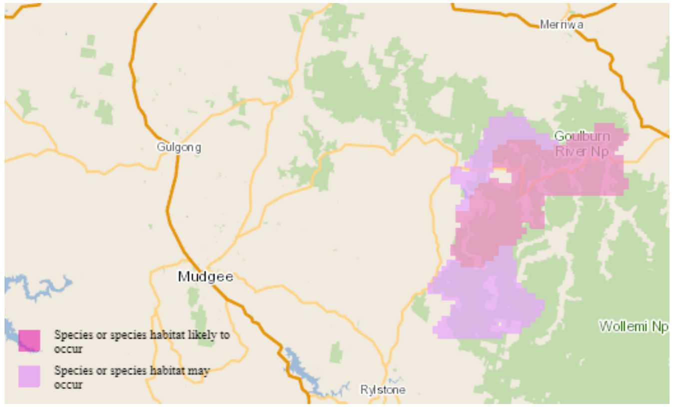
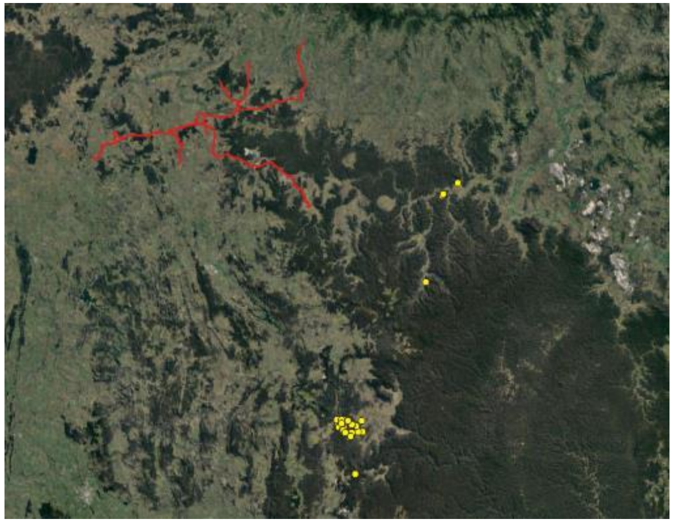
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Lasiopetalum longistamineum*.	
Persoonia marginata	*Persoonia marginata* is known from the central tablelands and central coast of NSW with the core of its distribution within Clandulla State Forest, west of Kandos. Within this distribution, there are disjunct populations; to the north at Dingo Creek and Mount Dangar within the Wollemi and Goulburn River National Parks; to the south within Ben Bullen State Forest, southeast of Capertee; and to the southeast at Devils Hole within Parr State Recreation Area, north of Colo Heights (Department of the Environment, Water, Heritage and the Arts, 2008c). *Persoonia marginata* is known to be found in PCT 477 and PCT 479. However, the nearest records of *Persoonia marginata* to the subject land are from the Kandos area approximately 48 km to the south of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Persoonia marginata* with the only identified potential habitat areas being the Gungal–Mt Dangar area (see Department of the Environment (2023c) and adjacent map). This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Persoonia marginata*.	

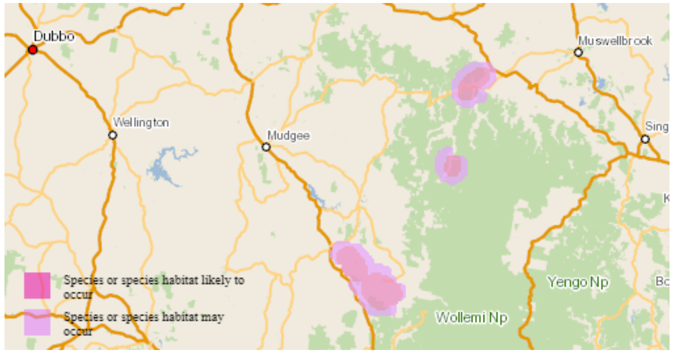
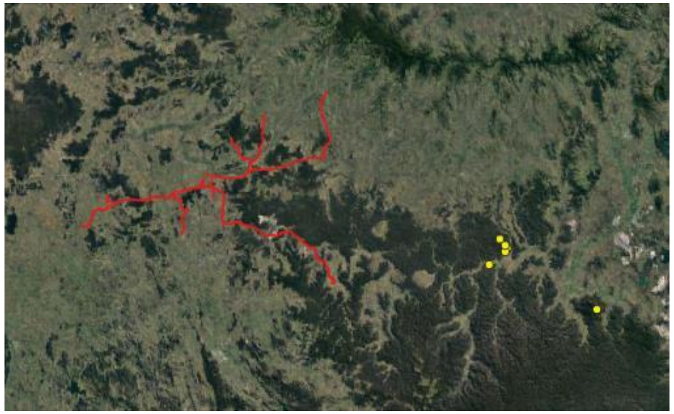
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
		
Pomaderris reperta	*Pomaderris reperta* is endemic to the Wybong Uplands and has been recorded from a small number of sites along a single ridgeline near Denman in the upper Hunter Valley (Muswellbrook local government area) (Department of the Environment, 2023d). The species appears to be a narrow range endemic (see Bell, 2001). The nearest records of *Pomaderris reperta* to the subject land are from Scrub Forty Creek in the Goulburn River National Park approximately 47 km to the east of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Pomaderris reperta*. The only identified potential habitat area was located around Denman (see Department of the Environment (2023c) and adjacent map). This model does not appear to consider the records from Goulburn River National Park from 2019 but gives an approximation of likely habitat distribution. One PCT mapped by the SVTM that is present in the subject land at Moolarben, is listed as associated with *Pomaderris reperta* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation.	

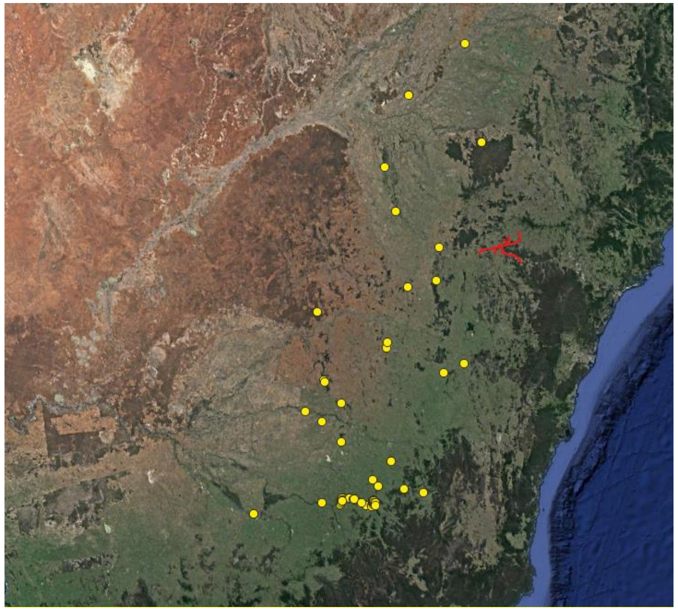
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Pomaderris reperta*.	
Pomaderris sericea	Only three subpopulations of *Pomaderris sericea* are known, although the species has not been seen at any of these since 1997 and it is not known if it is still extant at these localities (Department of Agriculture, Water and the Environment, 2021a). *Pomaderris sericea* was considered by Silcock *et al*. (2020) as possibly extinct. Records occur in the following localities (Carter & Walsh, 2010): — Coopracambra National Park, Victoria. Fewer than 20 plants. Last observed in 1987 — Morton National Park, New South Wales. Population size unknown. Last observed in 1987 — Wollemi National Park, New South Wales. Population size unknown. Last observed in 1997. The nearest records of *Pomaderris sericea* to the subject land are from Wollemi National Park approximately 24 km to the southeast of the subject land (see adjacent maps). BIOCLIM modelling has been used to estimate the potential distribution of *Pomaderris sericea* with the only identified potential habitat within the locality of the subject land being Wollemi National Park (see Department of the Environment and Heritage (2006c) and adjacent map). There are no known PCTs with which this species is associated present in the subject land.	

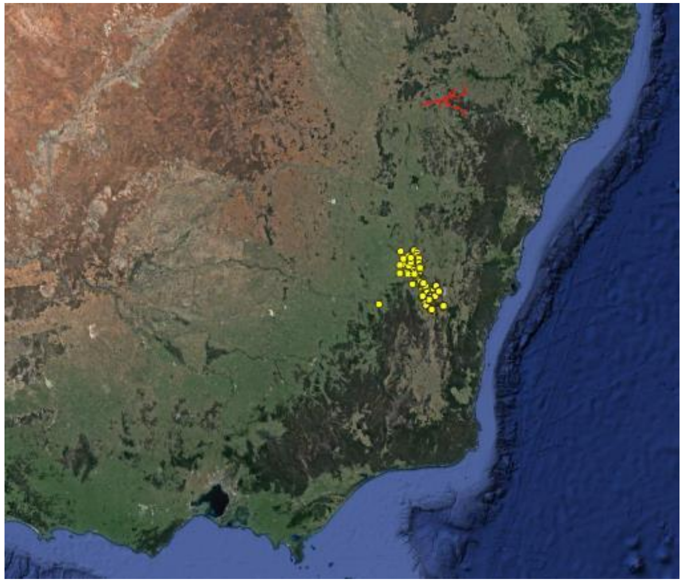
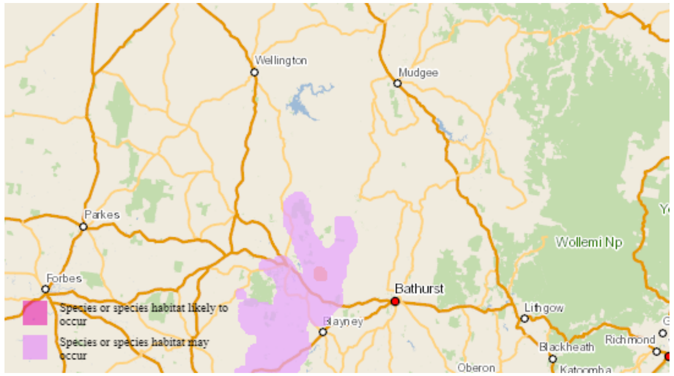
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Pomaderris sericea.*	
Prostanthera cryptandroides subsp. *cryptandroides*	*Prostanthera cryptandroides* subsp. *cryptandroides* is known to occur from Glen Davis to Capertee, extending to the Goulburn River valley, NSW around Denman (Department of the Environment, Water, Heritage and the Arts, 2008d). The nearest records of *Prostanthera cryptandroides* subsp. *cryptandroides* to the subject land are from Kerrabee approximately 35 km to the east of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Prostanthera cryptandroides* subsp. *cryptandroides*. The only identified potential habitat within the locality of the subject land was located to the east from Nullo Mountain north to Owens Gap (see Department of the Environment, 2023e and adjacent map). According to the TBDC, at Glen Davis *Prostanthera cryptandroides* subsp. *cryptandroides* grows in occurs in open forest dominated by *Eucalyptus fibrosa*. In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities. Associated communities include Narrabeen Rocky Heath, Narrabeen Acacia Woodland, Narrabeen Exposed Woodland; Open Heath of *Calytrix tetragona*, *Leptospermum parviflorum* and *Isopogon dawsonii*; and Open Scrubland of *Eucalyptus dwyeri*, *Baeckea densifolia*, *Dillwynia floribunda*, *Aotus ericoides* and *Hemigenia cuneifolia*.	

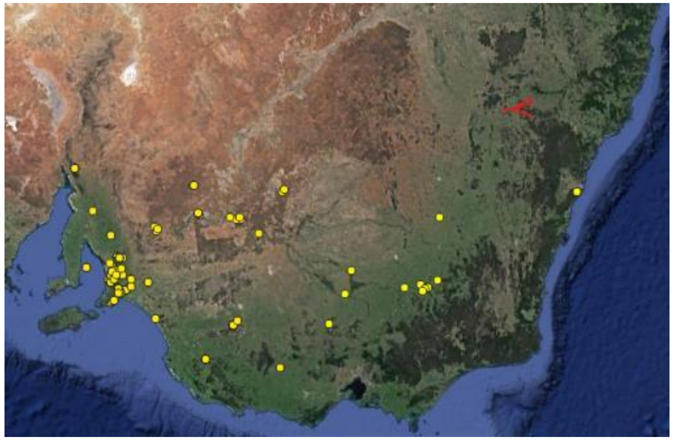
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	One PCT mapped by the SVTM that is also present in the subject land at Moolarben is listed as associated with *Prostanthera discolor* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the normal distribution of habitat of *Prostanthera cryptandroides* subsp. *cryptandroides.*	
Prostanthera discolor	*Prostanthera discolor* is known to occur in the NSW Central Western Slopes and in the Sandy Hollow–Merriwa district at localities including Cox's Gap, Bylong Valley, Baerami and Murrumbo (Department of the Environment, Water, Heritage and the Arts, 2008e). According to the TBDC, *Prostanthera discolor* is restricted to only two known localities in Bylong Valley, with a potential distribution in the Baerami Valley within the Mid-Western Regional local and Muswellbrook local government areas. The nearest records of *Prostanthera discolor* to the subject land are from Coxs Gap approximately 26 km to the east of the subject land (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Prostanthera discolor* with the only identified potential habitat within the locality of the subject land being to the east from Nullo Mountain north to Baerami (see Department of the Environment, 2023f and adjacent map).	

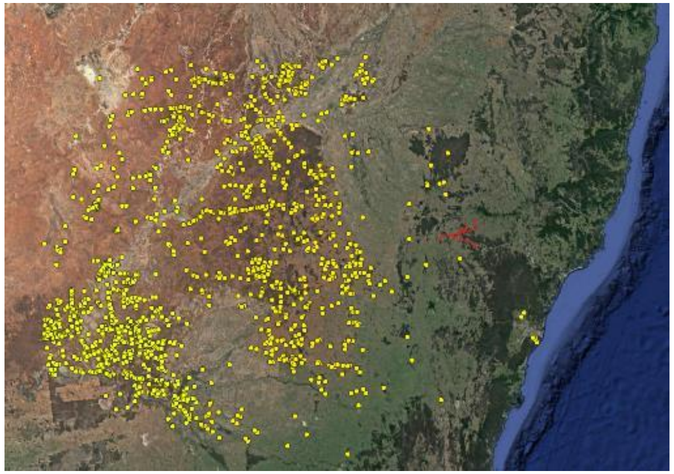
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	According to the TBDC, *Prostanthera discolor* grows in dry sclerophyll forest in the side gullies of main creek lines, often on rocky or well-drained alluvial substrates. The TBDC provides no further information and does not provide any detailed information on habitat types apart from some broad PCT associations. One PCT mapped by the SVTM as present in the subject land at Moolarben is listed as associated with *Prostanthera discolor* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Prostanthera discolor*.	
Prostanthera stricta	*Prostanthera stricta* is known from the NSW Central Tablelands and Central Western Slopes. *Prostanthera stricta* s. str. is known from Mount Vincent and Genowlan Mountain and *Prostanthera* aff. stricta is known from Dingo Creek and the Widden and Baerami Valleys (Department of the Environment, Water, Heritage and the Arts, 2008f). The nearest records of *Prostanthera stricta* to the subject land are 45 km to the east of the subject land at Hope Hill (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of *Prostanthera stricta* with the only identified potential habitat within the locality of the subject land being restricted to small areas around Baerami and Widden (see Department of the Environment, 2023g and adjacent map) noting that these plants are *Prostanthera* aff. stricta. According to the TBDC *Prostanthera stricta* is often a locally dominant undershrub in heath or scrub communities along cliff edges, or as an understorey species within a range of open forest or tall open forest types, or in adjacent transitional communities. Associated vegetation includes *Eucalyptus blaxlandii, Eucalyptus cannonii* and *Eucalyptus viminalis* with *Acacia implexa* and *Goodenia ovata*. Other associated species recorded at sites include Ang*ophora floribunda, Eucalyptus punctata, Brachychiton populneus, Acacia parvipinnula, Beyeria viscosa, Microlaena stipoides* and *Cheilanthes* species. Vegetation associated with	

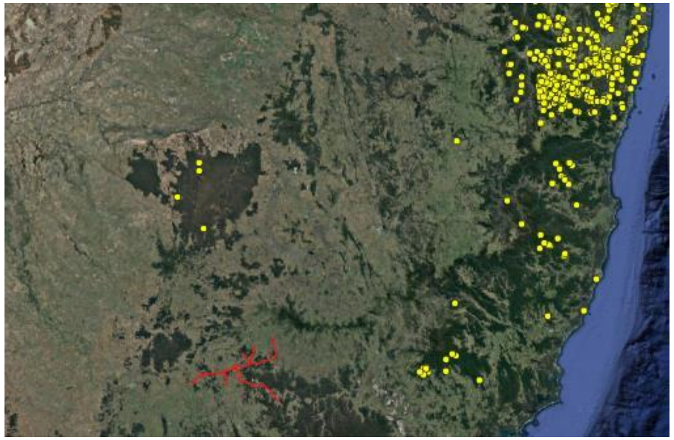
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
	Prostanthera aff. stricta includes *Eucalyptus caleyi, Eucalyptus punctata, Eucalyptus sideroxylon, Eucalyptus tereticornis, Eucalyptus fibrosa, Angophora floribunda, Backhousia myrtifolia, Cryptandra buxifolia, Isopogon dawsonii, Leucopogon muticus, Allocasuarina torulosa, Macrozamia communis, Acacia caesiella* and *Callistemon salignus*. The subject land does not contain any vegetation types that match the description of the habitat of *Prostanthera stricta* or *Prostanthera* aff. stricta. One PCT mapped by the SVTM that is present in the subject land at Moolarben is listed as associated with *Prostanthera stricta* (PCT 1674). Surveys have not been able to be conducted on Moolarben land to date but the mapping of PCT 1674 is considered likely to be erroneous based on verification of nearby vegetation. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Prostanthera stricta.*	
Senecio linearifolius var. *dangarensis*	According to the TBDC, *Senecio linearifolius* var. *dangarensis* is restricted to a single known population in the Goulburn River National Park. This species grows on an open scree slope and in woodland and rainforest communities on basalt. The population is estimated to contain 500–1000 individuals over an area of 20 hectares. The nearest records of *Senecio linearifolius* var. *dangarensis* to the subject land are 50 km to the east of the subject land at Mt Dangar (see adjacent map). This species is known to be restricted to the tertiary basalts (olivine basalt and dolerite) of Mt Dangar. There are no similar habitats present in the Kerrabee IBRA subregion within the subject land. The specific area of habitat is mapped by the SVTM as Mount Dangar Wattle Scrub and Hunter-Peel Ranges Dry Rainforest. These PCTs do not occur in the subject land. This species has not been recorded within the 170 BAM plots undertaken to date for this BDAR, or in the plots undertaken for other BDARs in the broader locality. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of *Senecio linearifolius* var. *dangarensis.*	

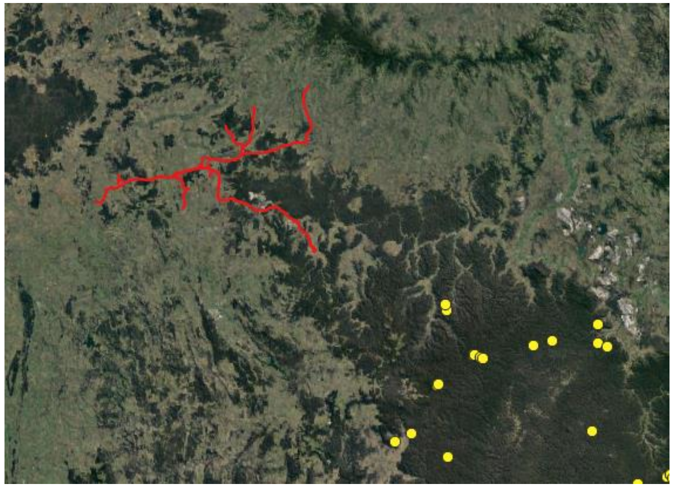
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Sloane's Froglet	According to the conservation advice for Sloane's Froglet, the species is endemic to the Murray-Darling Basin, where it has been recorded at widely scattered locations in north central Victoria and central western New South Wales from the Victorian to the Queensland border. Nearly three quarters of the records are from the Riverina Bioregion which straddles southern New South Wales and Central Victoria, with a further 18 percent of records within the NSW South Western Slopes. Records for Sloane's Froglet north of Dubbo in New South Wales are likely to be misidentification of other *Crinia* species. Based on available evidence, the subject land is not considered to be within the usual distribution of habitat of Sloane's Froglet (Threatened Species Scientific Committee (2019). Conservation Advice *Crinia sloanei* (Sloane's Froglet). Canberra: Department of the Environment and Energy). BIOCLIM modelling has been used to estimate the potential distribution of Sloane's Froglet with potential habitat mapped to the west in between Narromine and Dubbo which is approximately 70 km west of the subject land (see Department of the Environment, 2023h and adjacent map).	 

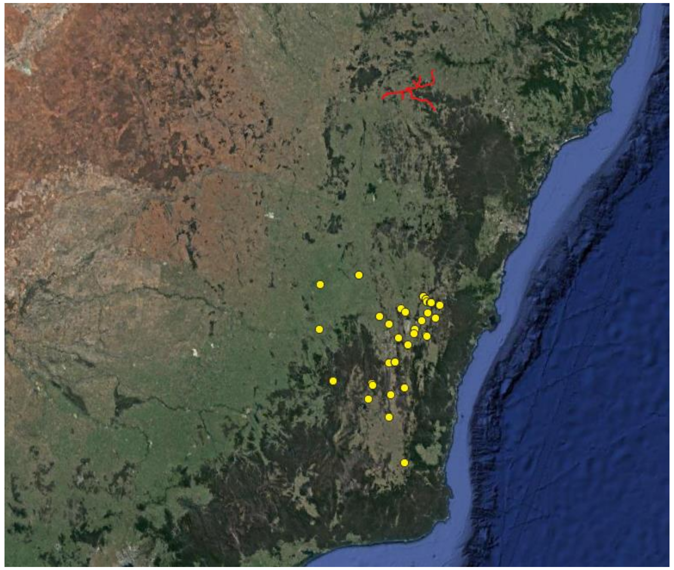
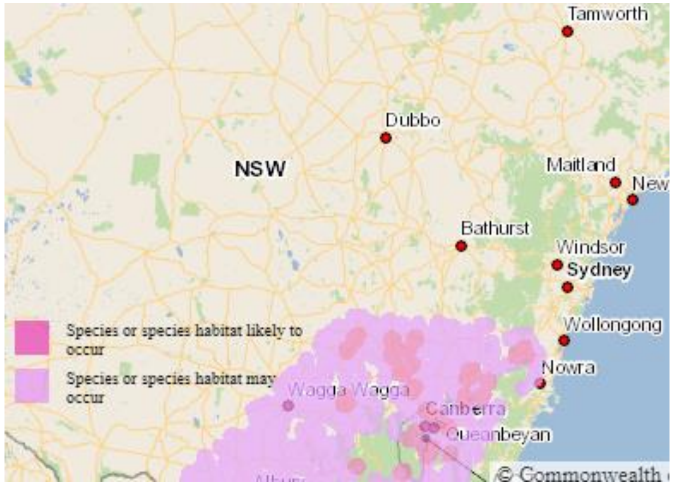
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Golden Sun Moth	According to the TBDC, the Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species' historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia (Department of Agriculture, Water and the Environment, 2021b). The Golden Sun Moth was never known to occur near the subject land. The nearest records of Golden Sun Moth to the subject land are approximately 245 km to the south of the subject land near Boorowal (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of Golden Sun Moth with potential habitat mapped north to Mullions Range State Forest east of Molong which is approximately 98 km south of the subject land (see Department of the Environment, 2023h and adjacent map). Based on available evidence, the subject land is not considered to be in the normal distribution of habitat of Golden Sun Moth.	 

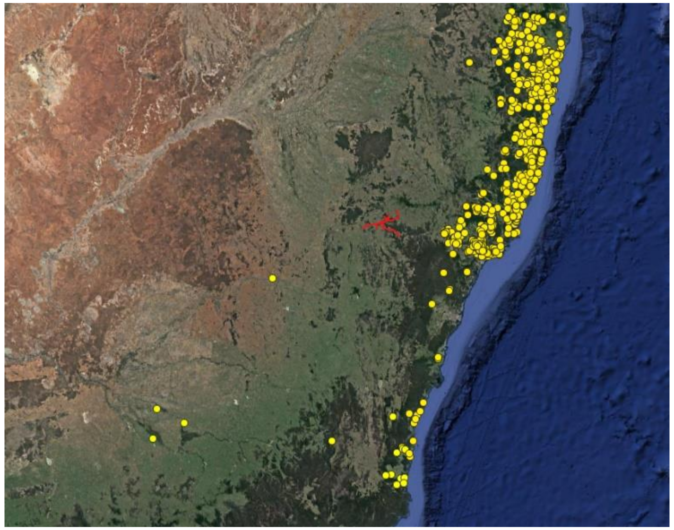
Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Purple-crowned Lorikeet	According to the TBDC, the Purple-crowned Lorikeet is uncommon in NSW, with records scattered across the box-ironbark woodlands of the Riverina and south west slopes, the River Red Gum forests and mallee of the Murray Valley as far west as the South Australian border, and, more rarely, the forests of the South Coast. The distribution map published by BirdLife International (2023a) shows the ‘native resident’ range for Purple-crowned Lorikeet (see adjacent map) with the eastern extent of this species cutting off around Wangaratta in Victoria and the NSW distribution of this species being restricted to the Murray Darling Depression and Riverina IBRA regions with records also from the NSW South Western Slopes (Inland Slopes) subregion around Albury. Based on available evidence, the subject land is not considered to be within the usual distribution of Purple-crowned Lorikeet. It is likely that the only Purple-crowned Lorikeets that would use the subject land would be vagrant birds or aviary escapees.	 

Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Major Mitchells Cockatoo	According to the TBDC, Major Mitchells Cockatoo is a species of the arid and semi-arid inland IBRA regions, for example the Murray Darling Depression, Darling Riverine Plains, Mulga lands, Cobar Peneplain, Lachlan Plains, and South Western Slopes (Lower Slopes) subregion. There are few scattered records of this species from the Brigalow Belt South (Pilliga) subregion and NSW South Western Slopes (Inland Slopes) subregion but these birds are an exception to the normal distribution of the species. The distribution map published by BirdLife International (2023b) shows the 'native resident' range for Major Mitchells Cockatoo (see adjacent map) with the eastern extent of this species cutting off around Orange and west of Dubbo. There is one isolated record in Mudgee from 2007. This is the nearest record to the subject land. Given the large size and conspicuous nature of this species it is likely there would be more records if the species if it were resident. Based on available evidence, the subject land is not considered to be within the usual distribution of Major Mitchells Cockatoo. It is likely that the only Major Mitchells Cockatoos that would use the subject land would be vagrant birds or aviary escapees.	 

Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Rufous Bettong	According to the TBDC, Rufous Bettong originally ranged from Coen in north Queensland to central Victoria. The current range of Rufous Bettong has been reduced to a patchy distribution from Cooktown in Queensland to north-eastern NSW as far south as Mount Royal National Park. In NSW it has largely vanished from inland areas but there are sporadic, unconfirmed records from the Pilliga and Torrington districts. The nearest records of Rufous bettong to the subject land are approximately 122 km to the north from the Pilliga area (a 2014 record from Dandry Road Coonabarabran) and approximately 126 km to the east from Mount Royal National Park (a trapping record off Cedar Rd from 2004). Other records from the Pilliga area exist including a 2008 record from Cumbil Road Central Pilliga, a 2018 record from Schwaggers Bore Road, between Pilliga SCA and Schwaggers Bore in Pilliga East State Forest, and an older 1993/1994 record from Pilliga East State Forest (see adjacent map). These data suggests extant populations of Rufous Bettong are present in these areas. Based on available evidence, the subject land is not considered to be within the current distribution of habitat of Rufous Bettong.	

Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Giant Burrowing Frog	According to TBDC the Giant Burrowing Frog is confined to the eastern slopes of the Great Dividing Range and coastal regions from near Mt Coridudgy and Kings Cross in Wollemi National Park, New South Wales (NSW NPWS 2001b; Penman et al. 2005). Only two species records are present within a 50km radius of the subject land within the Kerrabee Subregion. Both records present on BioNet (2023), and Atlas of Living Australia (2023) occur approximately 49km to the south-east of the subject land, just south of Baerami Creek. The remaining records for this species are confined to or occur south of the Sydney Basin. Based on available evidence, the subject land is not considered to be in the normal distribution of habitat of Giant Burrowing Frog (Giant Burrowing Frog, Department of the Environment and Energy 2023). BIOCLIM modelling has been used to estimate the potential distribution of Giant Burrowing Frog. The "Species or species habitat may occur" does not reach the alignment but has been mapped to the east and incorporates the south-eastern portion of Munghorn Gap Nature Reserve. (See Department of the Environment, 2023h and adjacent map).	 

Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Key's Matchstick Grasshopper	The current geographic distribution of Key's Matchstick Grasshopper is inferred to be highly restricted, based on all records available in the period 2009-2019, and recent survey efforts (Kearney and Hoffman 2019). According to the TBDC the Key's Matchstick Grasshopper historical distribution extended from Orange, NSW south to Victoria, predominantly occurring across the wheat belt (Kearney and Hoffman 2019). The Key's Matchstick Grasshopper was never known to occur near the subject land. The nearest records of Key's Matchstick Grasshopper to the subject land are approximately 250 km to the south of the subject land within Boorowa Redhill Environmental Reserve (see adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of Key's Matchstick Grasshopper with potential habitat mapped just north of north Young NSW which is approximately 250 km south of the subject land (see Department of the Environment, 2023h and adjacent map). BIOCLIM modelling has been used to estimate the potential distribution of Key's Matchstick Grasshopper. The "Species or species habitat may occur" does not reach our alignment but has been mapped to the east and incorporates the south-eastern portion of Munghorn Gap Nature Reserve. (See Department of the Environment, 2023h and adjacent map). Based on available evidence, the subject land is not considered to be in the usual distribution of habitat of Key's Matchstick Grasshopper.	 

Species name	Reason for vagrant determination	Mapped distribution/records of the species (yellow dots) in the context of the subject land (shown in red) (Source BioNet)
Brush-tailed Phascogale	Based on records from BioNet (2023), Atlas of living Australia (2023) and the SOS program (NSW Environment, Energy and Science, n.d.) the current geographic distribution of Brush-Tailed Phascogale is predominantly on the coast' east of the Great Dividing Range. The species is also excluded from the Liverpool Range and the northern extent of the Inland Slopes as the habitat constraint is not met "North of Hwy from Ulan to Gulgong, North of Hwy East from Gulgong to Wellington, N/NW of highway from Wellington to Molong, W/NW of Hwy from Molong to Forbes". The closest records push into the upper Hunter Valley approximately 90 km to the east of the subject land. Most of these records are situated around Ravensworth, between Muswellbrook and Singleton (refer adjacent figure). No records of Brush-tailed Phascogale exist within 50km of the subject land. However, one preserved specimen has been collected from inland in 1788 from the Condobolin area (Atlas of living Australia, 2023), and currently exists in the South Australian Museum, Adelaide (Catalog number SAM02243). The species has not since been recorded within the locality and the population is assumed no longer extant. Extensive and exhaustive targeted surveys were undertaken within the Inland Slopes Kerrabee and Subregions. However, this species was not recorded (refer to Section 5.3 Threatened species surveys).	

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.

Table 5-4 Predicted ecosystem credit species within the subject land

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Regent Honeyeater (foraging)	*Anthochaera phrygia*	CE	CE; M	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks any mid-storey to canopy vegetation and favoured feed trees	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	Moderate
Gang-gang Cockatoo (foraging)	*Callocephalon fimbriatum*	V	E	✓	✓	-	-	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	Moderate
Glossy Black-Cockatoo (foraging)	*Calyptorhynchus lathami*	V	V	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks presence of Allocasuarina and Casuarina species	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Little Pied Bat	*Chalinolobus picatus*	V	-	✓	-	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	High
Speckled Warbler	*Chthonicola sagittata*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks any mid-storey to canopy vegetation which provide suitable foraging habitat and connectivity.	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Spotted Harrier	*Circus assimilis*	V	-	✓	✓	✓	✓	✓		☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	Moderate

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	High
Varied Sittella	*Daphoenositta chrysoptera*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	✓	✓	✓	✓	✓		☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	High
Black Falcon	*Falco subniger*	V	-	✓	✓	✓	✓	-	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	Moderate
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	✓	✓	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones in all PCT's	High
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	V	-	✓	-	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The species has been excluded as it is most likely a vagrant to the subject land. The core distribution of the species incorporates the southern parts of the continent from Victoria to south-western Western Australia. Records from NSW are rare and infrequent. An unconfirmed record from 2012 is present on Atlas of living Australia in the township of Lue approximately 30 km to the south of the subject land. Based on the species distribution this record is most likely a vagrant to the locality.	N/A	High

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Little Lorikeet	*Glossopsitta pusilla*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks any mid-storey to canopy vegetation and favoured feed trees	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Painted Honeyeater	*Grantiella picta*	V	V	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only. Habitat constraint of mistletoes present at a density of greater than five per hectare not met within DNG	The species has been retained in all applicable vegetation zones and PCT's except for DNG	Moderate
White-bellied Sea-eagle (foraging)	*Haliaeetus leucogaster*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Little Eagle (foraging)	*Hieraaetus morphnoides*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
White-throated Needletail	*Hirundapus caudacutus*	-	V	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Swift Parrot (foraging)	*Lathamus discolor*	E	CE; M	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Malleefowl	*Leipoa ocellata*	E	V	-	-	-	-	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	V	E	✓	-	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The species has been excluded as it is most likely a vagrant to the subject land. The core distribution of the species in eastern Australia incorporates the arid and semi-arid inland, from south-western Queensland south to north-west Victoria. In NSW they are found regularly as far east as Bourke and Griffith with some infrequent records further east. A confirmed record is present on BioNet in the township of Mudgee approximately 45 km to the south of the subject land. Based on the species core distribution this record is most likely a vagrant to the locality.	N/A	Moderate
Square-tailed Kite	*Lophoictinia isura*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	V	E	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Large Bent-winged Bat (foraging)	*Miniopterus orianae oceanensis*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Turquoise Parrot	*Neophema pulchella*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Barking Owl (foraging)	*Ninox connivens*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Powerful Owl (foraging)	*Ninox strenua*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks any mid-storey to canopy vegetation suitable for hosting favoured pretty items such as Greater Glider, Common Ringtail Possum and Sugar Glider.	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Corben's Long-eared Bat	*Nyctophilus corbeni*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Gilbert's Whistler	*Pachycephala inornata*	V	-	✓	-	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only. Species requires dense shrub layer which is not present in DNG and is therefore excluded from this vegetation zone.	The species has been retained in all applicable vegetation zones and PCT's except for DNG	Moderate
Yellow-bellied Glider	*Petaurus australis*	V	V	✓	✓	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Scarlet Robin	*Petroica boodang*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Flame Robin	*Petroica phoenicea*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Superb Parrot	*Polytelis swainsonii*	V	V	✓	-	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate

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	Sensitivity to gain class
		BC Act	EPBC Act	IS	KER	LR	PIL	TV						
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	✓	✓	-	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species excluded from Inland Slopes due to geographic limitation, 'occurring north of Canowindra and west of Cumnock'.	The species has been retained in all applicable vegetation zones and PCT's but excluded from Inland Slopes subregion	High
Grey-headed Flying-fox (foraging)	*Pteropus poliocephalus*	V	V	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	The species has been excluded from DNG only as it lacks any mid-storey to canopy vegetation ruling out suitable foraging habitat.	The species has been retained in all applicable vegetation zones and PCT's except for DNG	High
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	-	✓	-	-	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Diamond Firetail	*Stagonopleura guttata*	V	V	✓	✓	✓	✓	✓	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	Moderate
Masked Owl (foraging)	*Tyto novaehollandiae*	V	-	✓	✓	✓	✓	✓	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained	The species has been retained in all applicable vegetation zones and PCT's	High
Rosenberg's Goanna	*Varanus rosenbergi*	V	-	✓	✓	✓	✓	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species excluded from the Inland Slopes Subregion based on geographic limitation, 'occurring south-east of a line that runs between Tarcutta and Galong'.	The species has been retained in all applicable vegetation zones and PCT's excluding the Inland Slopes Subregion.	High

5.1.4 Species credit species

Table 5-5 and 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.

Table 5-5 Predicted flora species credit species within the subject land

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Acacia ausfeldii	Ausfeld's Wattle	V	–	No	✓	✓	–	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. See Figure 14-13 for species and assumed species polygons. See Section 5.2.1 for a detailed discussion of this species in the subject land.	Species associated with PCT 266, 277, 281, 461, 1610, 1674 & 1696 according to the TBDC. Species recorded in PCT 281, 461, 479, 481 & 1610. Assumed species polygons created for areas lacking survey effort in PCT 266, 277, 281, 1610 & 1674 in the Inland Slopes and Kerrabee IBRA subregions. See Figure 14-13 for species and assumed species polygons.
Acacia pendula – endangered population	Acacia pendula population in the Hunter catchment	E	–	Yes	–	✓	–	–	–	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained.	Species polygons not created. Species not found during surveys.
Ammobium craspedioides	Yass Daisy	V	V	No	✓	–	–	–	–	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Species has listed geographic constraint being south of Cowra. Subject land does not meet this requirement; therefore, species is not considered further.	Not applicable. The subject land does not meet the geographic constraints for this species.
Androcalva procumbens *(syn. Commersonia procumbens)*	–	–	V	–	–	✓	–	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Species has listed habitat constraint being Pilliga sandstone. Assumed species polygons removed where field survey has failed to identify suitable habitat (Pilliga sandstone). See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 202, 440, 468, 477, 478, 479, 481, 1610, 1661 & 1674 according to the TBDC. The survey was unable to be undertaken within a suitable time period post fire. Assumed species polygons created for areas in PCT 42, 477, 478, 479, 1610, 1674 in the Kerrabee and Pilliga subregions in areas of Pilliga Sandstone geology. See Figure 14-13 for assumed species polygons.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Androcalva rosea *(syn. Commersonia rosea)*	Sandy Hollow Commersonia	E	E	Yes	-	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. See Figure 14-13 for species and assumed species polygons. Potential habitat present in PCT 1674.	Species associated with PCT 1674 according to the TBDC. The survey was unable to be undertaken within a suitable time period post fire. Assumed species polygons created for areas in PCT 1674 in Kerrabee IBRA subregion. See Figure 14-13 for assumed species polygons.
Cullen parvum	Small Scurf-pea	E	–	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Cymbidium canaliculatum - endangered population	Cymbidium canaliculatum population in the Hunter Catchment	E	-	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained.	Species polygons not created. Species not found during surveys.
Cynanchum elegans	White-flowered Wax Plant	E	E	No	-	✓	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. *Cynanchum elegans* occurs in a variety of habitats from coastal scrub and littoral rainforest to wet sclerophyll forest, and the margins of dry, littoral and subtropical rainforests (see NSW Scientific Committee, 2009). This type of habitat does not occur in the subject land. *Cynanchum elegans* is not a dry sclerophyll forest or grassy woodland species so has been excluded based on the absence of suitable habitat according to published habitat descriptions.	Species polygons not created. Suitable habitat deemed not to be present based on published habitat descriptions for the species.
Dichanthium setosum	Bluegrass	V	V	No	✓	✓	✓	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. Potential individuals of this species were recorded in Kerrabee subregion during the survey. Samples, including seed, collected and sent to the Royal Botanic Gardens for confirmation. *Dichanthium setosum* was recorded during work undertaken for the Valley of the Winds Wind Farm (see Eco Logical Australia Pty Ltd, 2022) to the north of the subject land.	Species associated with PCT 81, 202, 281, 461 & 483 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 81, 281, 461 & 483. See Figure 14-13 for species and assumed species polygons.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Digitaria porrecta	Finger Panic Grass	E	–	No				✓		☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Suitable habitat for this species is present in the form of PCT 599 in the Pilliga IBRA subregion .	Species associated with PCT 599 in the Pilliga IBRA subregion according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 599 in the Pilliga IBRA subregion. See Figure 14-13 for species and assumed species polygons
Diuris tricolor	Pine Donkey Orchid	V	–	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Suitable habitat for this species is present in the form of PCT 202, 461, 477 & 1674. A population of Diuris tricolor was recorded near Sandy Creek Road at Cobbora during work undertaken for this project in 2021. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 81, 202, 461, 468, 477 & 1674 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 202, 461, 477 & 1674. See Figure 14-13 for assumed species polygons.
Diuris tricolor – endangered population	Pine Donkey Orchid population in the Muswellbrook LGA	E	–	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. The subject land is not within Muswellbrook LGA	Not applicable. The subject land not within Muswellbrook LGA
Eucalyptus camaldulensis	Eucalyptus camaldulensis population in the Hunter catchment	E	–	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. Eucalyptus camaldulensis trees were found along Wilpinjong Creek during the survey which is in the Hunter catchment (see Section 5.2.2). See Figure 14-13 for species polygons.	Species recorded in PCT 281. See Figure 14-13 for species polygons.
Eucalyptus cannonii	Capertee Stringybark	V	–	No	✓	✓	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. Species added to the BAM-C based on field survey and identification of samples sent to the Royal Botanic Gardens. Some individuals were identified by the Royal Botanic Gardens as Eucalyptus cannonii or E. cannonii x macrorhyncha (see Section 5.2.3). See Figure 14-13 for species polygons.	Species associated with PCT 1674 according to the TBDC. Species recorded in PCT 281 and PCT 440, 479 during the survey. Species polygons created for recorded locations of Eucalyptus cannonii and non-definitive Eucalyptus cannonii hybrids found in the Inland Slopes, Kerrabee and Pilliga IBRA subregions. See Figure 14-13 for species polygons. Assumed species polygons were not created as this is a Count species.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Euphrasia arguta	-	CE	CE	Yes	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Habitat restricted to Mod_Good condition state PCT 266, 277 & 281 in the Inland Slopes IBRA subregion. Euphrasia arguta is a very rare species that was rediscovered in in the Nundle area of the NSW north western slopes and tablelands in 2008 (NSW Scientific Committee, 2012, Binns, 2012). Between the first collection in approximately 1804 and a collection from Nundle in 1904, there were few records from widely separated localities including Bathurst, Mudgee, Blue Mountains and 'Hunter's River' (Barker 1987). This species is an annual that appears to rely on disturbance such as fire or mechanical ground disturbance for persistence. The main potential threats to Euphrasia arguta include browsing by domestic stock, rabbits and macropods (Department of Sustainability, Environment, Water, Population and Communities, 2011). The Derived Native Grasslands, Derived Native Shrublands, and the Poor and Thinned vegetation zones in the subject land display the damage caused by land clearing and stock grazing since the 1800s (when the first collections of Euphrasia arguta were made in NSW). The absence of this species from the Bathurst/Mudgee area since the 1800s (coinciding with grazing pressure) and rediscovery after mechanical disturbance of good condition vegetation at Nundle (see Binns, 2012) suggest that Euphrasia arguta would be absent from grazing paddocks and other areas subject to grazing. Euphrasia arguta is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large, introduced herbivores that has occurred in the subject land over the last 200+ years so has been excluded from most vegetation zones due to habitat degradation. There is however a low chance that Mod_Good vegetation zones could support this species. See Figure 14-13 for assumed species polygons for this species.	Species associated with PCT 266, 277 & 281 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 266, 277 & 281 Mod_Good condition state in the Inland Slopes IBRA subregion. See Figure 14-13 for species and assumed species polygons.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Homoranthus darwinioides	Fairy Bells	V	V	No	✓	✓	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. A population of *Homoranthus darwinioides* is known to be present near Spring Ridge Road at Cobbora (recorded during surveys in 2021). The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the shift to continuous intense grazing by large, introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from Derived Native Grassland vegetation zones due to habitat degradation. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 440, 468, 477 & 1674 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 1674 Mod_Good and Thinned condition states.
Grevillea wilkinsonii	Tumut Grevillea	CE	E	Yes	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Kennedia retrorsa	-	V	V	Yes	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Lasiopetalum longistamineum	-	V	V	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Leucochrysum albicans var. *tricolor (syn. Leucochrysum albicans* subsp. *tricolor)*	Hoary Sunray	E	E	No	✓	✓	-	-	-	☐ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	Yes	Species retained. Recorded at Cope during the field survey (see Section 5.2.5) in the area of BioNet records. Added to the BAM-C. Also recorded outside of the subject land at Gulgong during the survey. See Figure 14-13 for species and species polygons.	Not associated with any of the PCTs recorded in the subject land according to the TBDC. Recorded in PCT 461 & 481 during the survey in the Kerrabee subregion. Also recorded near Gulgong in the Inland Slopes subregion during the survey. Species polygons created for recorded locations of Leucochrysum albicans var. tricolor found in the Kerrabee IBRA subregion. Assumed species polygons were not created as this is a Count species.
Monotaxis macrophylla	Large-leafed Monotaxis	E	–	No	-	-	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 440, 477, 479, 6110 & 1661 according to the TBDC. The survey was unable to be undertaken within a suitable time period post fire. Assumed species polygons created for areas in PCT 477, 479, 483 & 1661 in the Kerrabee, Pilliga and Talbragar Valley IBRA subregions.
Ozothamnus tesselatus	-	V	V	No	-	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Known to occur at Wollar near to the subject land as outlined in the Wilpinjong Extension Project Biodiversity Assessment Report and Biodiversity Offset Strategy (Hunter Eco, 2015). See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 1674 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 1674 in the Kerrabee subregion.
Persoonia marginata	Clandulla Geebung	V	V	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	No	✓	✓	-	-	-	☐ BAM-C ☒ TBDC ☒ Previous survey ☐ Current survey	Yes	Species retained. There are recent records of this species from Moolarben (see Niche Environment and Heritage, 2022). This species has listed geographic constraint for the Inland Slopes IBRA subregion being east of Tumut. Subject land does not meet this requirement (this is yet to be updated in the BAM-C) but is retained as a candidate species based on more appropriate local data. Cotoneaster Pomaderris occurs in a very broad mix of vegetation communities, from tall open eucalypt forest to dry open eucalypt woodland, sometimes (but not always) in sites physically protected from fire, such as along rivers, gorges or escarpments (Department of Agriculture, Water and the Environment, 2021). The longevity of the soil seed bank is unknown for Cotoneaster Pomaderris, although seed from other Pomaderris are likely to survive for at least 20 years in the soil (Department of Agriculture, Water and the Environment, 2021).. Many Pomaderris are reliant on fire to promote germination of soil-stored seed (Department of Agriculture, Water and the Environment, 2021). In terms of grazing tolerance, continuous browsing can kill adult plants and germinating seedlings (Department of Agriculture, Water and the Environment, 2021). Increases in grazing if browsing are considered likely to significantly impact the species (Department of Environment, Climate Change and Water (NSW), 2009). The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from Derived Native Grassland vegetation zones due to habitat degradation. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 478 and 1610 according to the TBDC. Assumed species polygons created for areas lacking survey effort in: PCT 478 and 1610. Excluded from Derived Native Grassland vegetation zones.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Pomaderris queenslandica	Scant Pomaderris	E	–	No	✓	-	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. The identified threats to Pomaderris queenslandica outlined in the TBDC include clearing of habitat for agriculture, infrequent fire restricting the species germination from seed, and disturbance from domestic stock. The Derived Native Grasslands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from the Derived Native Grasslands vegetation zones due to habitat degradation. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 440, 468, 477 & 1661 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 477 & 1661. Excluded from Derived Native Grassland vegetation zones.
Pomaderris reperta	Denman Pomaderris	CE	CE	Yes	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Pomaderris sericea	Silky Pomaderris	E	V	No	-	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	✓	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Known populations of Prasophyllum petilum occur in the grassy woodlands and grasslands of the southern tablelands and western slopes of New South Wales and the Australian Capital Territory growing among native and (to a lesser extent) exotic grasses in grassy woodland or natural grassland occurring on fertile soils at flat or gently sloping sites. (Department of Agriculture, Water and the Environment, 2021d). *Prasophyllum petilum* has suffered past loss, degradation, and fragmentation of habitat due to residential, infrastructure and agricultural developments (Department of Agriculture, Water and the Environment, 2021d). Current threats to the species' persistence include inappropriate mowing or grazing regimes, especially in spring and summer when above-ground parts are growing, and competition from other plant species competing for space and resources, both native and non-native (Department of Agriculture, Water and the Environment, 2021d). While it appears that *Prasophyllum petilum* can withstand some grazing, it is likely that there is a critical level of grazing above which its survival would be reduced (Department of Agriculture, Water and the Environment, 2021d). The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s (habitat degradation). This species is likely to have been poorly equipped to survive the shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from selected Derived Native Grassland vegetation zones where the VI score is <17 (a VI score <17 indicates a very poor condition habitat) due to habitat degradation. The better quality Derived Native Grasslands may be suitable as habitat for this species particularly where they are in close proximity to woodlands. See Figure 14-13 for species polygons.	Species associated with PCT 277 & 281 according to the TBDC. This species was not recorded within the subject land during the survey. Samples sent to Herbariums for confirmation of identification were *Prasophyllum campestre* and *Prasophyllum patens* (see Appendix F). Assumed species polygons were created for areas lacking survey effort in PCT 277 & 281 in Mod_Good, Thinned and Derived Native Grassland condition states with a VI score of ≥17.
Prasophyllum sp. *Wybong*	-	-	CE	Yes	✓	✓	-	✓	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	No	Species excluded. Considered a synonym of *Prasophyllum petilum*.	Species polygons not created. Considered a synonym of *Prasophyllum petilum*.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Prostanthera cryptandroides subsp. *cryptandroides*	Wollemi Mint-bush	V	V	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Prostanthera discolor	-	V	V	Yes	-	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Prostanthera stricta	Mount Vincent Mint-bush	V	V	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Pterostylis cobarensis	Greenhood Orchid	V	–	No	-	-	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Potential habitat is present in the form of PCT 440 in the Pilliga subregion. The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from the Derived Native Grasslands and Derived Native Shrublands vegetation zones due to habitat degradation.	Species associated with PCT 440 according to the TBDC. Species not identified in potentially suitable habitat during targeted surveys. No species or assumed species polygons recorded.
Senecio linearifolius var. *dangarensis*	-	E	–	Yes	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.1).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Swainsona recta	Small Purple-pea	E	E	No	✓	-	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Known to occur in Eucalyptus albens dominated vegetation at Mudgee Common growing with Swainsona sericea. The range reduction and decline in population sizes is believed to be due to both adult mortality and low recruitment which occurs in response to several major threat factors including habitat loss due to pasture improvement and other agricultural developments; domestic stock grazing; and reduced fire frequency and the resulting competition with native groundcover species (to name the most applicable to the subject land) (see NSW Office of Environment and Heritage, 2012). The foliage and flowers of Swainsona species are highly palatable to grazing animals and Swainsona species are adversely affected by intense and continuous grazing by stock, rabbits or native herbivores (Earl et al. 2003). Despite the capacity to resprout from damaged rootstock, the species will not persist when the shoot growth is periodically removed by domestic stock grazing (NSW Office of Environment and Heritage, 2012). The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from the Derived Native Grasslands and Derived Native Shrublands vegetation zones due to habitat degradation. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 266 & 277 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 266 & 277 Mod_Good and Thinned condition classes. Excluded from areas of Derived Native Grassland and Derived Native Shrublands.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Swainsona sericea	Silky Swainson-pea	V	-	No	✓	-	-	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☒ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained Known to occur in Eucalyptus albens dominated vegetation at Mudgee Common growing with Swainsona recta. Recorded during surveys for the Beryl Solar Farm BDAR (see NGH Environmental, 2017). Known form a specimen backed herbarium record collected from the Cudgegong River at Gulgong. There is a BioNet record of this species midway between Gulgong and Ulan from 1983. It is known to occur in grassland and eucalypt woodland communities in a variety of habitats including riverine plains, sandhills and rocky outcrops (NSW Scientific Committee, 2008a). Potentially recorded within the subject land in the Talbragar Valley IBRA subregion near Laheys Creek in PCT 202 Mod_Good vegetation zone (see Section 5.2.6). Clearing of habitat has been responsible for past declines with the development of agricultural landscapes (NSW Scientific Committee, 2008a). The foliage and flowers of Swainsona species are highly palatable to grazing animals and Swainsona species are adversely affected by intense and continuous grazing by stock, rabbits or native herbivores (Earl et al. 2003). The species may also be vulnerable to trampling and pugging effects by stock when the clay soils are wet (NSW Scientific Committee, 2008a). Heavy grazing in the flowering and fruiting season may influence the soil seed bank and hence the future abundance of plants in populations (NSW Scientific Committee, 2008a). The Derived Native Grasslands and Derived Native Shrublands in the subject land display the damage caused by land clearing and stock grazing since the 1800s. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. Therefore, it has been excluded from the Derived Native Grasslands and Derived Native Shrublands vegetation zones due to habitat degradation. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 202, 266, 277, 281, 440, 461, 468 & 477 according to the TBDC. Species potentially recorded in PCT 202 in the subject land. Species polygons created in the area of recorded habitat in PCT 202 Mod_Good. Assumed species polygons created for areas lacking survey effort in PCT 266, 277, 281, 440, 468, & 477 Mod_Good and Thinned condition classes, excluded from areas of Derived Native Grassland and Derived Native Shrublands.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Thesium australe	Austral Toadflax	V	V	No	-	-	✓	✓	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Potential habitat for Thesium australe within the subject land includes Derived Native Grassland vegetation zones. Thesium australe is largely confined to grasslands, grassy woodlands or sub-alpine grassy heathlands (Scarlett, et al., 2003). Thesium australe is known to occur in cleared paddocks (see Doyle and Pellow, 2018). Thesium australe is believed to have a parasitic association with the native tussock grass Themeda triandra. Observations indicated that a range of native tussock grasses may be suitable for Thesium australe since it has been found in grasslands where Themeda triandra was sparsely distributed (see Doyle and Pellow, 2018). The main identified threats to the austral toadflax are: lack of fire/disturbance, existing and intensified grazing by livestock, native herbivores and feral herbivores, residential, infrastructure and agricultural development, weed invasion (e.g. blackberry (Rubus spp.)), and infrastructure (road and rail) maintenance, particularly road widening and re-routing (Department of the Environment, 2013). Austral Toad-flax is grazed severely by cattle, horses, rabbits, kangaroos and wombats (Scarlett, et al., 2003). Grasshoppers also graze it severely, but possibly only when other food sources are limited (Archer 1984). This species can occur in un-treed native grassland or heterogeneous native/exotic grassland according to the TBDC and other literature. Although the habitat is grazed, absence of this species cannot be confirmed without targeted survey given the presence of potentially suitable habitat.	Species associated with PCT 599 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 599 in the Pilliga IBRA subregion including Derived Native Grassland vegetation zones.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Tylophora linearis (syn. *Vincetoxicum forsteri)*	-	V	E	No	✓	✓	-	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Potential habitat for Tylophora linearis is present in the subject land but it restricted to Mod_Good and Thinned vegetation zones. The species is known to occur in dense shrublands occasionally overtopped by Callitris glaucophylla and various species of Eucalyptus (NSW Scientific Committee, 2008b). The habitats are variously dominated by the tree species Eucalyptus crebra, Eucalyptus sideroxylon and Callitris glaucophylla, Eucalyptus microcarpa, Eucalyptus dumosa, Eucalyptus fibrosa, Eucalyptus pilligaensis, Eucalyptus melanophloia, Allocasuarina luehmannii, Eucalyptus albens, Eucalyptus populnea, and Eucalyptus viridis (Forster et al. 2004). The critical habitat defining feature in the Goonoo S.F./Coolbaggie N.R. appears to be the presence of the dense understorey (Forster et al. 2004). The main identified threats to Tylophora linearis include forestry activities; disturbances such as grazing and fire; and invasion of habitat by introduced weeds, such as Lantana (Department of the Environment, Water, Heritage and the Arts, 2008g). The land clearing and grazing disturbance that has occurred in the Derived Native Grassland vegetation zones is likely to have degraded the habitat to a point where Tylophora linearis is unlikely to occur. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. See Figure 14-13 for species and assumed species polygons.	Species associated with PCT 202, 440, 461, 468, 477 & 479 according to the TBDC. Assumed species polygons created for areas lacking survey effort in PCT 202, 440, 461, 468, 477 & 479.

Scientific name	Common name	Listing status			Subregion[4]					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[3]	IS	KER	LR	PIL	TV				
Zieria ingramii	Keith's Zieria	E	E	No	-	-	-	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species retained. Potential habitat is present in the subject land but it restricted to Mod_Good and Thinned vegetation zones. A population of Zieria ingramii is known to be present outside of the subject land near Spring Ridge Road at Cobbora (recorded during surveys in 2021). Zieria ingramii is a naturally rare species, characterised by low population numbers and a highly restricted distribution (Department of Environment and Conservation (NSW), 2007). Habitat loss and modification (such as the clearing of habitat resulting in the formation of grazing paddocks (i.e. Derived Native Grassland)) is recognised as a threat to this species (Department of Environment and Conservation (NSW), 2007). Excessive grazing by domestic stock or native herbivores as well as trampling caused by hoofed stock has the potential to threaten the species (Department of Environment and Conservation (NSW), 2007). Therefore, it is considered unlikely to persist in Derived Native Grasslands or in areas with habitat modification and grazing pressure. Zieria ingramii has been excluded from Derived Native Grassland vegetation zones based on available evidence. There is no evidence to suggest that Zieria ingramii persists in Derived Native Grassland. This species is likely to have been poorly equipped to survive the fire suppression and shift to continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years. The Derived Native Grassland vegetation zones are degraded to a point where Zieria ingramii is unlikely to occur. It has been suggested that particular elements of the soil, such as organic carbon, phosphorous or aluminium levels, may be determining where Zieria ingramii occurs (Department of Environment and Conservation (NSW), 2007) so it is unlikely that this species would survive with agricultural modification of soil.	Species associated with PCT 440, 468, & 477 according to the TBDC. Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.

Table 5-6 Predicted fauna species credit species within the subject land

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Frogs														
Sloane's Froglet	*Crinia sloanei*	V	E	No	No	✓	-	-	-	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present.
Booroolong Frog	*Litoria booroolongensis*	E	E	No	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. The species is known to inhabit rocky, permanent streams with fringing vegetation (Office of Environment & Heritage, 2017). Waterways present within the subject land display the damage caused by land clearing and stock grazing since the 1800s. This shift to continuous intense grazing by large, introduced herbivores that has occurred in the subject land over the last 200+ years has severely degraded what would have once been considered suitable habitat. Survey located one area of marginal habitat for this species approximately 250m to the west of the subject land at the Tallawang Creek crossing. However, targeted surveys undertaken in warm wet conditions for the species failed to locate any individuals, and, overall, the project is considered unlikely to impact upon habitats in which this species is most likely to occur (Refer to Section 5.3 Threatened species surveys). Habitat within and around riparian areas within the subject land would generally be avoided, with the maximum impact limited to the removal or trimming of tree canopy on riverbanks to facilitate the construction and operation of the transmission line spanning riparian areas. Any potential water-holding habitat would remain largely unaffected. The species is unlikely to be affected based on survey or any impacts based on the absence of micro habitat.	Species polygons not created. Suitable habitat deemed not to be present.
Giant Burrowing Frog	*Heleioporus australiacus*	V	V	No	No	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present.

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Reptiles														
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	No	No	✓	✓	✓	-	-	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Habitat has been refined to appropriate habitat features as listed in the Threatened Reptiles: Biodiversity Assessment Method. Suitable habitat includes rocky areas (or within 50 m of rocky areas) located within PCTs associated with the species. Species polygons have been refined to a 50 m buffer around all recorded rocky areas present. See Figure 14-13 for assumed species polygons.	Species associated with: PCT 42, 266, 277, 281, 440, 461, 468, 477, 478, 618, 1610, 1674, 1696 Assumed species polygons created for areas lacking survey effort in: PCT 42, 266, 277, 281, 440, 461, 468, 477, 478, 618, 1610, 1674, 1696
Striped Legless Lizard	*Delma impar*	V	V	No	No	✓	✓	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species excluded from the Inland Slopes Subregion as the geographic limitation has not been met 'South of Mid-Western Highway'. The Subject land occurs approximately 120 km north of the Mid-western Highway. However, the species has been retained within the Liverpool Range and Kerrabee Subregion. The Hunter Valley and Liverpool Range population has recently described as *Delma vescolineata* (Mahony, Cutajar and Rowley, 2022). The nearest records occur approximately 80 km to the east of the Subject land in Muswellbrook. The newly described species is currently treated as *Delma impar* under in the TDBC and has been retained for this reason.	Species associated with: PCT 42, 277, 618, 1696 Assumed species polygons created for areas lacking survey effort in: PCT 42, 277, 618, 1696
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	-	No	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Derived Native Grassland and Derived Native Shrubland has been excluded as potential habitat for the species. The species is primarily arboreal and relies on trees which are considered important structural elements in the landscape for all *Hoplocephalus* species (Webb and Shine 1997a; Fitzgerald et al. 2002a, 2010). The genus is highly morphologically derived relative to other members of the elapid radiation (Shine 1983a), reflecting an adaptation to their arboreal habits (i.e. keeled ventral scales). At the microhabitat scale, there is preference for live hollowing-bearing trees that were generally 100 years old, which be driven by temperature buffering which large growth trees allow (Shelton, 2020). The DNG and DNS present in the subject land lacks stands of large remnant trees which are considered suitable for sheltering and foraging. Therefore, it has been excluded from DNG vegetation zones where the VI score is <17 (a VI score <17 indicates a very poor condition habitat) as a result of habitat degradation. See Figure 14-13 for assumed species polygons.	Species associated with: PCT 42, 440, 468, 477, 1674 Assumed species polygons created for areas lacking survey effort in: PCT 42, 440, 468, 477, 1674

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Broad-headed Snake	*Hoplocephalus bungaroides*	E	V	Yes	Yes	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. The species shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. During summer the species moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500 m of escarpments in summer (Broad-Headed Snake - Profile | NSW Environment, Energy and Science, 2021). Species polygons, a 100 m buffer, has been mapped to the full extent in areas of suitable habitat within the subject land. The species has been excluded from Derived Native Grassland in areas where suitable rocky habitat and hollow bearing trees aren't present within the associated PCT's. See Figure 14-13 for species and assumed species polygons.	Species associated with: PCT 1674 Assumed species polygons created for areas lacking survey effort in: PCT 1674
Birds														
Regent Honeyeater (breeding)	*Anthochaera phrygia*	CE	CE; M	Yes	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species breeding habitat has been excluded from areas that are not within the Important Habitat Map. Habitat for the species is mapped in the Inland Slopes and Kerrabee Subregion. Species is excluded from the Liverpool Range, Pilliga and Talbragar Valley Subregions.	Species polygon corresponds directly with the Important Habitat Map.
Australian Bustard	*Ardeotis australis*	E	-	No	No	-	-	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. This species was not recorded despite extensive and exhaustive targeted surveys in all seasons, including diurnal targeted and opportunistic surveys. Refer to Section 5.3 Threatened species surveys.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.
Bush Stone-curlew	*Burhinus grallarius*	E	-	No	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. This species was not recorded despite extensive and exhaustive targeted surveys in all seasons, including diurnal surveys, call playback and spotlighting. The good quality patches of vegetation remaining within the subject land lack suitable areas of a sparse grassy ground layer and fallen timber favoured by the species. Refer to Section 5.3 Threatened species surveys.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	V	E	No	Yes	✓	✓	-	-	-	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes	Species excluded. This species was not recorded despite extensive and exhaustive targeted surveys in all seasons, including diurnal targeted and opportunistic surveys. Furthermore, the species generally occurs in tall mountain forests and woodlands – particularly within mature, wet sclerophyll forests, dominated by eucalypts with dense, shrubby acacia and banksia understories, often in secluded valleys (Higgins 1999). This habitat is not present within the subject land.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.
Glossy Black-Cockatoo (breeding)	*Calyptorhynchus lathami*	V	V	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species observed within the Inland Slopes bioregion. Evidence of foraging was recorded within the Inland Slopes and Kerrabee Subregions. Foraging activity recorded has been limited, suggesting these habitats are not frequently used by the species See Section 5.2.8 for detailed discussion of this species in the subject land. Breeding habitat is yet to be determined through survey, assumed potential nest trees have been mapped within the locality of recorded foraging and observations. See Figure 14-13 for species and assumed species polygons. Species has been excluded from Liverpool Range, Talbragar Valley and Pilliga Subregions through extensive survey and a lack of suitable foraging and breeding habitats present. Remnant vegetation patches within the Pilliga Subregion were subject to intense wildfires in 2017 significantly limiting both suitable foraging and breeding habitats. These subregions lack the presence of mature stands of *Allocasuarina* and *Casuarina* species considered suitable for foraging habitat (Refer to Appendix D). Specific preferences in tree species and hollow characteristics are required for nesting to occur. Hollows are generally located within proximity to suitable foraging habitat. Branches 30 cm in diameter with a minimum 15 cm diameter entrance, higher than 8 m above ground and greater than 45 degrees are preferred (Department of Climate Change, Energy, the Environment and Water, 2022). No suitable hollows have been recorded within these subregions.	Species associated with: PCT 42, 81, 202, 266, 440, 461, 468, 477, 1674 Species recorded in: PCT 266 and 440 Assumed species polygons created for areas lacking survey effort in: PCT 42, 81, 202, 266, 440, 461, 468, 477, 1674
White-bellied Sea-eagle (breeding)	*Haliaeetus leucogaster*	V	-	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded due through adequate survey. Stick nests for this species were not recorded within the subject land despite extensive and exhaustive targeted surveys in all seasons. Refer to Section 5.3 Threatened species surveys.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Little Eagle (breeding)	*Hieraaetus morphnoides*	V	-	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	No	Species excluded due to adequate survey. No stick nests for this species were recorded within the subject land despite extensive and exhaustive targeted surveys in all seasons (Refer to Section 5.3 Threatened species surveys). One stick nest was recorded just north of the Merotherie workforce accommodation camp. However, it outside of the subject land and no impact is predicted.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.
Swift Parrot (breeding)	*Lathamus discolor*	E	CE; M	Yes	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded Subject land not mapped on important habitat map. This species only breeds in Tasmania.	No species or assumed species polygons were created for this species.
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	V	-	No	Yes	✓	-	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Square-tailed Kite (breeding)	*Lophoictinia isura*	V	-	No	Yes	✓	✓	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded due to adequate survey. No stick nests for this species were recorded within the subject land despite extensive and exhaustive targeted surveys in all seasons.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.
Barking Owl (breeding)	*Ninox connivens*	V	-	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. A pair were recorded during breeding season in the Inland Slopes Subregion. See Figure 14-13 for species and assumed species polygons. The species has been excluded from the Pilliga Subregion as the 2019-2022 wildfires greatly reduced the habitat quality and quantity further, as many old, hollow-bearing trees were burnt (Milledge and Soderquist 2022). Species has also been excluded from Talbragar Valley and Liverpool Range Subregions through adequate survey. Refer to Section 5.3 Threatened species surveys.	Species associated with: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 479, 481, 483, 618, 1177, 1610, 1661, 1674, 1696 Species recorded in: PCT 277 Assumed species polygons created for areas lacking survey effort in: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 479, 481, 483, 618, 1177, 1610, 1661, 1674, 1696
Powerful Owl (breeding)	*Ninox strenua*	V	-	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Species was not recorded despite extensive and exhaustive targeted surveys in all seasons, including diurnal surveys targeting roost sites, call playback and spotlighting. See Section 5.3 Threatened species surveys for survey effort.	Species not found in suitable habitat during targeted surveys. No species or assumed species polygons were created for this species.

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Superb Parrot (breeding)	*Polytelis swainsonii*	V	V	No	Yes	✓	-	-	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species has been excluded from Inland Slopes and Pilliga Subregions through adequate survey. This species was not recorded despite undertaking extensive targeted and opportunistic surveys across all seasons (See Section 5.3 Threatened species surveys for survey effort). The species is assumed present within the Talbragar valley Subregion (See Figure 14-13 for species and assumed species polygons).	Species associated with: PCT 81, 202, 266, 277, 281, 440, 461, 477 Assumed species polygons created for areas lacking survey effort in: PCT 81, 202, 266, 277, 281, 440, 461, 477
Masked Owl (breeding)	*Tyto novaehollandiae*	V	-	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species retained. Species recorded in Inland Slopes, Kerrabee, and Pilliga Subregions through adequate survey (See Figure 14-13 for species and assumed species polygons). Breeding habitat is yet to be determined. Species has been excluded from Liverpool Range Subregion through adequate survey (See Section 5.3 Threatened species surveys for survey effort).	Species associated with: PCT 81, 202, 266, 277, 281, 440, 461, 468, 477, 1177, 1674 Species recorded in: PCT 440, 1177, and 1610 Assumed species polygons created for areas lacking survey effort in: PCT 81, 202, 266, 277, 281, 440, 461, 468, 477, 1177, 1674
Invertebrates														
Key's Matchstick Grasshopper	*Keyacris scurra*	E	-	No	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Golden Sun Moth	*Synemon plana*	V	V	No	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).
Mammals														
Rufous Bettong	*Aepyprymnus rufescens*	V	-	No	No	-	-	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	No	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Derived Native Grassland has been excluded as potential habitat for the species. The species depends on sufficient foraging resources such as nectar and pollen, in particular Banksia spp. It also depends on Eucalyptus and Xanthorrhoea sp. for shelter (Tulloch, Ayesha & Dickman, Christopher, 2006). The species is known to occur in grassy woodlands where the presence of Eucalypts alone is sufficient to support low density populations. The species dens in hollows, stumps, abandoned nests of birds and possums and thickets of vegetation (Eastern Pygmy-Possum - Profile | NSW Environment, Energy and Science, 2022). The DNG present in the subject land lacks the mid-storey to canopy vegetation suitable for foraging opportunities and lacks the structure to allow for shelter. Therefore, it has been excluded from selected Derived Native Grassland where vegetation zones where the VI score is <17 (a VI score <17 indicates a very poor condition habitat) due to habitat degradation.	Species associated with: PCT 42, 277, 440, 461, 468, 477, 1674 Assumed species polygons created for areas lacking survey effort in: PCT 42, 81, 202, 266, 440, 461, 468, 477, 1674
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Yes	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained. Species has been recorded previously by ELA in the Liverpool Range (Valley of the Winds BDAR). WSP recorded it in 2023 harp trapping and acoustic detector surveys in the Kerrabee Subregion. Breeding habitat was not detected during this survey in the subject land. Potential breeding habitat has been mapped in areas requiring further survey.	Species associated with: PCT 42, 202, 277, 281, 440, 461, 468, 477, 1674 Species recorded in: PCT 1610 Assumed species polygons created for areas lacking survey effort in: PCT 42, 202, 277, 281, 440, 461, 468, 477, 1674
Little Bent-winged Bat (breeding)	*Miniopterus australis*	V	-	Yes	Yes	-	✓	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Species excluded as habitat constraints not met within the subject land. Only one associated PCT is currently mapped within the subject land, PCT 42. The areas of PCT 42 that are currently mapped are limited to very few isolated patches on the flood plain of the Talbragar River. These patches of vegetation do not occur within 2 km of any rocky habitat or cliff lines ruling out potential breeding habitat within the subject land.	N/A

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	V	-	Yes	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☒ Current survey	No	Species excluded. Species excluded as habitat constraints not met within the subject land. Large Bent-winged Bat has been recorded to the north of the Subject land through acoustic analysis by Eco Logical (Valley of the Winds BDAR) and Umwelt (Liverpool Range BDAR, 2022). The species was recorded by WSP in 2023 harp trapping and acoustic detector surveys in the Kerrabee Subregion. The TBDC defines Large Bent-winged Bat suitable breeding habitat as a cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding. No caves tunnels, mines or other structures are present within the Subject land. Several caves and overhangs are recorded within close proximity to the Study area in the Kerrabee Subregion survey (See Figure 14-13 for cave and overhang locations). Caves and overhangs structures recorded were subject to microbat roost search surveys, but no observation of breeding clusters was made (Refer to Section 5.3 Threatened species surveys). A Large Bent-winged Bat maternity roost site was recorded in a historical audit on Wilpinjong Coal Mine on the western boundary of Pit 9, approximately 850 m away from an active mine pit (Hunter Eco, 2015). Monitoring surveys of the roost recorded approximately 145 Large Bent-winged Bats emerging from the adit, including lactating and young individuals (Biodiversity Monitoring Services 2014). The most recent BioNet records are from 2020 suggesting the roost is most likely still active despite ongoing mining disturbances. The historical adit sits approximately 2.5 km away from the Subject land and works to be undertaken for the proposal is unlikely to disturb the maternity roost.	No breeding habitat for this species was found in the subject during targeted surveys. No species or assumed species polygons were created for this species.
Squirrel Glider	*Petaurus norfolcensis*	V	-	No	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☒ Current survey	Yes	Species retained. Species has been recorded at a number of sites across the subject land including Pilliga, Kerrabee, Talbragar Valley and Inland Slopes Subregion.	Species associated with: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 477, 1177, 1674 Species recorded in: PCT 81, 202, 281, 440, 477, 479. Assumed species polygons created for areas lacking survey effort in: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 477, 1177, 1674

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Squirrel Glider in the Wagga Wagga Local Government Area	*Petaurus norfolcensis – endangered population*	E	-	No	No	✓	-	-	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Endangered population not retained. Geographic limitation has not been met as the subject land is not located in the Wagga Wagga LGA.	N/A
Greater Glider	*Petauroides volans*	E	E	No	No	✓	✓	-	-	-	☒ BAM-C ☒ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded Species has been excluded based on adequate survey within the subject land. No individuals were not recorded despite extensive and exhaustive targeted surveys in all seasons (Refer to Section 5.3 Threatened species surveys). Furthermore, the species is typically found in highest abundance in taller, montane, moist eucalypt forests on fertile soils, with relatively old trees and abundant hollows in north-eastern NSW (Andrews et al. 1994; Smith et al. 1994a,b), south-eastern NSW (Kavanagh 2000), eastern Vic (van der Ree et al. 2004) – but also occurs in drier habitats in south-eastern Qld (Eyre 2004). This habitat typically favoured by the species is not present within the subject land. BIOCLIM modelling has been used to estimate the potential distribution of Greater Glider with potential habitat mapped on the south-eastern edge of Munghorn Gap Nature Reserve approximately 12 km south of the subject land. A known isolated population also occurs approximately 16km north of the subject site in Coolah Tops National Park. Neither of these populations fall within the study area and will not be impacted by the proposal.	Species associated with: PCT 42, 1177, 1674 Assumed species polygons created for areas lacking survey effort in: PCT 42, 1177, 1674
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	No	✓	✓	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species has been excluded from the Pilliga subregion as the habitat constraint is not met. The TBDC defines habitat as rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines are present within 1 km of the subject land. Associated PCT's within 1 km of rocky habitat has been mapped within remaining subregions. See Figure 14-13 for species and assumed species polygons.	Species associated with: PCT 81, 202, 266, 277, 281, 440, 477, 1177, 1674 Assumed species polygons created for areas lacking survey effort in: PCT 81, 202, 266, 277, 281, 440, 477, 1177, 1674
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	No	✓	✓	✓	-	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. Considered to be vagrant (see Section 5.1.2).	Species polygons not created. Suitable habitat deemed not to be present (see Section 5.1.1).

Common name	Scientific name	Listing status			Dual credit species	Subregions					Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act	SAII		IS	KER	LR	PIL	TV				
Koala	*Phascolarctos cinereus*	E	E	No	No	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species has been excluded from areas where adequate survey was undertaken (Refer to Section 5.3 Threatened species surveys). Assumed habitat is mapped within associated PCT's with the exclusion of Derived Native Grassland. This has been excluded based on the Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide for information on targeted survey requirements and mapping species polygons. The DNG present onsite lacks trees of a suitable age to be considered foraging habitat. Therefore, it has been excluded from selected DNG vegetation zones where the VI score is <17 (a VI score <17 indicates a very poor condition habitat) due to habitat degradation.	Species associated with: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 477, 478, 479, 481, 483, 618, 1177, 1610, 1661, 1674, 1696 Assumed species polygons created for areas lacking survey effort in: PCT 42, 81, 202, 266, 277, 281, 440, 461, 468, 477, 478, 479, 481, 483, 618, 1177, 1610, 1661, 1674, 1696.
Grey-headed Flying-fox (breeding)	*Pteropus poliocephalus*	V	V	No	Yes	✓	✓	✓	✓	✓	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Species excluded. The species or any breeding camps were not recorded despite extensive and exhaustive targeted surveys in all seasons, including diurnal surveys targeting camp sites and spotlighting (Refer to Section 5.3 Threatened species surveys). No active camps are present within the vicinity of the subject land on the National Flying-fox monitoring viewer (DCCEEW).	Species polygons not created. Breeding habitat deemed not to be present.
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Yes	No	-	✓	-	✓	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Partial (when a species is retained within one vegetation zone but not another)	Species partially retained. Species excluded from Liverpool Range Subregion as habitat constraints are not met within the subject land. The TBDC defines Eastern Cave Bat habitat as "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." These habitat structures are not present in the Subject land within the Liverpool Range Subregion. The species was recorded by WSP in 2023 harp trapping and acoustic detector surveys in the Kerrabee Subregion. Several caves and overhangs are recorded within close proximity to the Study area in the Kerrabee Subregion survey (See Figure 14-13 for cave and overhang locations). Caves and overhangs structures recorded were subject to microbat roost search surveys, but no observation of breeding clusters was made (Refer to Section 5.3 Threatened species surveys). See Figure 14-13 for species and assumed species polygons.	Species associated with: PCT 81, 202, 440, 461, 468, 477, 1674 Species recorded in: PCT 1610 Assumed species polygons created for areas lacking survey effort in: PCT 81, 202, 440, 461, 468, 477, 1674

5.2 Presence of candidate species credit species

Table 5-7 to Table 5-11 identify the candidate flora species and Table 5-12 to Table 5-16 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 dual credit species), or
- an expert report.

The sections below provide a description 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 Inland Slopes IBRA subregion

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Acacia ausfeldii	Ausfeld's Wattle	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes. Recorded in the subject land during surveys (see Section 5.2.1). Assumed present in areas lacking survey.	Yes
Dichanthium setosum	Bluegrass	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort.	Assumed present in areas lacking survey.	Yes
Diuris tricolor	Pine Donkey Orchid	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Euphrasia arguta	–	CE	CE	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Eucalyptus cannonii	Capertee Stringybark	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes. Recorded in the subject land during surveys (see Section 5.2.3). Assumed present in areas lacking survey.	Yes
Homoranthus darwinioides	Fairy Bells	V	V	Targeted threatened species survey	No. Adequate survey undertaken.	No
Pomaderris queenslandica	Scant Pomaderris	E	–	Targeted threatened species survey	No. Adequate survey undertaken.	No
Prasophyllum petilum	Tarengo Leek Orchid	E	E	Targeted threatened species survey & assumed present in areas lacking survey effort	This species was not recorded within the subject land during the survey. Samples sent to Herbariums for confirmation of identification were *Prasophyllum campestre* and *Prasophyllum patens* (see Appendix F). Assumed present in areas lacking survey.	Yes

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Swainsona sericea	Silky Swainson-pea	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Swainsona recta	Small Purple-pea	E	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Tylophora linearis	–	V	E	Targeted threatened species survey	Assumed present in areas lacking survey.	No

Table 5-8 Determining the presence of candidate flora species credit species on the subject land in the Kerrabee IBRA subregion

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Acacia ausfeldii	Ausfeld's Wattle	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes. Recorded in the subject land during surveys (see Section 5.2.1). Assumed present in areas lacking survey.	Yes
Acacia pendula – endangered population	Acacia pendula population in the Hunter catchment	E	–	Targeted threatened species survey	No. Adequate survey undertaken.	No
Androcalva procumbens (Commersonia procumbens)	–	–	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present. Survey unable to be undertaken under required conditions. Survey of potential habitat is required after recent fire or mechanical disturbance within the last 1 to 2 seasons. Species will then revert to underground thickened rootstock.	Yes
Androcalva rosea (Commersonia rosea)	Sandy Hollow Commersonia	E	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present. Survey unable to be undertaken under required conditions. Fire ephemeral species. Survey required 18 months post fire. After about 5 years, the species will no longer persist above ground but is likely to be present in the seedbank.	Yes
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* population in the Hunter Catchment	E	–	Targeted threatened species survey	No. Adequate survey undertaken.	No

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Dichanthium setosum	Bluegrass	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes. Recorded in the subject land during surveys. Assumed present in areas lacking survey	Yes
Diuris tricolor	Pine Donkey Orchid	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Eucalyptus camaldulensis	*Eucalyptus camaldulensis* population in the Hunter catchment	E	–	Targeted threatened species survey	Yes. Recorded in the subject land during surveys.	Yes
Eucalyptus cannonii	Capertee Stringybark	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Potentially recorded in the subject land during surveys (see Section 5.2.3). Assumed present in areas lacking survey.	Yes
Homoranthus darwinioides	Fairy Bells	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Ozothamnus tesselatus	–	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Prasophyllum petilum	Tarengo Leek Orchid	E	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes

Table 5-9 Determining the presence of candidate flora species credit species on the subject land in the Liverpool Ranges IBRA subregion

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Dichanthium setosum	Bluegrass	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Pomaderris queenslandica	Scant Pomaderris	E	–	Targeted threatened species survey	No. Adequate survey undertaken.	No

Table 5-10 Determining the presence of candidate flora species credit species on the subject land in the Pilliga IBRA subregion

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Androcalva procumbens *(Commersonia procumbens)*	–	–	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present. Survey unable to be undertaken under required conditions. Survey of potential habitat is required after recent fire or mechanical disturbance within the last 1 to 2 seasons. Species will then revert to underground thickened rootstock.	Yes
Dichanthium setosum	Bluegrass	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Digitaria porrecta	Finger Panic Grass	E	–	Assumed present in areas lacking survey effort.	Assumed present in areas lacking survey.	Yes
Eucalyptus cannonii	Capertee Stringybark	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Potentially recorded in the subject land during surveys (see Section 5.2.3). Assumed present in areas lacking survey.	Yes
Homoranthus darwinioides	Fairy Bells	V	V	Targeted threatened species survey	No. Adequate survey undertaken	No
Monotaxis macrophylla	Large-leafed Monotaxis	E	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present. Survey unable to be undertaken under required conditions. Survey within 6 months of disturbance or fire, if possible. Species is a short-lived annual, and will not be present unless a recent disturbance/fire event has occurred and triggered germination.	Yes

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Pomaderris queenslandica	Scant Pomaderris	E	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Pterostylis cobarensis	Greenhood Orchid	V	–	Targeted threatened species survey	No. Adequate survey undertaken.	No
Swainsona sericea	Silky Swainson-pea	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Thesium australe	Austral Toadflax	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Tylophora linearis	–	V	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey.	Yes
Zieria ingramii	Keith's Zieria	E	E	Targeted threatened species survey	No.	No

Table 5-11 Determining the presence of candidate flora species credit species on the subject land in the Talbragar Valley IBRA subregion

Scientific name	Common name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Acacia ausfeldii	Ausfeld's Wattle	V	–	Targeted threatened species survey	No. Adequate survey undertaken	No
Dichanthium setosum	Bluegrass	V	V	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey	Yes
Diuris tricolor	Pine Donkey Orchid	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey	Yes
Homoranthus darwinioides	Fairy Bells	V	V	Targeted threatened species survey	No. Adequate survey undertaken.	No
Pomaderris queenslandica	Scant Pomaderris	E	–	Targeted threatened species survey	No. Adequate survey undertaken	No
Swainsona sericea	Silky Swainson-pea	V	–	Targeted threatened species survey & assumed present in areas lacking survey effort	Yes, potentially recorded (see Section 5.2.6). Assumed present in areas lacking survey effort	Yes
Tylophora linearis	–	V	E	Targeted threatened species survey & assumed present in areas lacking survey effort	Assumed present in areas lacking survey	Yes
Zieria ingramii	Keith's Zieria	E	E	Targeted threatened species survey	No	No

Table 5-12 Determining the presence of candidate fauna species credit species on the subject land in the Inland Slopes 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	EPBC Act			
Regent Honeyeater	*Anthochaera phrygia*	CE	CEM	Within important habitat mapped area	Assumed present	Yes
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Assumed present	Assumed present	Yes
Eastern Pygmy-possum	*Cercartetus nanus*	V	–	Assumed present	Assumed present	Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Assumed present	Assumed present	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	–	Assumed present	Assumed present	Yes
Barking Owl	*Ninox connivens*	V	–	Assumed present	Yes	Yes
Southern Greater Glider	*Petauroides volans*	–	E	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	–	Assumed present	Yes	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Assumed present	Assumed present	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	–	Assumed present	Assumed present	Yes
Koala	*Phascolarctos cinereus*	E	E	Assumed present	Assumed present	Yes
Masked Owl	*Tyto novaehollandiae*	V	-	Assumed present	Assumed present	Yes

Table 5-13 Determining the presence of candidate fauna species credit species on the subject land in the Kerrabee 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	EPBC Act			
Regent Honeyeater	*Anthochaera phrygia*	CE	CEM	Within important habitat mapped area	Assumed present	Yes
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Assumed present	Assumed present	Yes
Eastern Pygmy-possum	*Cercartetus nanus*	V	–	Assumed present	Assumed present	Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Targeted threatened species survey	Yes	Yes
Striped Legless Lizard	*Delma impar*	V	V	Assumed present	Assumed present	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	–	Assumed present	Assumed present	Yes
Broad-headed Snake	*Hoplocephalus bungaroides*	E	V	Assumed present	Assumed present	Yes
Barking Owl	*Ninox connivens*	V	-	Assumed present	Assumed present	Yes
Southern Greater Glider	*Petauroides volans*	–	E	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	–	Assumed present	Assumed present	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Assumed present	Assumed present	Yes
Koala	*Phascolarctos cinereus*	E	E	Assumed present	Assumed present	Yes
Masked Owl	*Tyto novaehollandiae*	V	–	Assumed present	Yes	Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V	–	Targeted threatened species survey	Yes	Yes

Table 5-14 Determining the presence of candidate fauna species credit species on the subject land in the Liverpool Ranges 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	EPBC Act			
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Assumed present	Assumed present	Yes
Eastern Pygmy-possum	*Cercartetus nanus*	V	–	Assumed present	Assumed present	Yes
Striped Legless Lizard	*Delma impar*	V	V	Assumed present	Assumed present	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	–	Assumed present	Assumed present	Yes
Barking Owl	*Ninox connivens*	V	–	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	–	Assumed present	Assumed present	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	–	Assumed present	Assumed present	Yes
Koala	*Phascolarctos cinereus*	E	E	Assumed present	Assumed present	Yes
Masked Owl	*Tyto novaehollandiae*	V	–	Assumed present	Assumed present	Yes

Table 5-15 Determining the presence of candidate fauna species credit species on the subject land in the Pilliga 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	EPBC Act			
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Assumed present	Assumed present	Yes
Eastern Pygmy-possum	*Cercartetus nanus*	V	–	Assumed present	Assumed present	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	–	Assumed present	Assumed present	Yes
Barking Owl	*Ninox connivens*	V	–	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	–	Assumed present	Assumed present	Yes
Koala	*Phascolarctos cinereus*	E	E	Assumed present	Assumed present	Yes
Masked Owl	*Tyto novaehollandiae*	V	–	Assumed present	Assumed present	Yes

Table 5-16 Determining the presence of candidate fauna species credit species on the subject land in the Talbragar Valley 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	**EPBC Act**			
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Assumed present	Assumed present	Yes
Eastern Pygmy-possum	*Cercartetus nanus*	V	–	Assumed present	Assumed present	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	–	Assumed present	Assumed present	Yes
Barking Owl	*Ninox connivens*	V	–	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	–	Assumed present	Yes	Yes
Koala	*Phascolarctos cinereus*	E	E	Assumed present	Assumed present	Yes
Superb Parrot	*Polytelis swainsonii*	V	V	Assumed present	Assumed present	Yes
Masked Owl	*Tyto novaehollandiae*	V	–	Assumed present	Assumed present	Yes

5.2.1 *Acacia ausfeldii*

Acacia ausfeldii was recorded within the subject land during the survey. The specific location where the species was recorded within the subject land was Cope (including the Highett Road Management Area which is a well-known site for this species). *Acacia ausfeldii* was recorded to approximately 450 m east of Highett Road to approximately 1.7 km west of Highett Road. The population in this area is large with thousands of plants expected to be present. A smaller population was also found in the subject land approximately 3.8 km north of Cope Road and 4.4 km east of Blue Springs Road at Cope. *Acacia ausfeldii* was not recorded in any other areas of the subject land. The location of the *Acacia ausfeldii* plants recorded during the field surveys is shown in Figure 14-13.

The habitat constraints for *Acacia ausfeldii* provided in the TBDC are footslopes and low rises on sandstone. The habitat within which *Acacia ausfeldii* was found within the subject land is mapped as Ulan Quartz Monzonite (which is an igneous rock) and Quaternary Alluvium (along Sportsmans Hollow Creek). The geology mapping was observed to be correct in the field, the Cope *Acacia ausfeldii* population occurs on igneous rocks and alluvium. *Acacia ausfeldii* was not found on footslopes or low rises on sandstone during the field survey.

According to the TBDC, *Acacia ausfeldii* occurs with *Eucalyptus albens, E. blakelyi* and *Callitris* spp., with an understorey dominated by *Cassinia* sp. and grasses. Within the subject land at Cope *Acacia ausfeldii* occurs within a different mix of PCTs in forests dominated by a mix of tree species including *Eucalyptus rossii, Eucalyptus tereticornis, Angophora floribunda, Eucalyptus macrorhyncha,* and *Callitris endlicheri* east of Highett Road. A small patch of *Acacia ausfeldii* was present in *Eucalyptus crebra* dominated woodland east of Highett Road. West of Highett Road on the alluvium of Sportsmans Hollow Creek the dominant trees are *Eucalyptus moluccana* and *Eucalyptus tereticornis*. Further west along the subject land there was one *Acacia ausfeldii* plant recorded from *Eucalyptus dealbata* dominant vegetation on hills. Co-occurring shrub species include *Acacia implexa, Sannantha cunninghamii, Styphelia triflora, Lissanthe strigosa, Persoonia linearis, Acacia decora, Hibbertia obtusifolia, Leptospermum polyanthum, Leucopogon muticus, Melichrus urceolatus, Brachyloma daphnoides, Astroloma humifusum, Hibbertia* sp. aff. *riparia, Cassinia sifton, Exocarpos strictus.* The ground layer is characterised by *Aristida ramosa, Microlaena stipoides, Arundinella nepalensis, Themeda triandra, Eulalia aurea, Panicum effusum, Austrostipa densiflora, Echinopogon ovatus, Rytidosperma* spp., *Lomandra* spp., *Cheilanthes sieberi, Goodenia hederacea, Gonocarpus elatus, Laxmannia gracilis, Schoenus apogon* and *Pomax umbellata*.

At Cope, *Acacia ausfeldii* can be the dominant midstorey species. *Acacia ausfeldii* was observed colonising canopy gaps and becoming dominant in open areas including under the existing power lines.

Within the subject land *Acacia ausfeldii* was recorded in an area at the interface of the Sydney Basin (Kerrabee) IBRA region and the NSW South Western Slopes (Inland Slopes) region with plants found on both sides of the IBRA region boundaries.

Photo 5-1 *Acacia ausfeldii* at the Highett Road *Acacia ausfeldii* Management Area at Cope

Photo 5-2 Habitat of *Acacia ausfeldii* in the at the Highett Road *Acacia ausfeldii* Management Area at Cope

Photo 5-3 *Acacia ausfeldii* forming the dominant shrub species west of Highett Road at Cope

Photo 5-4 *Acacia ausfeldii* colonising gaps in the canopy after disturbance at Cope

5.2.2 Eucalyptus camaldulensis population in the Hunter catchment

According to the TBDC the population of River Red Gum in the Hunter 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. The closest known population in a western catchment is at Mudgee, some 50 km from Bylong. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter (NSW Scientific Committee, 2005).

Within the subject land, *Eucalyptus camaldulensis* endangered population was recorded in an area associated with the Quaternary Alluvium of Wilpinjong Creek north of Ulan Wollar Road and Sandy Hollow Gulgong Railway. The location of the *Eucalyptus camaldulensis* endangered population recorded during the field surveys is shown in Figure 14-13. This area is within the Hunter catchment and in the Sydney Basin (Kerrabee) IBRA region.

The *Eucalyptus camaldulensis* trees that occur on the Talbragar River floodplain are not considered to be part of the *Eucalyptus camaldulensis* in the Hunter Catchment endangered population listing as they do not occur in the Hunter catchment. These plants along the Talbragar River floodplain are in the Macquarie catchment.

Photo 5-5 *Eucalyptus camaldulensis* on Wilpinjong Creek

Photo 5-6 Habitat of *Eucalyptus camaldulensis* on Wilpinjong Creek

5.2.3 *Eucalyptus cannonii*

The stringybark eucalypt samples collected from the Durridgere SCA near Summerhill Road (Pilliga IBRA subregion) were identified as *Eucalyptus cannonii* or possible *Eucalyptus cannonii* x *macrorhyncha* hybrids (see correspondence in Appendix F). A definitive identification of these trees was not provided by the Royal Botanic Gardens due to the poor quality of material. The samples from Merotherie (Inland Slopes IBRA subregion) were identified as *Eucalyptus macrorhyncha* and a possible *Eucalyptus cannonii* x *macrorhyncha* hybrid. These non-definitive *Eucalyptus cannonii* plants were found scattered throughout the subject land at localities including Merotherie, Cope, Leadville, and Durridgere. As outlined in *Surveying threatened plants and their habitats; NSW guide for the Biodiversity Assessment Method* (Department for Planning Industry and Environment, 2020), hybrids or intergrades are not considered to be the listed threatened species under the BC Act, unless hybridisation or intergrades are specifically described in the NSW Threatened Species Scientific Committee final determination for that species.

Eucalyptus cannonii x *macrorhyncha* hybrids were recorded during surveys undertaken for the Wilpinjong Extension Project Biodiversity Assessment Report and Biodiversity Offset Strategy (see Hunter Eco, 2015). Impacts to these trees were not assessed as the hybrid is not considered to be the listed threatened species.

Eucalyptus cannonii is distinguished from *Eucalyptus macrorhyncha* by the by its fewer flowered umbels (3–7 as opposed to 7–11), shorter pedicels (1–4 mm as opposed to 2–8 mm), the usually larger distinctly angular buds and the usually larger fruits with a distinct and prominent medial rim (Hunter and White, 2015). The buds on trees observed during the survey were not distinctly angular. However, some trees had fruit with a prominent medial rim.

All stringybark trees that resembled *Eucalyptus macrorhyncha* were checked in the field for fruit and bud features to check for the potential presence of *Eucalyptus cannonii*. All plants that had buds at the time of survey (or where old buds could be found on the ground under the tree) were typical of *Eucalyptus macrorhyncha* with rounded buds (not angular as in *Eucalyptus cannonii*) and generally more than seven flowered umbels. Few trees had fruit but where fruit was available some trees with fruit with a distinct medial rim (which is noted as a feature in *Eucalyptus cannonii*). *Eucalyptus cannonii* was previously classified as a subspecies of *Eucalyptus macrorhyncha* (*Eucalyptus macrorhyncha* subsp. *cannonii*) and the two species are closely related. There is known hybridisation between the two species (see Hunter and White, 2015). Hybridisation is also noted with *Eucalyptus sparsifolia* (see Hunter and White, 2015) which also occurs on the subject land.

The herbarium advice on these plants was not definitive. The subject land is north of the known distribution of *Eucalyptus cannonii* (see map in Hunter and White, 2015) and may be in an introgression zone. The field observations suggest that a hybrid (or potentially undescribed taxon) is present in the subject land. As outlined in *Surveying threatened plants and their habitats; NSW guide for the Biodiversity Assessment Method* (Department for Planning Industry and Environment, 2020), where the NSW herbarium advice is not definitive a precautionary approach is recommended. As such, the assessment of *Eucalyptus cannonii* in this BDAR has taken a precautionary approach and species polygons for non-definitive *Eucalyptus cannonii* plants has been created. The location of the non-definitive *Eucalyptus cannonii* plants is shown in Figure 14-13.

Photo 5-7 Aborted buds on a tree at Merotherie showing rounded form

Photo 5-8 Old fruit on a tree at Merotherie showing medial rim suggestive of *Eucalyptus cannonii*

Photo 5-9 Buds on a tree at Merotherie showing rounded form

Photo 5-10 Immature fruit on a tree at Merotherie showing medial rim suggestive of *Eucalyptus cannonii*

5.2.4 *Dichanthium setosum*

The TBDC indicates that *Dichanthium setosum* occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It is associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.

Within the subject land, *Dichanthium setosum* was recorded on grazing land at Leadville approximately 2.1 m north of the Golden Highway. Twenty plants were recorded in this location. The paddock was relatively heavily grazed at the time of survey so it is likely that this plant is more abundant than counted. The habitat was grazed grassland on rolling hills attributed to a derived grassland form of PCT 618 (White Box x Grey Box – Red Gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley). Species recorded from the habitat during a survey include

Eucalyptus albens, Brachychiton populneus subsp. *populneus, Austrostipa verticillata, Austrostipa aristiglumis, Xanthium spinosum, Malva parviflora, Modiola caroliniana, Eleusine indica, Lachnagrostis filiformis, Cynodon dactylon, Carex inversa, Rumex brownii, Conyza* sp., *Salvia coccinea, Glycine* sp., *Boerhavia dominii, Einadia nutans, Hypericum perforatum, Sida corrugata, Grona varians, Aristida* sp., *Bothriochloa macra, Aristida ramosa, Juncus* sp., *Cirsium vulgare, Onopordum acanthium* subsp. *acanthium, Mentha* sp., *Juncus usitatus, Cyperus gracilis, Sida rhombifolia, Solanum chenopodioides, Solanum cinereum, Eragrostis brownii, Tribulus* sp., *Chloris ventricosa, Convolvulus erubescens,* and *Dichanthium sericeum*. The geology was Pilliga Sandstone downslope of a basalt cap. Basalt enrichment of the soil was evident (heavy red brown clay soils).

During this survey *Dichanthium setosum* was also recorded to the west of Cainbil Creek at Leadville (at the edge of the study area) approximately 360 m north of the Golden Highway. The habitat was disturbed grassland at the edge of PCT 281 (Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion) and PCT 618 (White Box x Grey Box – Red Gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley). Geology was Purlawaugh Formation directly adjacent to the Quaternary Alluvium of Cainbil Creek. Soil was heavy red brown clay. Searches of the adjacent heavily grazed paddocks resulted in no *Dichanthium setosum* plants being found.

These *Dichanthium setosum* plants were recorded from the Sydney Basin (Kerrabee) IBRA region. The location of the *Dichanthium setosum* plants is shown in Figure 14-13.

Another possible *Dichanthium setosum* plant was recorded north of the subject land at Coolah approximately 740 m east of Girragulang Road and approximately 620m south of Collier Road near Collier Creek during initial surveys for this BDAR. This is the location of a *Dichanthium setosum* record outlined in the Valley of the Winds Wind Farm Biodiversity Development Assessment Report (see Eco Logical Australia Pty Ltd, 2022) and is now outside of the subject land.

Other samples of *Dichanthium* sp. from the subject land have been sent to the Royal Botanic Gardens for confirmation of identification.

Photo 5-11 *Dichanthium setosum* recorded during surveys in March 2023

Photo 5-12 Habitat for *Dichanthium setosum* within the subject land – PCT 618 Derived Native Grassland on basalt enriched Pilliga sandstone in the Kerrabee IBRA subregion

5.2.5 *Leucochrysum albicans subsp. tricolor*

Leucochrysum albicans subsp. *tricolor* is listed as Endangered under the EPBC Act and the BC Act.

Leucochrysum albicans subsp. *tricolor* is endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT (Department of Agriculture, Water and the Environment, 2021c; Sinclair, S.J., 2010). The majority of Hoary Sunray subpopulations are in NSW and the ACT where the taxon is still locally common and the species currently occurs on the Southern Tablelands roughly from Bombala to Goulburn, with several records from further north near Mudgee (Department of Agriculture, Water and the Environment, 2021c; Sinclair, S.J., 2010).

Within the subject land, *Leucochrysum albicans* subsp. *tricolor* was recorded at a known site (present on BioNet) at Cope in two different habitat types. The first habitat type was an open forest dominated by *Angophora floribunda, Eucalyptus melliodora, Eucalyptus bridgesiana,* and *Callitris endlicheri* on sandy flats and the second habitat type was *Eucalyptus dealbata* and *Callitris endlicheri* forest on Ulan Quartz Monzonite.

There were 87 *Leucochrysum albicans* subsp. *tricolor* plants recorded during the survey. The location of the *Leucochrysum albicans* subsp. *tricolor* plants is shown in Figure 14-13.

During the survey there were observations of *Leucochrysum albicans* subsp. *tricolor* plants made while commuting to the subject land. *Leucochrysum albicans* subsp. *tricolor* plants were observed on the edge of Barneys Reef Road and Castlereagh Highway at Gulgong.

Photo 5-13 *Leucochrysum albicans* subsp. *tricolor* at Cope

Photo 5-14 Habitat for *Leucochrysum albicans* subsp. *tricolor* at Cope

5.2.6 *Swainsona sericea*

Plants similar to *Swainsona sericea* were recorded from an area of PCT 202 on the Laheys Creek floodplain in the Talbragar Valley IBRA subregion during initial surveys in 2021. This location and other similar habitats along Laheys Creek and in other areas of the subject land undertaken in 2022 and 2023 could only locate the species *Swainsona monticola* and *Swainsona behriana*.

Field observations with an electronic microscope suggest that all the plants from the subject land, including the plants at PCT 202 on the Laheys Creek site (illustrated in Figure 14-13) have basally attached (basifixed) hairs on the stems which is a characteristic of the superficially similar more common congener *Swainsona behriana* and a characteristic that is not found in the threatened species *Swainsona sericea*. Until confirmation of identification is provided by the Royal Botanic Gardens species polygons have been mapped for the threatened species *Swainsona sericea*.

Photo 5-15 Flower detail of *Swainsona behriana* recorded in the subject land during the surveys

Photo 5-16 Stem hair detail of *Swainsona behriana* recorded from the subject land during the survey showing basifixed stem hairs

5.2.7 Regent Honeyeater

The Regent Honeyeater is currently listed as Critically Endangered under both the NSW BC Act and the Commonwealth EPBC Act. Its distribution ranges from north-eastern Victoria to south-eastern Queensland. Within NSW the species is confined to two key breeding regions, at Capertee Valley and the Bundarra-Barraba region, as well as fragmented woodlands in the surrounding area (Office of Environment and Heritage 2022). Commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, the Regent Honeyeater shows a preference for woodland that features a high canopy cover, significantly high numbers of mature trees, and an abundance of mistletoe (Office of Environment & Heritage 2022). They are also known to inhabit riparian vegetation and lowland coastal forest as well as a range of other habitats including planted vegetation in gardens and parks, remnant farmland trees and roadside reserves.

The species' National Recovery Plan identifies the following as key tree and mistletoe species for the Regent Honeyeater; Mugga (or Red) Ironbark (*Eucalyptus sideroxylon*) Yellow Box (*E. melliodora*) White Box (*E. albens*) Yellow Gum (*E. leucoxylon*) Spotted Gum (*Corymbia maculate*) Swamp Mahogany (*E. robusta*) Needle-leaf Mistletoe (*Amyema cambagei*) on River She-oak (*Casuarina cunninghamiana*) Box Mistletoe (*A. miquelii*) Long-flower Mistletoe (*Dendrophthoe vitellina*). The Regent Honeyeater's diet consists primarily of nectar from the aforementioned key species, however it can include invertebrates and their exudates as well as occasionally fruit (Commonwealth of Australia 2016). As taller and larger diameter trees typically produce more nectar these are preferred for foraging, while tall mature Eucalypts and She-oaks are selected for nesting as well as occasionally the haustoria of mistletoe (Office of Environment and Heritage 2022).

No visual observations of the Regent Honeyeater were made during survey periods. Due to its distinctive black and yellow colouring, as well as its characteristic patch of dark pink or cream-coloured facial-skin around the eye, it was unlikely to have been incorrectly identified as another honeyeater species. As Regent Honeyeaters undertake large-scale nomadic movements this highly mobile species may only occur as a vagrant, and it remains a consideration as it has previously been highly recorded within the wider study site region (Atlas of Living Australia 2022; Bionet 2022; Commonwealth of Australia 2016).

The National Recovery Plan for the Regent Honeyeater describes habitat critical to its survival as any breeding or foraging areas where the species is likely to occur and, as a flagship species, the conservation advice for the Regent Honeyeater can have a positive flow on effect for a larger suit of declining and threatened woodland fauna (Office of Environment & Heritage 2022). While the Capertee Valley contains one of the key breeding regions, other subsidiary breeding areas are considered likely to be used also. This includes the Mudgee-Munghorn Gap-Wollar subsidiary which is partially situated within the study area (Commonwealth of Australia, 2016). Important habitat for this species which resides within subject land has been mapped and is subject to Serious and Irreversible Impact (SAII) assessment. This species is assumed to be present due to the presence of such habitat within the subject land, as such the assessment of the Regent Honeyeater within this BDAR reflects this assumption.

5.2.8 Glossy Black-cockatoo

The Glossy Black-cockatoo is currently listed as Vulnerable under both the NSW BC Act and Commonwealth 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 (Department of Environment & Conservation, 2004; Office of Environment & Heritage, 2022). Suitable habitats all feature the Glossy Black-cockatoos preferred food trees, She-oaks (*Allocasuarina* spp.), yet vary from coastal dry eucalypt forests and woodlands, to forested watercourses and open inland woodlands.

Black She-oak (*A. littoralis*) and Forest She-oak (*A. torulosa*) are important foods coastally, with inland populations feeding on Drooping She-oak (*A. verticillata*) and Belah (*Casuarina cristata*) while the shrubbier *A. gymnanthera* and *A.* diminuta are particularly important within the cypress / ironbark forests of the north-west (Department of Environment & Conservation, 2004; Office of Environment & Heritage, 2022). Glossy Black-cockatoos feed almost exclusively on the seeds of these She-oak species. Due to the Glossy Black-cockatoos dependence on She-oaks, it is important that habitat containing She-oaks within the subject land be maintained where possible for foraging opportunities. Additionally, further habitat fragmentation may have negative consequences for foraging efficiency due to an increase in distance between potential nesting and food areas which could lead to a population decline (NSW Scientific Committee, 2008).

While the presence of She-oaks is a determining factor for habitat selection, Glossy Black-cockatoos also require large tree hollows in Eucalypts, both living or dead, for nesting (Department of Environment & Conservation, 2004). These nesting hollows are on average 26 cm wide and up to 1.4 m deep, commonly in a living tree within a dead spout (NSW Scientific Committee, 2008). In autumn or winter, an individual egg is usually laid, with a single chick raised per clutch annually (NSW Scientific Committee, 2008). For this reason, all suitable hollow-bearing trees were documented within the subject land and will be incorporated into autumn/winter survey periods for targeted Glossy Black-cockatoo breeding surveys.

Visual observations during diurnal bird surveys, as well as opportunistically, were undertaken to determine presence of Glossy-black Cockatoos within the subject land. This species can be distinguished from other similar looking birds including the Red-tailed Black-Cockatoo and the Yellow-tailed Black Cockatoo as it has a shorter crest and a quieter call (NSW Scientific Committee, 2008). During field surveys particular attention was paid to stands of She-oaks for evidence of Glossy Black-cockatoo feeding, which is characterised by chewed cones littering the ground underneath these trees with chewed cones located south of the Merotherie hub (Inland Slopes IBRA subregion) (Department of Environment & Conservation, 2004). Despite such evidence, no individuals were observed during diurnal bird surveys. However, the alignment resides within land mapped as a priority management area for Glossy Black Cockatoos – thus the assessment of Glossy Black Cockatoos in this BDAR has taken a precautionary approach, until targeted field surveys are completed.

Photo 5-17 Chewed *Allocasuarina verticillata* fruit recorded at Cope

Photo 5-18 Chewed *Callitris glaucophylla* fruit recorded at Merotherie

5.2.9 Little Eagle

The Little Eagle (*Hieraaetus morphnoides*) is listed as Vulnerable under the NSW BC Act, and currently not listed as threatened under the Commonwealth EPBC Act.

The Little Eagle occurs as a single population throughout NSW but is found throughout the Australian mainland except the most densely forested parts of the Dividing Range escarpment. It typically occupies open eucalypt forests, woodlands or open woodlands and pastures. They have been observed utilising Sheoak or Acacia woodland and riparian woodlands of inland NSW, with a strong association to Yellow box – Red Gum Grassy Woodland and Derived Native Grassland. Little Eagles build their nests in tall, living trees within a remnant patch, where pairs build a large stick nest in winter. Adult breeding Little Eagles are resident in permanent home ranges for at least several consecutive years, individuals and juveniles however are quite dispersive and can travel up to 3000 km away (Brawata et al. 2018; Rae et al. 2019).

Little Eagles are carnivorous, eating mainly rabbits, birds and reptiles (Emison et al. 1987). This species is heavily dependent on rabbits, which are in abundance in open pastures, grassland and woodland where Little Eagles are known to occupy regularly. Since the rabbit population in Australia has continued to decline, Little Eagles have become increasingly dependent on native prey. This places them in competition with other birds of prey particularly the Wedge-tailed Eagle, which is a common species found within the subject land. One of the largest threats facing Little Eagles is loss of breeding habitat and nest sites either by urbanisation, high-density rural subdivision, or clearing leading to competition with Wedge-tailed Eagles (Debus 2017, Larkin et al. 2020). Given the number of records historically, abundance of breeding and foraging habitat and prey species in the area, the Little Eagle is likely to utilise habitat found within the subject land either as a seasonal vagrant or permanent home range during breeding seasons.

Two Little Eagles were opportunistically observed flying over the subject land, west of Merotherie Road (Inland Slopes IBRA subregion), in July 2022 – one of the individuals carrying nesting material then later taking respite in a stag in derived native grassland (Map 8 of 26). These individuals were distinguished from similar species, particularly the Whistling Kite, by identifying the bird's erratic, floating flight pattern, wing size, sexual dimorphism and characteristic pale bar across the wings. A large stick nest was identified following this observation, located north-west of where the individuals were first sighted (Map 9 of 26). The stick nest was found at the top of a living *Eucalyptus macrorhyncha* west of Merotherie Road, with white downy feathers and skeletal fragments found at the base of the tree – which suggests either recent or previous occupation of the nest and presence of potential breeding habitat within the study area. Given such evidence was found, the possibility of the species occurrence in the subject land cannot be discounted thus a species polygon has been created within the nest tree location with a 300 m buffer. This is in accordance with the ACT offset guidelines for this species in absence of species survey guidelines from DPE.

Photo 5-19 Little eagle (*Hieraaetus morphnoides*) potential nest, found at Merotherie Hub

5.2.10 Masked Owl

The Masked Owl is currently listed as Vulnerable under the NSW BC Act and is currently not listed as a threatened species under Commonwealth legislation. This species is recorded across 90 % of NSW with a home-range of approximately 1,000 ha for a breeding pair (Office of Environment & Heritage 2017). Masked Owls avoid areas of young regrowth, utilising dry Eucalypt forest and woodlands greater than 60 years old, with optimal habitat featuring a mosaic understorey of dense shrubby and sparse grassy ground cover ideal for hunting their preferred prey species which includes ground dwelling mammals, especially rats (Department of Environment and Conservation 2006; Office of Environment & Heritage 2017).

Roost sites are generally hollows in Eucalypts greater than 5 m above ground, live or dead, dense foliage in moist Eucalypt gullies, and recesses in cliffs or caves. While nesting also occurs in old Eucalypts hollows these are generally 3 m above the ground, in live or dead trees measuring at least 90 cm diameter at breast height. Further, these hollows must be greater than 40 cm wide and 1 m deep for Masked Owl nesting suitability (Department of Environment and Conservation 2006). Clearing of native vegetation has been identified as a key threatening process to Masked Owl survival, with further potential negative affects linked to the removal of dead wood and dead trees (Department of Environment and Conservation 2006).

While no individuals were visually observed during survey, EMM did make a positive observation in 2021 in the north-western branches of the alignment (Map 18 of 26) (Pilliga IBRA subregion). A Masked Owl was also heard responding to call playback within the Wilpinjong mine site 6 (Map 13 of 26) (Kerrabee IBRA subregion). This species is distinguished from the similar Barn Owl (*Tyto alba*) due to its heavier build, feathered lower legs and its more prominent dark border to the heart-shaped facial disk. The dark form of the Masked Owl contrasts against the golden colour of Barn Owls and is also much darker than the Sooty Owl (*Tyto tenebricosa*) (Department of Environment and Conservation 2006). Given the abundance of suitable habitat within the subject land and evidence of occurrence, species polygons have been created as a precaution.

5.2.11 Barking Owl

The Barking Owl (*Ninox connivens*) is considered Vulnerable under the NSW BC Act, but it is currently not listed as a threatened species under Commonwealth legislation. The Barking Owl is a medium-sized owl with a body length of approximately 42 centimetres and an average weight of 650 grams. Its eyes are bright yellow, and it has white breast that is vertically streaked with brown. There is a slight sexual dimorphism with males being larger than females and a squarer crown. They have a distinctive dog-like territorial call, which provided them with their common name.

The Barking Owl is distributed throughout continental Australia, with the exception of the central arid regions. In NSW it has a wide but sparse distribution, with core populations occurring on the western slopes and plains, and some northeast forests. 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. Thus, this species is particularly vulnerable to clearing of woodland habitat, as a result confining its distribution to linear riparian strips of remnant trees. However, in a study in South-Eastern Australia, the Barking Owl was rarely recorded in remnant forest (Kavanagh and Stanton 2002). A study across State Forests in NSW also found a low occurrence of Barking Owls, raising concern about its conservation status (Parker, Webster et al. 2007). Furthermore, the 2019-2022 wildfires greatly reduced the habitat quality and quantity further, as many old, hollow-bearing trees were burnt (Milledge and Soderquist 2022), putting the species at further risk of decline.

The roosts are located in shaded portions of tree canopies, including tall mid-storey trees. It prefers 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. It predominantly hunts small arboreal mammals, such as sugar and squirrel gliders and common ringtail possums. When these prey are becoming less abundant, due to for example the loss of tree hollows, the owl becomes more reliant on native birds, invertebrates and terrestrial mammals (Debus, Shepherd et al. 1998, Debus and Rose 2003).

Territorial pairs respond strongly to playback of calls, and through this method a pair has been located in the subject land. They were found off Blue Springs Road, in the IBRA subregion Inland Slopes, in a patch of forest containing multiple habitat trees. Thus, the subject land contains suitable nesting habitat for this species, and a territorial pair has been located along the alignment.

Photo 5-20 Barking Owl recorded from Blue Springs Road at Stubbo during the survey

5.2.12 Squirrel Glider

While not listed as threatened under the Commonwealth's EPBC Act 1999, the Squirrel Glider's conservation status within NSW is considered Vulnerable (Biodiversity Conservation Act, 2016). 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 two genetically distinct geographical groups, the northern coastal population and the southern population west of the Great Dividing Range (Pavlova et al. 2010).

West of the Great Dividing Range, Squirrel Glider's inhabit mature or old growth River Red Gum forest as well as Box and Box-Ironbark woodlands with a preference for stands of mixed species featuring an Acacia dominated or shrubby mid-storey. These habitat preferences reflect the varied seasonal diet of Squirrel Gliders which includes Acacia gum, Eucalyptus sap, nectar, manna, honeydew and pollen, alongside the consumption of invertebrates (Office of Environment & Heritage 2022). A study of Squirrel Gliders at Bungawalbin, Northern NSW, demonstrated that Banksia and Eastern Red Gum / Northern Grey Ironbark habitats were common across all home ranges, as they feature both winter- and spring-flowering trees (Sharpe & Goldingay 2007). While other studies have identified a preference for Grey Box (*Eucalyptus macrocarpa*) and Yellow Box (*Eucalyptus melliodora*) amongst southern populations in the absence of flowering trees (Mason et al. 2017).

An abundance of tree hollows, for refuge and nesting, is a species requirement for the Squirrel Glider with an average of 5–7 trees utilised as den sites per individual, with 3 den trees per hectare all within close proximity to feeding sites (Crane et al, 2010). A variety of Eucalyptus trees are utilised for nesting, with a preference for Grey Box and an average of 93 cm diameter at breast height across all den tree species (Mason et al. 2017). Studies of Squirrel Glider's on the south-western slopes showed that 'countryside elements' featuring woody vegetation were utilised by the species, specifically old growth Eucalyptus with scattered paddock trees of particular importance. The other 'countryside elements' identified included linear roadside stands, native vegetation patches, scattered trees and tree plantings (when tree plantings were in association with another of the aforementioned elements) (Crane et al 2014).

Potential habitat was consequently mapped during floristic surveys, including an area of approximately 1 km of proposed transmission line for each of the associated Plant Community Types: PCT 440 Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland, and PCT 479 Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest. The identification and mapping of hollow-bearing trees across the survey site, as scattered paddock trees demonstrate a disproportionately high value for Squirrel Gliders, was also undertaken with an abundance of suitable trees identified.

Squirrel Gliders have been identified previously close to the subject land within the Dunedoo LGA, Ulan Coal Mine area and Durridgere State Conservation Area (ALA & Bionet NSW). Targeted searches including stag watches were undertaken at dusk, in areas where hollow-bearing trees and senescing Eucalypts were identified within the subject land, to observe for potential Squirrel Gliders. Following stag watches, nocturnal spotlighting transects were also undertaken through areas of potentially favourable habitat including woody vegetation. Identification of individuals was based on the species distinctive observable characteristics. That is, with a head and body length of approximately 20 cm, and a bushy tail as wide as the body at the base and up to 27 cm long, Squirrel Gliders are twice as large as the Sugar Glider, for whom they are often mistaken (Office of Environment & Heritage 2022). The facial markings of Squirrel Gliders are also more distinct, with a dark stripe between the eyes through to the mid-back. With a white to creamy yellow belly and blue-grey to brown-grey fur above, Squirrel Gliders also feature a blackened tail tip (Office of Environment & Heritage 2022). Squirrel Gliders were observed on multiple occasions utilising several hollow-bearing trees contained within linear roadside reserves on Spring Ridge Road (Talbragar Valley IBRA subregion) (Map 2 of 26). Individuals were identified in the road reserve in late August, and again in December 2022. Several individuals were sighted across two nights consecutively in December, with several utilising the same hollows across both nights. This suggests the habitat contained within the road reserves is essential for maintaining existing populations and connectivity to other remnant patches in the immediate vicinity.

The protection of linear roadside elements, native vegetation patches and scattered trees connectivity is of utmost importance. As Squirrel Gliders rarely come to ground, and their maximum glide distance is 70 m, gaps between canopy trees greater than this distance are considered barriers to movement (van der Ree et al. 2004). Given this, the species is particularly vulnerable to clearing and habitat loss as they are dependent on such corridors for movement. Despite much of the land within the subject land containing sufficient patches of woodland, the linear patches of woodland along road edges and creek lines are often considerable in length. Works associated with the project, during both construction and operational phases, have the potential to fragment currently occupied vegetation within these road edges – ultimately placing existing populations at risk of isolation and reduction if such habitat is removed.

Photo 5-21 Squirrel glider (*Petaurus norfolcensis*)

Photo 5-22 Mature large-eared pied bat (*Chalinolobus dwyeri*), caught in a harp trap at the Ulan mine site

5.2.13 Large-eared Pied Bat

The Large-eared Pied Bat (*Chalinolobus dwyeri*) is considered Vulnerable under both the NSW BC Act and Commonwealth EPBC ACT.

Large-eared Pied Bats are patchily distributed across eastern Queensland and New South Wales, predominantly in areas with volcanic rock and sandstone outcrop that provide escarpments for roosting (Dwyer 1966, Sinclair 2010). It is generally assumed that potential breeding habitat is located within 100m of rocky areas containing caves, overhangs, crevices, cliffs, old mines, tunnels and culverts. Radio-tracking of seven individuals found that both sexes roosted in west-facing cliff faces without large caverns. Bats switched roosts almost daily over the tracking period (4–5 nights) but tended to remain close to the preceding roost, indicating a fidelity to the roost area. This suggests this species might be more vulnerable to habitat loss at a local scale than more generalist species (Williams and Thomson, 2019).

Tracking of these insectivorous bats also revealed a preference for foraging along forest edges at mid-to-upper-canopy height and on the outer canopy of individual trees. Foraging habitat included grassland-forest border, creeks, and a drainage gully with wet vegetation types (Williams and Thomson 2019). The species' breeding and maternity behaviour are poorly known, and the only information available is based on observations from a roost located in 1966, which has been flooded since, and from a maternity roost located in 2001 (Pennay 2008). This more recent study revealed females give birth to twins in the first half of November. The cave was well insulated and seemed to be used long-term (Pennay 2008).

Large-eared Pied Bat calls have been recorded 37 times through passive acoustic recording across 7 Anabats (see Appendix G). Furthermore, two individuals were caught in the Wilpinjong escarpment, off Ulan Wollar Road (Map 13 of 26) (Kerrabee IBRA subregion). The species was identified by the absence of a leaf-nose, the wattle on the lower outer edge of the ear, near the corner of the mouth and the glossy black fur on the back with white stripes along the junction of the belly fur and the wing membranes, joining at the groin (Churchill 1998). This species roosts near the entrances of caves, in crevices in cliffs, and in old mine workings. Harp traps were thus set up along a cliff edge, resulting in the capture of the species on the first night and the fourth night. One individual was an adult regressed female, the second individual was a juvenile male, for which an age of 2–3 months was estimated based on the degree of joint fusion. Given the trapping occurred just after the maternity season, it is possible the female was reproductive this year, and the juvenile was from this year's cohort. During sunset, distinctive calls of Large-eared Pied Bats were recorded in the same area, using an Anabat Walkabout. This suggests the subject land contains potential breeding habitat for this species, with the roosts sites likely to be within the immediate locality. It is important to note that there are no caves in the subject land.

The subject land falls within their known distribution and many occurrences of this species have been recorded in the vicinity. Furthermore, the habitat in the broader assessment area contained rocky escarpments and caves for roosting, and forest edges for foraging. Additionally, the conducted surveys indicate the presence of potential breeding habitat in close vicinity to the alignment but it is important to note that there are no caves in the subject land. In combination with the species' relative roost and foraging area fidelity, loss of both foraging and breeding habitat caused by the project could have a detrimental impact on this species. As such, species polygons have been created within identified breeding and foraging habitat with a 100 m buffer applied, with the breeding habitat features as the centroid as is outlined in *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method.*

5.2.14 Large Bent-winged Bat

The Large Bent-wing Bat (or Eastern bent-wing bat; *Miniopterus orianae oceanensis)* is listed as Vulnerable under the NSW BC Act and is currently not listed under the Commonwealth EPBC Act. The species has recently been renamed to *Miniopterus orianae oceanensis* from *Miniopterus schreibersii* subsp. *oceanensis*, or the Eastern bent-wing bat. The Large Bent-wing Bat uses a variety of habitat, including rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grasslands (Churchill, 1998). When in forested areas, these bats fly above the canopy. In open areas they can be found flying within six meters of the ground. The study area has highly suitable habitat for the species. It contains cliff edges with numerous caves, and forested areas for foraging.

The species' distribution extends along the eastern coast of mainly New South Wales, with occurrences in Victoria and Queensland. The species' distribution extends halfway into NSW. The large Bent-wing bat is one of the few Australian microbats that are known to migrate, yet migrating patterns are still largely unknown. Knowledge is mostly based on studies in the 1960s and showed that females migrate from winter roosts to maternity sites in NSW during spring (Dwyer 1963, Dwyer 1963, Dwyer and Hamilton-Smith 1965, Dwyer 1966, Dwyer 1969). Females arrive at the maternity roost in early to mid-December, and autumn migration commences approximately 83–87 days after the commencement of arrival of adult females at the maternity roost (Mills 2021). Over-wintering sites habitat include urban areas, including parts of Greater Sydney (White, 2011). A roost site was found near the subject land, at Slate Gully, which is located west of Wollar, 45 km north-east of Mudgee, NSW, and part of the Peabody Wilpinjong Coal Mine. In 2014, post-lactating adult females and recently free-flying young were discovered, revealing its potential as a breeding roost. However, individuals were observed exiting the roost only from February to November (Lothian and Hoye, 2023). It is important to note that there are no caves in the subject land so no breeding habitat for this species is present.

Large Bent-winged bat calls have been recorded 89 times through passive acoustic recording across 7 Anabats (see Appendix G). One non-reproductive male was caught during targeted surveys using harp traps in the Wilpinjong escarpment, off Ulan Wollar Road (Map 13 of 26) (Kerrabee IBRA subregion). The species was identified by the absence of a leaf-nose, the second phalanx of the third finger being three times as long as the first phalanx, giving the wing its bent appearance, and the greater forearm length (Churchill, 1998). Further, the Large Bent-wing bat has chocolate to reddish brown fur on its back, and a slightly lighter belly. It has short round ears, and weights up to 20 grams.

5.2.15 Eastern Cave Bat

The Eastern Cave bat (*Vespadelus troughtoni*) is considered Vulnerable under the NSW BC Act, and currently not listed as a threatened species under Commonwealth legislation.

This cave-dwelling species roosts in small groups [up to 240 individuals (Law and Chidel 2007)] in caves (usually sandstone, limestone or volcanic substrates), mine tunnels, road culverts, and occasionally in buildings (Parnaby, Law et al. 2008). They have also been found to frequently roost in old Fairy Martin (Hirundo ariel) nests in far northeastern NSW (Schulz 1998). Radio-tracking of five bats found maternity roosts in overhangs of large sandstone caves, usually containing a dome at the rear. Searches revealed that small caves, crevices, and small overhangs were not used as day-roosts. The radio-tracked bats switched roosts frequently. Most of the inter-roost movements were within 1.5 km, with the exception of one female moving 3.75 km between roosts (Law, Chidel et al. 2005). A maternity group has also been found roosting beneath the corrugated iron roof of a farm shed. It is possible females chose the location for its microclimate's thermoregulatory and thus energetic benefits during lactation, compared to the more stable microclimate of a cave (Law and Chidel 2007).

The species can be found in rainforest margins, tropical and temperate forests, woodlands and semiarid environments. Foraging occurred predominantly along streams that were lined with trees, and surrounded by cleared paddocks, and it suggested that a key habitat requirement is the presence of native vegetation in close proximity to roosts. However, extensive forested area may not be required for this species (Law, Chidel et al. 2005). Generally, the species is found in dry forests and woodlands within proximity to rocky habitats. The broader assessment area contains these required habitat parameters, with cliff edges containing a multitude of caves found in Kerrabee. As the species does not need extensive forested areas for foraging, the subject land likely provides ideal habitat for foraging. Habitat loss due to development in the subject land could thus have a detrimental impact on this species.

The species’ call was recorded eight times across seven Anabats (see Appendix G). Six individuals were caught using harp traps in the Wilpinjong escarpment, off Ulan Wollar Road (Map 13 of 26) (Kerrabee IBRA subregion). Two were adult males with regressed testes, three were non-reproductive adult males and one was a subadult female. This species has an average body length of 40 mm. It looks very similar to Vespadelus regulus. However, the fur is longer and darker (chestnut-brown with rufous tones on the head), and the skin on the face, wings and ears is darker. A definite distinction between species can be made using the penis morphology. The Eastern Cave bat can only be found in Australia, and it is distributed along the East Coast of Australia, and adjacent inland ranges, ranging from Sydney to the Iron Range on Cape York Peninsula (Parnaby, Law et al. 2008). However, while widely distributed, its distribution is highly localised, with the availability of suitable roosting habitat a possible limitation of distribution. Due to the abundance of both breeding and foraging habitat present within the broader assessment area and multiple observations of this species recorded on site, species polygons have been created within identified breeding and foraging habitat with a 100 m buffer applied, as is outlined in *‘Species credit’ threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method.*

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.

Reference sites for threatened plant species were used to determine likely detectability at the time of survey. Reference sites for most species were not available near to the subject land, or publicly accessible, but the following reference sites were used:

- *Prasophyllum petilum*: a reference site for this species in the Ilford locality was visited. *Prasophyllum petilum* was noted in flower at this site on 24 October 2022. Georeferenced and date/time stamped photos of the species at this location can be provided upon request.
- *Swainsona recta and Swainsona sericea*: A reference site for these two species near Mudgee was visited on 12 September 2022. The two species grow together at this location and were detectable. Georeferenced and date/time stamped photos of the species at this location can be provided upon request.
- *Diuris tricolor*: A reference site for this species near Dubbo was visited on 17 September 2022. *Diuris tricolor* was in flower at the site. Georeferenced and date/time stamped photos of the species at this location can be provided upon request.
- *Leucochrysum albicans* var. *tricolor* (syn. *Leucochrysum albicans* subsp. *tricolor*): Observed in flower on the edge of Barneys Reef Road and Castlereagh Highway at Gulgong in October 2022. Plants in the subject land at Cope had finished flowering by March 2023. Georeferenced and date/time stamped photos of the species at this location can be provided upon request.
- *Euphrasia arguta*: The known population in Nundle State Forest was visited in January 2023. *Euphrasia arguta* was in flower at this site. Georeferenced and date/time stamped photos of the species at this location can be provided upon request.

The surveys undertaken for threatened flora species are outlined in detail in Section 2.3. Table 5-17 to Table 5-21 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 5-22 to Table 5-26 outline the survey effort undertaken for threatened animal species in the subject land to date.

Table 5-17 Threatened flora species surveys for candidate flora species credit species within the Inland Slopes subregion

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Acacia ausfeldii	Ausfeld's Wattle	2-phase grid (Aug – Oct) Finer scale grid (October 2022 & February 2023) Surveyed for year round	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19 Sept 22 10 Oct 22 24-27 Oct 22	☒ No 21 Nov 22 27-28 Feb 23 Mar 23 Survey undertaken within the known Cope population to determine extent by ecologist familiar with the species and the differences between *A. ausfeldii* and *A. verniciflua*. *A. ausfeldii* was in bud in Feb 2023 allowing for examination of white hairs on peduncles.	01-05 Sept 22: 6 people x 7.5 hrs 06-07 Sept 22: 2 people x 7.5 hrs 13-16 Sept 22: 4 people x 7.5 hrs 19-20 Sept 22: 3 people x 7.5 hrs 10 Oct 22: 4 people x 7.5 hrs 24 Oct 22: 5 people x 7.5 hrs 25-27 Oct 22: 7 people x 7.5 hrs 21 Nov 22: 2 people x 7.5 hrs 27-28 Feb 23: 2 people x 12 hrs	PCT 266 – 38.6 km PCT 277 – 127.7 km PCT 281 – 416.3 km PCT 461 – 12.2 km	Yes	Yes. Recorded during the survey. Presence assumed where survey not undertaken.
Dichanthium setosum	Blue Grass	2-phase grid Nov – May	☒ Yes 21 Nov 22 24 Nov 22 13 Dec 22 27 Feb 23 30 Jan 23 02 Feb 23 March 23	☐ No	21 Nov 22: 2 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 13 Dec 22: 2 people x 7.5 hrs 27 Feb 23: 2 people x 7.5 hrs 30 Jan 23: 2 people x 7.5 hrs 02 Feb 23: 4 people x 7.5 hrs	PCT 81 – 7.2 km PCT 281 – 38.7 km PCT 461 – 7.5 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Diuris tricolor	Pine Donkey Orchid	2-phase grid Sept – Oct	☒ Yes 1-7 Sept 22 13-16 Sept 22 19 Sept 22 10-11 Oct 22 24-27 Oct 22	☐ No	1-7 Sept 22: 6 people x 7.5 13-16 Sept 22: 5 people x 7.5 19 Sept 22 : 2 people x 7.5 10-11 Oct 22: 4 people x 7.5 24-27 Oct 22: 6 people x 7.5	PCT 202 – 7.2 km PCT 281 – 321.6 km PCT 461 – 4.0 km	Presence assumed where survey not undertaken.	Yes. Presence assumed where survey not undertaken.
Eucalyptus cannonii	Capertee Stringybark	2-phase grid Year round	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19 Sept 22 10 Oct 22 24-27 Oct 22 21 Nov 22 27-28 Feb 23	☐ No	01-05 Sept 22: 6 people x 7.5 hrs 06-07 Sept 22: 2 people x 7.5 hrs 13-16 Sept 22: 4 people x 7.5 hrs 19-20 Sept 22: 3 people x 7.5 hrs 10 Oct 22: 4 people x 7.5 hrs 24 Oct 22: 5 people x 7.5 hrs 25-27 Oct 22: 7 people x 7.5 hrs 21 Nov 22: 2 people x 7.5 hrs 27-28 Feb 23: 2 people x 12 hrs	PCT 440 – 174.1 km PCT 461 – 12.2 km PCT 478 – 6.5 km PCT 479 – 48.0 km PCT 1177 – 24.6 km	Yes Recorded during the survey.	Yes.
Euphrasia arguta	-	2-phase grid Nov – Mar	☒ Yes 30 – 02 Feb 23 15 Feb 23 27 Feb 23	☐ No	30 Jan 23: 4 people x7.5 31 – 02 Feb 23: 2 people x7.5 15 Feb 23: 2 people x7.5 27 Feb 23: 2 people x7.5	PCT 266 – 8.4 km PCT 277 – 48.0 km PCT 281 – 38.7 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Homoranthus darwinioides	Fairy Bells	2-phase grid Mar – Dec	☒ Yes 1-5 Sept 22 16 Sept 22	☐ No	1-5 Sept 22: 6 people x7.5 16 Sept 22: 4 people x7.5	PCT 440 – 171.3 km	No.	No. Not recorded during the survey.
Pomaderris cotoneaster	Cotoneaster Pomaderris	2-phase grid Oct – Nov	☒ Yes 10 Oct 22 24 Oct 22 25-27 Oct 22 21 Nov 22	☐ No	10 Oct 22: 4 people x 7.5 hrs 24 Oct 22: 5 people x 7.5 hrs 25-27 Oct 22: 7 people x 7.5 hrs 21 Nov 22: 2 people x 7.5 hrs	PCT 478 – 1.7 km	No.	No.
Pomaderris queenslandica	Scant Pomaderris	2-phase grid All year	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19 Sept 22 10 Oct 22 24-27 Oct 22 21 Nov 22 27-28 Feb 23	☐ No	01-05 Sept 22: 6 people x 7.5 hrs 06-07 Sept 22: 2 people x 7.5 hrs 13-16 Sept 22: 4 people x 7.5 hrs 19-20 Sept 22: 3 people x 7.5 hrs 10 Oct 22: 4 people x 7.5 hrs 24 Oct 22: 5 people x 7.5 hrs 25-27 Oct 22: 7 people x 7.5 hrs 21 Nov 22: 2 people x 7.5 hrs 27-28 Feb 23: 2 people x 12 hrs	PCT 440 – 174.1 km	No.	No.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Prasophyllum petilum	Tarengo Leek Orchid	2-phase grid Finer scale grid Sept – Dec	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19-20 Sept 22 10-11 Oct 22 24-27 Oct 22 21 Nov 22 24 Nov 22	☐ No	1-7 Sept 22: 8 people x 7.5 13-14 Sept 22: 4 people x 7.5 16 Sept 22: 4 people x 7.5 19-20 Sept 22: 2 people x 7.5 10-11 Oct 22: 4 people x 7.5 24-27 Oct 22: 4 people x 7.5 21 Nov 22: 2 people x 7.5 24 Nov 22: 2 people x 7.5	PCT 277 – 48.3 km PCT 281 – 324.3 km	No. This species was not recorded within the subject land during the survey. Samples sent to Herbariums for confirmation of identification were *Prasophyllum campestre* and *Prasophyllum patens* (see Appendix F).	Yes. Presence assumed where survey not undertaken.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Swainsona sericea	Silky Swainson-pea	2-phase grid Sept – Nov	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19-20 Sept 22 10-12 Oct 22 24-27 Oct 22 21 Nov 22	☐ No	1-7 Sept 22: 2 people x 7.5 13-14 Sept 22: 5 people x 7.5 16 Sept 22: 5 people x 7.5 19-20 Sept 22: 3 people x 7.5 10-12 Oct 22: 4 people x 7.5 24-27 Oct 22: 7 people x 7.5 21 Nov 22: 3 people x 7.5	PCT 202 – 7.2 km PCT 266 – 1.6 km PCT 277 – 48.3 km PCT 281 – 324.3 km PCT 440 – 143.3 km PCT 461 – 4.0 km	Yes. Potentially recorded during the survey.	Yes. Presence assumed where survey not undertaken.
Swainsona recta	Small Purple-pea	2-phase grid Sept – Nov	☒ Yes 1-7 Sept 22 13-14 Sept 22 16 Sept 22 19 Sept 22 10-11 Nov 22 24 Nov 22	☐ No	1-7 Sept 22: 2 people x 7.5 13-14 Sept 22: 3 people x 7.5 16 Sept 22: 3 people x 7.5 19 Sept 22: 2 people x 7.5 10-11 Nov 22: 4 people x 7.5 24 Nov 22: 5 people x 7.5	PCT 266 – 1.6 km PCT 277 – 48.3 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Tylophora linearis	–	2-phase grid Oct – May	☒ Yes 25 Oct 22 31 Jan 23 02 – 3 Feb 23 15 Feb 23 27 Feb 23	☐ No	25 Oct 22: 2 people x 7.5 31 Jan 23: 2 people x 7.5 02 – 3 Feb 23: 4 people x 7.5 15 Feb 23: 2 people x 7.5 27 Feb 23: 2 people x 7.5	PCT 440 – 60.7 km PCT 461 – 11.4 km	No	No.

Table 5-18 Threatened flora species surveys for candidate flora species credit species within the Kerrabee subregion

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Acacia ausfeldii	Ausfeld's Wattle	2-phase grid (Aug – Oct)	☒ Yes 1-7 Sept 22 24, 26-27 Oct 22	☒ No 21 Nov 22 27-28 Feb 23 Survey undertaken within the known Cope population to determine extent by ecologist familiar with the species and the differences between *A. ausfeldii* and *A. verniciflua*. *A. ausfeldii* was in bud in Feb 2023 allowing for examination of white hairs on peduncles.	01-05 Sept 22: 6 people x 7.5 hrs 06-07 Sept 22: 2 people x 7.5 hrs 13 Oct 22: 4 people x 7.5 hrs 24 Oct 22: 5 people x 7.5 hrs 26-27 Oct 22: 7 people x 7.5 hrs 21-22 Nov 22: 2 people x 7.5 hrs	PCT 277 – 11.6 km PCT 281 – 275.4 km PCT 461 – 18.5 km PCT 479 – 80.1 km PCT 481 – 4.8 km	Yes Recorded during the survey. Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Acacia pendula – endangered population	Acacia pendula – endangered population	2-phase grid (Year round)	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 277 – 11.6 km	No.	No.
Androcalva procumbens *(syn. Commersonia procumbens)*	-	2-phase grid (Aug-May)	☒ Yes	☐ No	NA	NA	Presence assumed. The survey was unable to be undertaken within a suitable time period post fire.	Yes.
Androcalva rosea *(syn. Commersonia rosea)*	Sandy Hollow Commersonia	2-phase grid (All year)	☒ Yes	☐ No	NA	NA	Presence assumed. The survey was unable to be undertaken within a suitable time period post fire.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Cymbidium canaliculatum – endangered population	*Cymbidium canaliculatum* – endangered population	2-phase grid (All year)	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 277 – 11.6 km	No.	No.
Dichanthium setosum	Blue Grass	2-phase grid Nov – May	☒ Yes 15 – 16 Mar 23 31 Jan – 01 Feb 23	☐ No	15 – 16 Mar 23: 2 people x 7.5 31 Jan – 01 Feb 23: 2 people x 7.5	PCT 618 – 74.0 km	Yes. Recorded during the survey.	Yes.
Diuris tricolor	Pine Donkey Orchid	2-phase grid (Sept – Oct)	☐ Yes 1-7 Sept 22 13 Sept 22 24 Oct 22	☐ No	1-7 Sept 22: 6 people x 7.5 13 Sept 22: 5 people x 7.5 24 Oct 22: 6 people x 7.5	PCT 281 – 198.2 km PCT 461 – 11.8 km PCT 1610 – 14.5 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Eucalyptus camaldulensis – endangered population	Eucalyptus camaldulensis – endangered population	2-phase grid (All year)	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 281 – 275.4 km	Yes. Recorded during the survey.	Yes.
Eucalyptus cannonii	Capertee Stringybark	2-phase grid (All year)	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 440 – 7.7 km PCT 461 – 8.5 km PCT 478 – 6.8 km PCT 479 – 80.1 km	Yes. Potentially recorded during the survey.	Yes.
Homoranthus darwinioides	Fairy Bells	2-phase grid Mar – Dec	☒ Yes 1-5 Sept 22	☐ No	1-5 Sept 22: 6 people x 7.5	PCT 440 – 7.7 km PCT 477 – 4.0 km PCT 1610 – 20.6 km	Presence assumed where survey not undertaken in PCT 1674.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Leucochrysum albicans var. *tricolor*	Hoary Sunray	2-phase grid Sept-April	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 461 – 11.8 km PCT 481 – 2.4 km	Yes. Recorded during the survey.	Yes.
Monotaxis macrophylla	Large-leafed Monotaxis	2-phase grid Aug – Feb	☒ Yes	☐ No	NA	NA	Presence assumed. The survey was unable to be undertaken within a suitable time period post fire.	Yes.
Ozothamnus tesselatus	-	2-phase grid Sept – Oct	☒ Yes 1-5 Sept 22 26 Oct 22	☐ No	1-5 Sept 22: 4 people x 7.5 26 Oct 22: 2 people x 7.5	PCT 1610 – 14.5 km	No	No
Pomaderris cotoneaster	Cotoneaster Pomaderris	2-phase grid Oct – Nov	☒ Yes 27 Oct 22 24 Nov 22	☐ No	27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs	No survey effort undertaken in PCT 1610 due to access restrictions	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pomaderris queenslandica	Scant Pomaderris	2-phase grid All year	☒ Yes 1-5 Sept 22 27 Oct 22 24 Nov 22 14 – 15 Feb 23 02 – 03 Mar 23 17 Mar 23	☐ No	1-5 Sept 22: 4 people x 7.5 hrs 27 Oct 22: 4 people x 7.5 hrs 24 Nov 22: 2 people x 7.5 hrs 14 – 15 Feb 23: 4 people x 7.5 hrs 02 – 03 Mar 23: 2 people x 7.5 hrs 17 Mar 23: 2 people x 7.5 hrs	PCT 440 – 7.7 km PCT 477 – 4.0 km PCT 1610 – 21.4 km PCT 1661 – 6.9 km	No	No
Prasophyllum petilum	Tarengo Leek Orchid	2-phase grid Sept – Dec	☒ Yes 1-7 Sept 22 24,26-27 Oct 22 21 Nov 22 24 Nov 22	☐ No	1-7 Sept 22: 8 people x 7.5 24,26-27 Oct 22: 4 people x 7.5 21 Nov 22: 2 people x 7.5 24 Nov 22: 2 people x 7.5	PCT 277 – 8.9 km PCT 281 – 205.0 km	No	No
Tylophora linearis	-	Oct – May	☒ Yes 22 Nov 22 03 Feb 23 16 – 17 Feb 23 01 Mar 23	☐ No	22 Nov 22: 2 people x 7.5 03 Feb 23: 4 people x 7.5 16 – 17 Feb 23: 2 people x 7.5 01 Mar 23: 4 people x 7.5	PCT 440 – 6.6 km PCT 461 – 18.5 km	No	No.

Table 5-19 Threatened flora species surveys for candidate flora species credit species within the Liverpool Range subregion

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Dichanthium setosum	Blue Grass	2-phase grid Nov – May	☒ Yes 15 – 16 Mar 23 31 Jan – 01 Feb 23	☐ No	15 – 16 Mar 23: 2 people x 7.5 31 Jan – 01 Feb 23: 2 people x 7.5	PCT 483 – 72.5 km	No.	No.
Pomaderris queenslandica	Scant Pomaderris	2-phase grid All year	☒ Yes 7-8 Sept 22 12-13 Sept 22	☐ No	7-8 Sept 22: 2 people x 7.5 12-13 Sept 22: 2 people x 7.5	PCT 440 – 8.7 km	No.	No.

Table 5-20 Threatened flora species surveys for candidate flora species credit species within the Pilliga subregion

Scientific name	**Common name**	**Threatened flora species surveys**					**Present**	**Further assessment required (BAM Subsections 5.2.5 and 5.2.6)**
		Survey method (transects or grids)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**	**Effort (transect km – based on GPS data)**		
Androcalva procumbens *(syn. Commersonia procumbens)*	–	2-phase grid (Aug-May)	☒ Yes	☐ No	NA	NA	Presence assumed. The survey was unable to be undertaken within a suitable time period post fire.	Yes.
Dichanthium setosum	Blue Grass	2-phase grid Nov – May	☒ Yes 24 Nov 22	☐ No	24 Nov 22: 2 people x 7.5 hrs	PCT 281 – 4.2 km PCT 483 – 9.1 km PCT 618 – 5.6 km	Presence assumed where survey not undertaken.	Yes.
Diuris tricolor	Pine Donkey Orchid	2-phase grid Sept – Oct	☒ Yes 7-8 Sept 22 12-14 Sept 22 25-27 Oct 22	☐ No	7-8 Sept 22: 6 people x 7.5 12-14 Sept 22: 5 people x 7.5 25-27 Oct 22: 6 people x7.5	PCT 281 – 24.9 km PCT 599 – 3.0 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Eucalyptus cannonii	Capertee Stringybark	2-phase grid (All year)	☒ Yes 7-8 Sept 22 12-14 Sept 22 25-27 Oct 22 24 Nov 2202 Feb 23 28 Feb 23	☐ No	7-8 Sept 22: 6 people x 7.5 12-14 Sept 22: 5 people x 7.5 25-27 Oct 22: 6 people x 7.5 24 Nov 22: 2 people x 7.5 hrs 02 Feb 23: 2 people x 7.5 28 Feb 23: 2 people x 7.5	PCT 440 – 65.0 km PCT 479 – 9.1 km	Yes Recorded during the survey.	Yes.
Homoranthus darwinioides	Fairy Bells	2-phase grid Mar – Dec	☒ Yes 7-8 Sept 22 12-14 Sept 22 25-27 Oct 22 24 Nov 2202	☐ No	7-8 Sept 22: 6 people x 7.5 12-14 Sept 22: 5 people x 7.5 25-27 Oct 22: 6 people x 7.5 24 Nov 22: 2 people x 7.5 hrs	PCT 440 – 65.0 km PCT 477 – 0.9 km PCT 599 – 9.6 km	No.	No.
Monotaxis macrophylla	Large-leafed Monotaxis	2-phase grid Aug – Feb	☒ Yes	☐ No	NA	NA	Presence assumed. The survey was unable to be undertaken within a suitable time period post fire.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pomaderris queenslandica	Scant Pomaderris	2-phase grid All year	☒ Yes 7-8 Sept 22 12-13 Sept 22 16 – 17 Feb 23 31 Jan – 01 Feb 23	☐ No	7-8 Sept 22: 2 people x 7.5 12-13 Sept 22: 2 people x 7.5 16 – 17 Feb 23: 4 people x 7.5 31 Jan – 01 Feb 23: 2 people x 7.5	PCT 440 – 65.0 km PCT 477 – 6.9 km PCT 599 – 9.6 km PCT 1661 – 29.6 km	No.	No.
Prasophyllum petilum	Tarengo Leek Orchid	2-phase grid Sept – Dec	☒ Yes 7-8 Sept 22 12-13 Sept 22	☐ No	7-8 Sept 22: 2 people x 7.5 12-13 Sept 22: 2 people x 7.5	PCT 281 – 24.9 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Pterostylis cobarensis	Greenhood Orchid	2-phase grid Oct	☒ Yes 25 Oct 22	☒ No 18 September 2022 This species has been recorded flowering in September (24 occurrences on the Atlas if Living Australia). There is evidence of flowering during September in the Pilliga (see Jewkes, 2020; Phillips, 2020; Hay, 2022). Given the good rainfall conditions in 2022 September is likely to have been an appropriate survey period for this species.	25 Oct 22: 3 people x 7.5 25 Oct 22: 2 people x 7.5	PCT 440 – 4.1 km	No.	No.
Swainsona sericea	Silky Swainson-pea	2-phase grid Sept – Nov	☒ Yes 7-8 Sept 22 12-14 Sept 22 25-26 Oct 22	☐ No	7-8 Sept 22: 2 people x 7.5 12-14 Sept 22: 5 people x 7.5 25-26 Oct 22: 7 people x 7.5	PCT 281 – 24.9 km PCT 440 – 41.3 km	Presence assumed where survey not undertaken.	Yes.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Thesium australe	Austral Toadflax	2-phase grid Nov – Feb	☐ Yes	☒ No No targeted survey effort	No targeted survey effort	PCT 440 – 4.3 km	Presence assumed where survey not undertaken.	Yes.
Tylophora linearis	–	2-phase grid Oct – May	☒ Yes 25 Oct 22 16 – 17 Feb 23	☐ No	25 Oct 22: 2 people x 7.5 16 – 17 Feb 23: 2 people x 7.5	PCT 440 – 4.3 km	No.	No.
Zieria ingramii	Keith's Zieria	2-phase grid Sept – Feb	☒ Yes 25 Oct 22 16 – 17 Feb 23	☐ No	25 Oct 22: 2 people x 7.5 16 – 17 Feb 23: 2 people x 7.5	PCT 477 – 6.1 km	No.	No.

Table 5-21 Threatened flora species surveys for candidate flora species credit species within the Talbragar Valley subregion

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Acacia ausfeldii	Ausfeld's Wattle	2-phase grid (Aug – Oct)	☒ Yes 1-3 Sept 22 25 Oct 22 21 Nov 22 22 Nov 22	☒ No March	01-03 Sept 22: 6 people x 7.5 hrs 25 Oct 22: 7 people x 7.5 hrs 21 Nov 22: 2 people x 7.5 hrs 22 Nov 22: 2 people x 7.5 hrs	PCT 266 – 1.8 km PCT 277 – 0.02 km PCT 461 – 3.2 km	No	No
Dichanthium setosum	Blue Grass	2-phase grid Nov – May	☒ Yes 21 Nov 22 22 Nov 22	☐ No	21 Nov 22: 2 people x 7.5 hrs 22 Nov 22: 2 people x 7.5 hrs	PCT 202 – 1.6 km PCT 461 – 0.01 km	Presence assumed where survey not undertaken.	Yes.
Diuris tricolor	Pine Donkey Orchid	2-phase grid Sept – Oct	☒ Yes 1-3 Sept 22 25 Oct 22	☐ No	1-3 Sept 22: 6 people x 7.5 25 Oct 22: 6 people x 7.5	PCT 202 – 25.3 km PCT 461 – 0.2 km	Presence assumed where survey not undertaken.	Yes.
Homoranthus darwinioides	Fairy Bells	2-phase grid Mar – Dec	☒ Yes 1-3 Sept 22	☐ No	1-3 Sept 22: 6 people x 7.5	PCT 440 – 13.0 km	No.	No.
Indigofera efoliata	Leafless Indigo	2-phase grid Sept – Oct	☒ Yes 1-3 Sept 22 25 Oct 22	☐ No	1-3 Sept 22: 6 people x 7.5	PCT 468 – 0.7 km	No.	No.
Pomaderris queenslandica	Scant Pomaderris	2-phase grid All year	☒ Yes 1-3 Sept 22	☐ No	1-3 Sept 22: 2 people x 7.5	PCT 440 – 13.0 km	No.	No.

Scientific name	Common name	Threatened flora species surveys					Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)	Effort (transect km – based on GPS data)		
Swainsona sericea	Silky Swainson-pea	2-phase grid Sept – Nov	☒ Yes 1-3 Sept 22 25 Oct 22 21-22 Nov 22	☐ No	1-3 Sept 22: 2 people x 7.5 25 Oct 22: 7 people x 7.5 21-22 Nov 22: 3 people x 7.5	PCT 202 – 26.9 km PCT 277 – 0.02 km PCT 440 – 7.8 km PCT 461 – 0.2 km PCT 468 – 0.7 km	Presence assumed where survey not undertaken.	Yes.
Tylophora linearis	–	2-phase grid Oct – May	☒ Yes 25 Oct 22 22 Nov 22 15 Feb 23	☐ No	25 Oct 22: 2 people x 7.5 22 Nov 22: 2 people x 7.5 15 Feb 23: 2 people x 7.5	PCT 440 – 1.4 km PCT 461 – 0.01 km	No.	No.
Zieria ingramii	Keith's Zieria	2-phase grid Sept – Feb	☒ Yes	☐ No	1-2 Sept 22: 2 people x 7.5 25 Oct 22: 2 people x 7.5	PCT 468 – 0.7 km PCT 440 – 7.8 km	No.	No.

Table 5-22 Threatened fauna species surveys for candidate fauna species credit species within the Inland Slopes 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							
Booroolong Frog	Litoria booroolongensis	Frog survey	☒ Yes December	☒ No August	22 Aug 22: 2 people x 4 hrs 23 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs	No	No (Species excluded from further assessment, see table 5.4)
Reptiles							
Pink-tailed Legless Lizard	Aprasia parapulchella	Rock flip (>200 rocks per site)	☒ Yes November	☒ No August, December and January	22 Aug 22: 2 people x 4 hrs 23 Aug 22: 2 people x 4 hrs 15 Nov 22: 2 people x 4 hrs 6 Nov 22: 2 people x 4 hrs 17 Nov 22: 2 people x 4 hrs 18 Nov 22: 2 people x 4 hrs 15 Nov 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 4 people x 8 hrs 23 Jan 23: 2 people x 4 hrs	Assumed present	Yes

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	Rock flip (>200 rocks per site) Tile grids (5x10 tiles per grid)	☒ Yes November, December and January	☒ No August	Rock flip 22 Aug 22: 2 people x 4 hrs 23 Aug 22: 2 people x 4 hrs 15 Nov 22: 2 people x 4 hrs 15 Nov 22: 2 tile grids 16 Nov 22: 2 people x 4 hrs 17 Nov 22: 2 people x 4 hrs 17 Nov 22: 2 tile grids 18 Nov 22: 2 people x 4 hrs 18 Nov 22: 2 tile grids 15 Nov 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 4 people x 8 hrs 23 Jan 23: 2 people x 4 hrs Tile grid 21 Sep 21: 2 people x 3 grids 16 Nov 22: 2 tile grids	No	No (Species excluded as study area not within the species distribution, 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)		
Pale-headed Snake	Hoplocephalus bitorquatus	Spotlighting	☒ Yes December, January and March	☒ No August	22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs	Assumed present	Yes

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 survey	N/A	N/A	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs	Yes	No (Subject land is mapped on important habitat map, 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)		
					8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs		
Bush Stone-curlew	Burhinus grallarius	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season) Spotlighting and call playback	☒ Yes August, November, December, January, March	☐ No	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km Spotlighting and call playback 21 Sep 21: 2x call-playback locations 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 6 Feb 23: 2 people x 4 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)**		
					7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs		
Gang-gang Cockatoo	Callocephalon fimbriatum	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November, December and January	☒ No August and March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		
Glossy Black-Cockatoo	Calyptorhynchus lathami	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August and March	☒ No November and December	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs	Yes	Yes

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)		
					15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		

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	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, November and December	☒ No March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
					9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		
Little Eagle	Hieraaetus morphnoides	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August	☒ No November, December and March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs	Yes	No (Species recorded breeding outside of the subject land, no impact expected from the proposed development, 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)		
					18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		

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 Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	N/A	N/A	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs	No	No (species excluded as subject land is not mapped on important habitat map, 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)		
					9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs		
Major Mitchell's Cockatoo	Lophochroa leadbeateri	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November and December	☒ No August and March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs	No	No (Species excluded as it is likely a vagrant to the site, 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)		
					13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		
Square-tailed Kite	Lophoictinia isura	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November and December	☒ No August and March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		
Barking Owl	Ninox connivens	Spotlight and call-playback Stag watch	☒ Yes August, November and December	☒ No January and March	Spotlighting and call playback 21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs	Yes	Yes

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)		
					27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs Stag watch 22 Aug 22: 2 people x 2 hrs 22 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs 13 Dec 22: 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	Spotlight and call-playback Stag watch	☒ Yes August	☒ No November, December, January and March	Spotlighting and call playback 21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs Stag watch 22 Aug 22: 2 people x 2 hrs 22 Aug 22: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
					25 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs		
Superb Parrot	Polytelis swainsonii	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November	☒ No August, December, January and March	Diurnal bird survey 14 Sep 21: 2 people x 1.5 hrs 15 Sep 21: 2 people x 1.5 hrs 16 Sep 21: 2 people x 1.5 hrs 20 Sep 21: 2 people x 30 mins 22 Sep 21: 2 people x 2 hrs 22 Aug 22: 4 people x 2 hrs 23 Aug 22: 4 people x 2 hrs 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 29 Aug 22: 2 people x 1 hrs 14 Nov 22: 2 people x 1 hrs 15 Nov 22: 2 people x 1 hrs 16 Nov 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 18 Nov 22: 2 people x 1 hrs 6 Dec 22: 2 people x 1 hrs 7 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
					13 Dec 22: 4 people x 2 hrs 7 March 23: 2 people x 1 hrs 8 March 23: 2 people x 1 hrs 9 March 23: 2 people x 1 hrs 10 March 23: 2 people x 1 hrs 16 March 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		
Masked Owl	Tyto novaehollandiae	Spotlight and call-playback Stag watch	☒ Yes August	☒ No November, December, January and March	Spotlighting and call playback 21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs	Yes	Yes

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)		
					21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs Stag watch 22 Aug 22: 2 people x 2 hrs 22 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs		
Invertebrates							
Golden Sun Moth	Synemon plana	Active invertebrate searches (Transects)	☐ Yes	☒ No	13 Mar 23: 2 people x 8 hrs 14 Mar 23: 2 people x 8 hrs 15 Mar 23: 2 people x 8 hrs 16 Mar 23: 2 people x 8 hrs 17 Mar 23: 2 people x 8 hrs 17 Apr 23: 2 people x 8 hrs 18 Apr 23: 4 people x 16 hrs 19 Mar 23: 4 people x 8 hrs	No	No (Species excluded as study area not within the species distribution, 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)		
Mammals							
Eastern Pygmy-possum	Cercartetus nanus	Spotlighting Arboreal camera traps	☒ Yes Jan, March, November and December	☒ No August	Spotlighting 21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs	Assumed present	Yes

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)		
					Arboreal camera traps 14-17 Sep 21: 60 Camera nights 7 Mar 23 – 17 Apr 23: 15 cameras (615 trap nights)		
Large-eared Pied Bat	Chalinolobus dwyeri	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes December and January	☒ No August, September, February and March	Microbat roost search 22 Aug 22: 2 people x 2 hrs Anabat (Active) 22 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 30 Aug 22: 2 people x 1 hrs 30 Aug 22: 2 people x 1 hrs 12 Dec 22: 2 people x 1 hrs 13 Dec 22: 2 people x 1 hrs Anabat (Passive) 8-11 September 21: 3x recorder nights 14-15 September 21: 1x recorder night 12 -18 Dec 22: 1 Anabat express (6 recorder nights) 17-24 Jan 23: 1x Anabat express (7 recorder nights)	Assumed present	Yes

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)		
					6-15 Mar 23: 4x Anabat express (40 recorder nights) Harp trap 20-25 Jan 23: 3x harp traps (12 trap nights)		
Large Bent-winged Bat	Miniopterus orianae oceanensis	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes December, January and February	☒ No August and March	Microbat roost search 22 Aug 22: 2 people x 2 hrs Anabat (Active) 22 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 30 Aug 22: 2 people x 1 hrs 30 Aug 22: 2 people x 1 hrs 12 Dec 22: 2 people x 1 hrs 13 Dec 22: 2 people x 1 hrs Anabat (Passive) 8-11 September 21: 3x recorder nights 14-15 September 21: 1x recorder night 12 -18 Dec 22: 1 Anabat express (6 recorder nights) 17-24 Jan 23: 1x Anabat express (7 recorder nights)	No	No (Species excluded from further assessment, 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)		
					6-15 Mar 23: 4x Anabat express (40 recorder nights) Harp trap 20-25 Jan 23: 3x harp traps (12 trap nights)		
Greater Glider	Petauroides volans	Spotlighting	☒ Yes August, December, January and March	☐ No	21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Squirrel Glider	Petaurus norfolcensis	Spotlight and call-playback Stag watch Arboreal camera traps	☒ Yes August, December, January, March	☐ No	Spotlighting and call playback 21 Sep 21: 2 people x 4 hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs	Yes	Yes

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)		
					Stag watch 22 Aug 22: 2 people x 2 hrs 22 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs Arboreal camera traps 7-11 Sep 21 32x Camera nights 7 Mar 23 – 17 Apr 23: 15 cameras (615 trap nights)		
Brush-tailed Rock-wallaby	Petrogale penicillata	Spotlighting	☒ Yes August, December, January, February and March	☐ No	Spotlighting 21 Sep 21: 2 people x 4hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs	Assumed present	Yes

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)		
					21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs		
Brush-tailed Phascogale	Phascogale tapoatafa	Spotlighting Stag watch Arboreal camera traps	☒ Yes December, January and March	☒ No August	Spotlighting 21 Sep 21: 2 people x 4hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs Stag watch 22 Aug 22: 2 people x 2 hrs 22 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs Arboreal camera traps 14-17 Sep 21: 60 Camera nights 7 Mar 23 – 17 Apr 23: 15 cameras (615 trap nights)		
Koala	Phascolarctos cinereus	Spotlight and call-playback SAT (Spot Assessment Technique)	☒ Yes August, December, January and March	☐ No	Spotlighting 21 Sep 21: 2 people x 4hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs SAT 7 Dec 22: 2 people x 2 hrs (2x SAT's) 11 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 23 Jan 23: 2 people x 2 hrs 20 April 23: 9x SAT's		
Grey-headed Flying-fox	Pteropus poliocephalus	Spotlighting Daytime camp survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, December, January and March Spring and Summer	☒ No August, January and March Autumn and Winter	Spotlighting 21 Sep 21: 2 people x 4hrs 22 Aug 22: 4 people x 8 hrs 23 Aug 22: 4 people x 8 hrs 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
					28 Aug 22: 2 people x 4 hrs 29 Aug 22: 2 people x 4 hrs 6 Dec 22: 2 people x 4 hrs 7 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 4 people x 8 hrs 13 Dec 22: 4 people x 8 hrs 21 Jan 23: 2 people x 4 hrs 22 Jan 23: 2 people x 4 hrs 23 Jan 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs 7 March 23: 2 people x 4 hrs 8 March 23: 2 people x 4 hrs 9 March 23: 2 people x 4 hrs Daytime camp survey (traverses) Spring: 804 km Summer: 129 km Autumn: 28 km Winter: 301 km		

Table 5-23 Threatened fauna species surveys for candidate fauna species credit species within the Kerrabee 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)		
Reptiles							
Pink-tailed Legless Lizard	Aprasia parapulchella	Rock flip (>200 rocks per site)	☒ Yes November	☒ No August, December and January	26 Aug 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 9 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs	Assumed present	Yes
Striped Legless Lizard	Delma impar	Rock flip (>200 rocks per site) Tile grids (5x10 tiles per grid)	☒ Yes November, December and January	☒ No August	26 Aug 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 9 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs	Assumed present	Yes

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)		
Pale-headed Snake	Hoplocephalus bitorquatus	Spotlighting (>120 mins per site)	☒ Yes December, January and March	☒ No August	26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs	Assumed present	Yes

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)**		
Broad-headed Snake	Hoplocephalus bungaroides	Rock flip (>200 rocks per site) Spotlighting (>120 mins per site)	☒ Yes Rock flip August Spotlighting December, January and February	☒ No Rock flip December Spotlighting August	Rock flip 26 Aug 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 9 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs Spotlighting 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs 26 Aug 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 9 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs	Assumed present	Yes

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 survey Opportunistic survey (Traverses in line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	N/A	N/A	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs	Yes	Yes (Subject land is mapped on important habitat map, see table 5.4)
Bush Stone-curlew	Burhinus grallarius	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season) Spotlighting and call playback	☒ Yes August, December, January, February and March Spring, Summer, Autumn and Winter	☐ No	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
					8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km		

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	Callocephalon fimbriatum	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes October	☒ No August, December and February	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Glossy Black-Cockatoo	Calyptorhynchus lathami	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August	☒ No December and February	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	Yes	Yes

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	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August and December	☒ No February	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	No	No (Species excluded through extensive and exhaustive surveys, 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	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Spring	☒ No December and February Winter, Summer and Autumn	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	No	No (Species excluded through extensive and exhaustive surveys, 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 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs	No	No (Subject land is not mapped on important habitat map, 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)		
Square-tailed Kite	Lophoictinia isura	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes December Spring and Summer	☒ No August Autumn and Winter	Diurnal bird survey 26 Aug 22: 2 people x 1 hrs 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 4 people x 2 hrs 29 Aug 22: 4 people x 2 hrs 8 Dec 22: 2 people x 1 hrs 9 Dec 22: 2 people x 1 hrs 10 Dec 22: 2 people x 1 hrs 11 Dec 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 9 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	No	No (Species excluded through extensive and exhaustive surveys, 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	Spotlight and call playback Stag watch	☒ Yes August and December	☒ No February	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs	Assumed present	Yes

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	Spotlight and call playback Stag watch	☒ Yes August Autumn and Winter	☒ No December, January and Feb Spring and Summer	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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	Spotlight and call playback Stag watch	☒ Yes August Autumn and Winter	☒ No December, January and Feb Spring and Summer	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs	Yes	Yes

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	Spotlight Stag watch Arboreal camera traps	☒ Yes December, January and February Spring and Summer	☒ No August Autumn and Winter	Spotlighting 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs Arboreal camera traps 20-22 Sep 21: 6x Camera nights	Assumed present	Yes

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	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes January and February	☒ No August	Microbat roost search 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Passive) 17-24 Jan 23: 1x Anabat express (7 recorder nights) Harp trap 17-9 Jan 23: 3x harp traps (6 trap nights) 6-10 Feb 23: 4x Harp traps (14 trap nights)	Yes	Yes

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	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes January and February	☒ No August	Microbat roost search 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Passive) 17-24 Jan 23: 1x Anabat express (7 recorder nights) Harp trap 17-9 Jan 23: 3x harp traps (6 trap nights) 6-10 Feb 23: 4x Harp traps (14 trap nights)	No	No (Species excluded as study area not within the species distribution, 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	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes January and February	☒ No August	Microbat roost search 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 10 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Passive) 17-24 Jan 23: 1x Anabat express (7 recorder nights) Harp trap 17-9 Jan 23: 3x harp traps (6 trap nights) 6-10 Feb 23: 4x Harp traps (14 trap nights)	No	No (Species excluded from further assessment, 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)		
Greater Glider	Petauroides volans	Spotlight Stag watch	☒ Yes August, December, January and February	☐ No	Spotlighting 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs	Assumed present	Yes

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 norfolcensis	Spotlight and call playback Stag watch Arboreal camera traps	☒ Yes August, December, January and February	☐ No	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs Arboreal camera traps 20-22 Sep 21: 6x Camera nights	Yes	Yes

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	Spotlighting	☒ Yes August, December, January and February	☐ No	Spotlighting 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs	Assumed present	Yes

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	Spotlighting and call playback camera traps	☒ Yes February	☒ No August and September	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs Arboreal camera traps 20-22 Sep 21: 6x Camera nights	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Koala	Phascolarctos cinereus	Spotlighting and call playback SAT (Spot Assessment Technique)	☒ Yes August, December, January and February	☐ No	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 10 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Stag watch 26 Aug 22: 2 people x 2 hrs 29 Aug 22: 2 people x 2 hrs SAT 8 Dec 22: 2 people x 2 hrs 9 Dec 22: 2 people x 2 hrs 10 Feb 23: 2 people x 2 hrs	Assumed present	Yes

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	Spotlighting Daytime camp survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes December Summer	☒ No August, January and February Autumn, Winter and Spring	Spotlighting and call playback 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 28 Aug 22: 4 people x 8 hrs 29 Aug 22: 4 people x 8 hrs 11 Dec 22: 2 people x 4 hrs 12 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 4 hrs 10 Dec 22: 2 people x 4 hrs 21 Jan 23: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 9 Feb 23: 4 people x 8 hrs Daytime camp survey Spring: 912 km Summer: 131 km Autumn: 126 km Winter: 19 km	No	No (species excluded through extensive and exhaustive surveys, 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)		
Eastern Cave Bat	Vespadelus troughtoni	Microbat roost search Anabat (Active) Anabat (Passive) Harp trap	☒ Yes January	☒ No August, February and March	Microbat roost search 6 Feb 23: 2 people x 1 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs 6 Feb 23: 2 people x 1 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs 9 Feb 23: 2 people x 1 hrs Anabat (Passive) 17-24 Jan 23: 1x Anabat express (7 recorder nights) Harp trap 17-9 Jan 23: 3x harp traps (6 trap nights) 6-10 Feb 23: 4x Harp traps (14 trap nights)	Yes	Yes

Table 5-24 Threatened fauna species surveys for candidate fauna species credit species within the Liverpool Range 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)		
Reptiles							
Pink-tailed Legless Lizard	Aprasia parapulchella	Rock flip (>200 rocks per site)	☐ Yes	☒ No August and February	24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes
Striped Legless Lizard	Delma impar	Rock flip (>200 rocks per site) Tile grids (5x10 tiles per grid)	☐ Yes	☒ No August and February	24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 7 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes
Pale-headed Snake	Hoplocephalus bitorquatus	Spotlighting (>120 mins per site)	☒ Yes February	☒ No August	24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes

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 survey	N/A	N/A	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs	No	No (Subject land not mapped on important habitat map, see table 5.4)
Bush Stone-curlew	Burhinus grallarius	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season) Spotlighting and call playback	☒ Yes August, February Spring, Summer, Autumn and Winter	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
					Opportunistic survey (traverses) Spring: 241 km Summer: 21 km Autumn: 72 km Winter: 31 km		
Glossy Black-Cockatoo	Calyptorhynchus lathami	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season	☒ Yes August and February Spring, Autumn and Winter	☒ No Summer	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 241 km Summer: 21 km Autumn: 72 km Winter: 31 km	No	No (Species excluded through extensive and exhaustive surveys and lack of suitable habitat, 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)		
White-bellied Sea-eagle	Haliaeetus leucogaster	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Winter, Spring and Summer	☒ No Feb Autumn	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 241 km Summer: 21 km Autumn: 72 km Winter: 31 km	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)
Little Eagle	Hieraaetus morphnoides	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Winter, Spring and Summer	☒ No Feb Autumn	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs Opportunistic survey (traverses) Spring: 241 km Summer: 21 km Autumn: 72 km Winter: 31 km	No	No (species excluded through extensive and exhaustive surveys, 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 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 7 Feb 23: 2 people x 1 hrs 8 Feb 23: 2 people x 1 hrs	No	No (Subject land not mapped on important habitat map, see table 5.4)
Barking Owl	Ninox connivens	Spotlighting and call playback Stag watch	☒ Yes August and December	☒ No Feb	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Powerful Owl	Ninox strenua	Spotlighting and call playback Stag watch	☒ Yes August	☒ No Feb	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys, see table 5.4)
Masked Owl	Tyto novaehollandiae	Spotlighting and call playback Stag watch	☒ Yes August	☒ No February	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Mammals							
Eastern Pygmy-possum	Cercartetus nanus	Spotlighting and call playback Stag watch	☒ Yes February	☒ No August	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	Assumed present	Yes
Large-eared Pied Bat	Chalinolobus dwyeri	Anabat (active)	☐ Yes	☒ No August	Anabat (Active) 27 Aug 22: 2 people x 1 hrs	No	No (Species excluded as there are no rocky habitats present suitable within this subregion, see table 5.4)
Large Bent-winged Bat	Miniopterus orianae oceanensis	Anabat (active)	☐ Yes	☒ No August	Anabat (Active) 27 Aug 22: 2 people x 1 hrs	No	No (Species excluded from further assessment, 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)		
Squirrel Glider	Petaurus norfolcensis	Spotlighting and call playback Arboreal camera traps	☒ Yes September, August and February	☐ No	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs Arboreal camera traps 7-11 Sept 21 32x Camera nights	Assumed present	Yes

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	Spotlighting and call playback camera traps	☒ Yes February	☒ No August and September	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs Arboreal camera traps 7-11 September 21 32x Camera nights	Assumed present	Yes
Koala	Phascolarctos cinereus	Spotlighting and call playback SAT (Spot Assessment Technique)	☒ Yes September, August and February	☐ No	Spotlight and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs SAT 7 Dec 22: 2 people x 4 hrs 8 Dec 22: 2 people x 2 hrs	Assumed present	Yes

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	Spotlighting Daytime camp survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes Summer	☒ No August and February Autumn, Winter and Spring	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs Daytime camp survey Spring: 241 km Summer: 21 km Autumn: 72 km Winter: 31 km	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)

Table 5-25 Threatened fauna species surveys for candidate fauna species credit species within the Pilliga 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)		
Reptiles							
Pale-headed Snake	Hoplocephalus bitorquatus	Spotlighting (>120 mins per site)	☐ Yes	☒ No August	24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs	Assumed present	Yes
Birds							
Regent Honeyeater	Anthochaera phrygia	Diurnal bird survey	N/A	N/A	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Subject land not mapped on important habitat map, 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)**		
Australian Bustard	Ardeotis australis	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Spring, Summer, Autumn and Winter	☐ No	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Bush Stone-curlew	Burhinus grallarius	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season) Spotlighting and call playback	☒ Yes August Spring, Summer, Autumn and Winter	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Glossy Black-Cockatoo	Calyptorhynchus lathami	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Spring, Summer, Autumn and Winter	☐ No	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	Assumed present	Yes
White-bellied Sea-eagle	Haliaeetus leucogaster	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August Spring, Summer, Autumn and Winter	☐ No	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, 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	Diurnal bird survey	☒ Yes August Spring and Winter	☒ No Summer and Autumn	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)
Swift Parrot	Lathamus discolor	Diurnal bird survey	N/A	N/A	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Subject land not mapped on important habitat map, 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)		
Major Mitchell's Cockatoo	Lophochroa leadbeateri	Diurnal bird survey	☒ Yes Spring and Summer	☒ No August Autumn and Winter	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Excluded as it is most likely a vagrant to the subject site, see table 5.4)
Square-tailed Kite	Lophoictinia isura	Diurnal bird survey	☒ Yes Spring and Summer	☒ No August Autumn and Winter	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, 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	Spotlighting and call playback Stag watch	☒ Yes August	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)
Powerful Owl	Ninox strenua	Spotlighting and call playback Stag watch	☒ Yes August	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Superb Parrot	Polytelis swainsonii	Diurnal bird survey	☒ Yes Spring and Summer	☒ No August Autumn and Winter	Diurnal bird survey 24 Aug 22: 2 people x 1 hrs 25 Aug 22: 2 people x 1 hrs 26 Aug 22: 4 people x 2 hrs 27 Aug 22: 4 people x 2 hrs 28 Aug 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)
Masked Owl	Tyto novaehollandiae	Spotlighting and call playback Stag watch	☒ Yes August	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs	Yes	Yes

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							
Rufous Bettong	Aepyprymnus rufescens	Spotlighting	☒ Yes August	☐ No	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs	No	No (Considered extinct across large portion of its former distribution and no recent records exist near the subject area, see table 5.4)
Eastern Pygmy-possum	Cercartetus nanus	Spotlighting and call playback Stag watch Arboreal camera trap	☐Yes	☒ No August	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs Arboreal camera trap 7-9 Sep 21: 6x Camera nights 14-17 Sep 21: 27x Camera nights	Assumed present	Yes

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	Microbat roost search Anabat	☐Yes	☒ No August	Microbat roost search 24 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs 28 Aug 22: 2 people x 2 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs	No	No (Species excluded as there are no rocky habitats present suitable within this subregion, see table 5.4)
Large Bent-winged Bat	Miniopterus orianae oceanensis	Microbat roost search Anabat	☐ Yes	☒ No August	Microbat roost search 24 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs 28 Aug 22: 2 people x 2 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs	No	No (Species excluded from further assessment, 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)		
Squirrel Glider	Petaurus norfolcensis	Spotlighting and call playback Stag watch Arboreal camera traps	☒ Yes September, August and February	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Stag watch 24 Aug 22: 2 people x 2 hrs 25 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs Arboreal camera traps 7-9 Sep 21: 6x Camera nights 14-17 Sep 21: 27x Camera nights 14 Dec 22 – 8 Feb 23: 12 cameras (672 trap nights)	Yes	Yes
Brush-tailed Rock-wallaby	Petrogale penicillata	Spotlighting	☒ Yes August	☐ No	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs	No	No (Species excluded as there are no rocky habitats present suitable within this subregion, 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)		
Koala	Phascolarctos cinereus	Spotlighting, SAT	☒ Yes August	☐ No	Spotlighting and call playback 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs SAT 14 Dec 22: 2 people x 2 hrs	Assumed present	Yes
Grey-headed Flying-fox	Pteropus poliocephalus	Spotlighting Daytime camp survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes Summer	☒ No August and February Autumn, Winter and Spring	Spotlighting 24 Aug 22: 2 people x 4 hrs 25 Aug 22: 2 people x 4 hrs 26 Aug 22: 2 people x 4 hrs 27 Aug 22: 2 people x 4 hrs Daytime camp survey Spring: 120 km Summer: 35 km Autumn: 26 km Winter: 46 km	No	No (species excluded through extensive and exhaustive surveys, 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)		
Eastern Cave Bat	Vespadelus troughtoni	Microbat roost search Anabat	☐Yes	☒ No August	Microbat roost search 24 Aug 22: 2 people x 2 hrs 26 Aug 22: 2 people x 2 hrs 28 Aug 22: 2 people x 2 hrs Anabat (Active) 27 Aug 22: 2 people x 1 hrs 28 Aug 22: 2 people x 1 hrs	No	No (Species excluded as there are no rocky habitats present suitable within this subregion, see table 5.4)

Table 5-26 Threatened fauna species surveys for candidate fauna species credit species within the Talbragar Valley 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							
Reptiles							
Pale-headed Snake	Hoplocephalus bitorquatus	Spotlighting (>120 mins per site)	☒ Yes December and February	☒ No August	30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes
Birds							
Regent Honeyeater	Anthochaera phrygia	Diurnal bird survey	N/A	N/A	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (Subject land not mapped on important habitat map, 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)**		
Bush Stone-curlew	Burhinus grallarius	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season) Spotlighting and call playback	☒ Yes August, December and February Autumn, Winter and Spring	☐ No	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (Species excluded through extensive and exhaustive surveys, 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)		
Glossy Black-Cockatoo	Calyptorhynchus lathami	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, and February Autumn, Winter and Spring	☒ No December	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (Species excluded through extensive and exhaustive surveys and lack of suitable habitat, see table 5.4)
White-bellied Sea-eagle	Haliaeetus leucogaster	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, and February Autumn, Winter and Spring	☒ No December	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (Species excluded through extensive and exhaustive surveys, 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	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, November and December Spring and Winter	☒ No February Summer and Autumn	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (Species excluded through extensive and exhaustive surveys, see table 5.4)
Swift Parrot	Lathamus discolor	Diurnal bird survey	N/A	N/A	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (subject land not mapped on important habitat map, 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)		
Major Mitchell's Cockatoo	Lophochroa leadbeateri	Diurnal bird survey	☒ Yes November and December Spring and Summer	☒ No February and August Autumn and Winter	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (species excluded as it is likely a vagrant to the subject site, see table 5.4)
Square-tailed Kite	Lophoictinia isura	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November and December Spring and Summer	☒ No August and February Autumn and Winter	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (species excluded through extensive and exhaustive surveys, 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	Spotlighting and call playback Stag watch	☒ Yes August and December	☒ No February and March	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Stag watch 30 Aug 22: 2 people x 2 hrs 12 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes
Powerful Owl	Ninox strenua	Spotlighting and call playback Stag watch	☒ Yes August	☒ No February, December and March	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Stag watch 30 Aug 22: 2 people x 2 hrs 12 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 8 Feb 23: 2 people x 4 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)		
Superb Parrot	Polytelis swainsonii	Diurnal bird survey Opportunistic survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes November, December and February Spring and Summer	☒ No August Autumn and Winter	Diurnal bird survey 30 Aug 22: 2 people x 1 hrs 17 Nov 22: 2 people x 1 hrs 12 Dec 22: 4 people x 2 hrs 13 Dec 22: 4 people x 2 hrs 8 Feb 22: 4 people x 2 hrs Opportunistic survey (traverses) Spring: 120 km Autumn: 8 km Winter: 43 km	No	Yes
Masked Owl	Tyto novaehollandiae	Spotlighting and call playback Stag watch	☒ Yes August	☒ No February, December and March	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Stag watch 30 Aug 22: 2 people x 2 hrs 12 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 8 Feb 23: 2 people x 4 hrs	Assumed present	Yes

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	Spotlighting and call playback Stag watch	☒Yes December and February	☒ No August	Spotlighting 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Stag watch 30 Aug 22: 2 people x 2 hrs 12 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 8 Feb 23: 2 people x 4 hrs	Yes	Yes
Large-eared Pied Bat	Chalinolobus dwyeri	Anabat (Active)	☐Yes	☒ No August	Anabat (Active) 30 Aug 22: 2 people x 2 hrs	Assumed present	Yes
Large Bent-winged Bat	Miniopterus orianae oceanensis	Anabat (Active)	☐Yes	☒ No August	Anabat (Active) 30 Aug 22: 2 people x 2 hrs	No	No (Species excluded from further assessment, 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)		
Squirrel Glider	Petaurus norfolcensis	Spotlighting and call playback Stag watch	☒ Yes August, December, February and March	☐ No	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Stag watch 30 Aug 22: 2 people x 2 hrs 12 Dec 22: 2 people x 2 hrs 13 Dec 22: 2 people x 2 hrs 8 Feb 23: 2 people x 4 hrs	Yes	Yes
Koala	Phascolarctos cinereus	Spotlighting and call playback Stag watch	☒ Yes August, December, February and March	☐ No	Spotlighting and call playback 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs SAT 14 Dec 22: 2 people x 2 hrs 15 Dec 22: 2 people x 2 hrs	No	No (species excluded through extensive and exhaustive surveys, 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)**		
Grey-headed Flying-fox	Pteropus poliocephalus	Spotlighting Daytime camp survey (In line with the Two-phased Grid Survey, Refer to Table 2-3 for total kilometres covered per season)	☒ Yes August, December, February and March	☐ No	Spotlighting 30 Aug 22: 4 people x 8 hrs 12 Dec 22: 2 people x 4 hrs 13 Dec 22: 2 people x 4 hrs 6 Feb 23: 2 people x 4 hrs 8 Feb 23: 2 people x 4 hrs 6 March 23: 2 people x 4 hrs Daytime camp survey Spring: 120 km Autumn: 8 km Winter: 43 km	No	No (species excluded through extensive and exhaustive surveys, see table 5.4)

5.4 Expert reports

Expert reports have not been used for this BDAR.

5.5 More appropriate local data

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.

More appropriate local data has been used to assess habitat suitability for some threatened species. As outlined in Section 5.2.1, *Acacia ausfeldii* was recorded within the subject land during the survey. The habitat within which *Acacia ausfeldii* was found within the subject land is on Ulan Quartz Monzonite (which is an igneous rock) and Quaternary Alluvium (along Sportsmans Hollow Creek) geology. The habitat constraints for *Acacia ausfeldii* provided in the TBDC are footslopes and low rises on sandstone. The habitat for *Acacia ausfeldii* revealed from the field survey is considered to be more appropriate local data than the habitat constraints contained within the TBDC for this species.

Data from recent BDARs undertaken in the locality was also used as more appropriate local data. Several threatened species were recorded at Moolarben in 2021 (see Niche Environment and Heritage, 2022) including Pink-tailed Legless Lizard (*Aprasia parapulchella*), Broad-headed Snake (Hoplocephalus bungaroides), and *Pomaderris cotoneaster*. 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. However, given the variable broad condition states of the vegetation it was not deemed appropriate to use the PCT benchmarks in absence of other data without thought to on ground conditions. Benchmark data for the relevant PCT was used for some Thinned, Derived Native Shrubland and Derived Native Grassland vegetation zones (see Section 4.5.1) with adjustments to the scores for some variables to better reflect on ground-conditions based on data recorded from other PCTs in the subject land (e.g. Derived Native Grassland vegetation zones lack trees, so it was not deemed appropriate to use benchmarks for tree species variables in these vegetation zones). Section 4.5.1 provides more explanation of the approach used. Importantly, this BDAR does not modify the reference data for a PCT held within the BAM-C.

5.6 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:

- Threatened reptiles: Biodiversity Assessment Method survey guide (Department of Planning and Environment, 2022c).
- Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide (Department of Planning and Environment, 2022d).
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (Department of Planning, Industry and Environment, 2020a).
- 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (Office of Environment and Heritage, 2018).
- NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (Department of Planning, Industry and Environment, 2020b).

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, the estimated number of individuals present and their location (or the location of a group of individuals) on the subject land is provided. A 30 metre buffer was applied to each point. These species polygons were derived through field survey.
- For species assumed to be present, 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 are provided in Section 5.1. Species were assumed to be present in areas that were unable to be surveyed and where associated PCTs (as outlined in the TBDC) were present. The entirety of a vegetation zone was used for the species polygon for assumed presence species.
- For dual credit species with an important habitat map (in this case Regent Honeyeater), the entire area mapped on the important habitat map that occurs within the subject land is included in the species polygon.

Table 5-27 and Table 5-28 provide a summary of the species polygons for each recorded species credit species. A description of habitat condition (vegetation zone) and vegetation integrity score is provided in detail in Section 4.4 and 4.5.

Table 5-27 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)
		IS	KER	LR	PIL	TV						
Acacia ausfeldii	Ausfeld's Wattle	✓	✓			✓	High (2)	No	Footslopes and low rises on sandstone Note that this habitat constraint is incorrect as determined by field survey. *Acacia ausfeldii* was found on Ulan Quartz Monzonite and Quaternary Alluvium at Cope.	NA	8.61 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.
Dichanthium setosum	Bluegrass		✓				High (2)	No	None listed in the BAM-C. Broad habitat observed during the survey was Derived Native Grassland from PCT 618 on basalt enriched Pilliga Sandstone (heavy clay soil). Not recorded during surveys in PCT 483 or other habitats.	NA	124.74 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.
Eucalyptus camaldulensis	*Eucalyptus camaldulensis* population in the Hunter catchment		✓				High (2)	No	Floodplains of watercourses, including rivers, creeks, intermittent streams, or billabongs. Observed on the Wilpinjong Creek floodplain during the surveys.	NA	1.4 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)
		IS	KER	LR	PIL	TV						
Eucalyptus cannonii	Capertee Stringybark	✓	✓		✓		Moderate (1.5)	No	None listed in the BAM-C. Observed in areas of Narrabeen Sandstone, Illawarra Coal Measures, Pilliga Sandstone, and Quaternary Alluvium/Ulan Quartz Monzonite intergrade.	12 plants	NA	No relevant species specific recommendations for species polygons are provided in the TBDC.
Leucochrysum albicans subsp. *tricolor*			✓				High (2)	No	None listed in the BAM-C. Observed at Cope on Ulan Quartz Monzonite and Quaternary Alluvium in PCT 461 and PCT 481.	5 plants	NA	No relevant species specific recommendations for species polygons are provided in the TBDC.
Swainsona sericea	Silky Swainson-pea					✓	High (2)	No	None listed in the BAM-C. Potentially recorded in PCT 202 on Quaternary Alluvium on the Laheys Creek floodplain.	NA	15.75 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.

* IBRA subregions: Inland Slopes (IS), Kerrabee (KER), Liverpool Range (LR), Pilliga (PIL) & Talbragar Valley (TV) as output by the BAM-C

Table 5-28 Results for present fauna species separated by IBRA subregion

Common name	Scientific name	IBRA Sub-Region*					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	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		IS	KER	LR	PIL	TV					
Regent Honeyeater	*Anthochaera phrygia*	✓	✓				Very High (3)	Yes	As per Important Habitat Map. The Important Habitat Map maps areas in the subject land for Regent Honeyeater in Inland Slopes and Kerrabee subregion.	95.8 ha	The entire area mapped on the important habitat map that occurs within the subject land is included in the species polygon.
Squirrel Glider	*Petaurus norfolcensis*	✓	✓	✓	✓	✓	High (2)	No	None listed in the BAM-C.	369 ha	No relevant species specific recommendations for species polygons are provided in the TBDC.
Large-eared Pied-bat	*Chalinolobus dwyeri*	✓	✓				Very High (3)	Yes	Cliffs – Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	130.03 ha	The species is a full species credit because it cannot be reliably predicted to occur on a site based on vegetation and other landscape features (either foraging or breeding). Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. The species polygon for this species was mapped following this guidance.

Common name	Scientific name	IBRA Sub-Region*					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	TBDC species specific recommendations e.g. buffers, general comments (where relevant)
		IS	KER	LR	PIL	TV					
Eastern Cave Bat	*Vespadelus troughtoni*		✓				Very High (3)	Yes	Caves – 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.	39.28 ha	The species is a full species credit because it cannot reliably be predicted to occur on a site based on the vegetation and other landscape features (for breeding or foraging). Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat. When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated. All habitat on the subject land where the subject land is within 2 km of caves, scarps, cliffs, rock overhangs and disused mines must be mapped. Use high resolution aerial imagery and topographic maps to identify potential roost habitat features on the subject land within 2 km caves, scarps, cliffs etc. 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. The species polygon for this species was mapped following this guidance.

* IBRA subregions: Inland Slopes (IS), Kerrabee (KER), Liverpool Range (LR), Pilliga (PIL) & Talbragar Valley (TV) as output by the BAM-C

5.7 Listed aquatic threatened species, populations or ecological communities

The subject land contains mapped habitat for the following listed aquatic threatened species and endangered populations scheduled under the *Fisheries Management Act 1994* (FM Act)*:*

- Southern Purple Spotted Gudgeon (listed as Endangered under the FM Act): habitat mapped in the Talbragar Valley and Inland Slopes IBRA subregions in Sandy Creek, Laheys Creek, Patricks Creek, Tucklan Creek, Tallawang Creek, Huxleys Creek, Slapdash Creek, and White Creek, and some smaller unnamed watercourses.
- Eel Tailed Catfish in the Murray-Darling Basin (listed as Endangered Population under the FM Act): habitat is mapped in Talbragar River in the Inland Slopes IBRA subregion. An incidental observation of Eel Tailed Catfish was made in Laheys Creek during nocturnal bird and mammal surveys.
- Darling River Hardyhead in the Hunter River Catchment (listed as Endangered Population under the FM Act): habitat is mapped in Turill Creek, Four Mile Creek in the Pilliga and Liverpool Range IBRA subregions.

In the absence of any targeted aquatic threatened species surveys, these species are assumed to occur. These habitats are illustrated in Figure 14-19.

There are no FM Act listed ecological communities present in the subject land.

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 BC Regulation. A summary of the prescribed impacts associated with the project is provided in Table 6-1.

The prescribed impacts associated with the project are illustrated in the Figure 14-1 Site Map and Figure 14-2 Location Map.

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.

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 proposal, and illustrating potential areas of vehicle strike on a map (see Figure 14-1 Site Map and Figure 14-2 Location Map.

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, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☒Yes / ☐No	Caves used for roosting and potentially for breeding by threatened bat species. Rocky areas on granite potentially used by Pink-tailed Legless Lizard, Striped Legless Lizard. Sandstone areas potentially used by Broad-headed Snake. These features are a key part of the breeding habitat for these species. The location of features are illustrated in the Figure 14-1 Site Map and Figure 14-2 Location Map.	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. It is important to note that there are no caves in the subject land. 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. It is important to note that there are no caves in the subject land. 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. It is important to note that there are no caves in the subject land. 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. 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 (recorded in 2021 at Moolarben (see Niche Environment and Heritage, 2022)). Striped Legless Lizard (*Delma impar*) – known to shelter under surface rocks (see Cogger *et al*., 2003; Coulson 1995; Turner, 2014) and may potentially occur in the assessment area. Broad-headed Snake (*Hoplocephalus bungaroides*) – rock outcrops provide critical shelter sites for this species (Newell & Goldingay, 2005) and wait under rocks to ambush prey (Webb & Shine, 1998). This species may potentially occur in the assessment area (recorded in 2021 at Moolarben (see Niche Environment and Heritage, 2022)).

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, that are at risk of vehicle strike
Human-made structures	☒Yes / ☐No	Old farm buildings are present in the subject land. These buildings were examined for evidence of use by threatened fauna (specifically roosting bats). The location of these features are illustrated in the Figure 14-1.	Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – known to roost in human-made structures (see White, 2011) and be present in the assessment area. Eastern Cave Bat (*Vespadelus troughtoni*) – known to roost in human-made structures (see Law & Chidel, 2007) and be present in the assessment area.
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. The location of these features are illustrated in Figure 14-6.	Little Eagle (*Hieraaetus morphnoides*) – not a specialist forager, able to forage across grassland areas to feed on rabbits, reptiles and common bird species (Olsen *et al*. 2013). Known to be present in the assessment area and likely forages in cleared agricultural land. Foraging habitat is extensive in the assessment are and not a limiting factor for this species. Square-tailed Kite (*Lophoictinia isura*) – a habitat and diet specialist known to be reliant on eucalypt open forest and woodland and on passerines (specifically honeyeaters) (see Debus *et al.*, 1993). Unlikely to use cleared agricultural land for breeding or foraging but likely to fly over it. Black Falcon (*Falco subniger*) – Forages on birds, small mammals (e.g. rabbits, rats, etc.) and carrion (Debus & Olsen, 2011). Likely to be present in the assessment area and likely forages in cleared agricultural land. Foraging habitat is extensive in the assessment are and not a limiting factor for this species. 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.

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, that are at risk of vehicle strike
Habitat connectivity	☒Yes / ☐No	The corridor alignment 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. The location of these features are illustrated in Figure 14-17 and Figure 14-18.	These corridors will link habitat for the threatened species (see Section 3.2.4). The proposal may impact the movement aerial species such as birds and bats due to the placement of powerlines and towers. Movement corridors between state conservation areas and national parks may be affected, potentially impacting threatened species such as the Grey-crowned Babbler, Large Bent-wing Bat, Eastern Cave Bat, Large-eared Pied Bat, Diamond Firetail, Dusky Woodswallow, Brown Treecreeper, and Speckled Warbler. However, the proposal 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.
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	The corridor alignment crosses or is near several waterways (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 ensure 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 & Guidelines for Fish Habitat Conservation & Management (2013 update)* (Department of Primary Industries, 2013). The location of these features are illustrated in the Figure 14-1 Site Map and Figure 14-2 Location Map.	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.

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, that are at risk of vehicle strike
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	N/A	N/A
Vehicle strikes	☐Yes / ☐No	The corridor alignment is located adjoining to or crosses major roads such as the Castlereagh Highway and Golden Highway and the smaller roads of Spring Ridge Road, Tucklan Road, Merotherie Road, Blue Springs Road, Cope Road, Ulan Road, Ulan-Wollar Road (and other smaller local roads). The proposal is likely to generate additional vehicular movements along these roads, mostly during construction but also during operation. The location of where the alignment crosses major roads is illustrated in the Figure 14-1 Site Map.	Threatened species to be impacted are identified in Section 5.1. Threatened species at risk of vehicle strike include (but not limited to) Squirrel Glider, Barking Owl, Masked Owl, Powerful Owl, Little Eagle, White-bellied Sea-eagle, Glossy Black-Cockatoo, Gang-Gang Cockatoo, Grey-crowned Babbler, Spotted-tailed Quoll, Black Falcon, Little Lorikeet, Painted Honeyeater, Rosenberg's Goanna. The TECs that are likely to have increased vehicle strike are: — 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 — Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions — Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions 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 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 (Boggi), 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, that are at risk of vehicle strike
			— 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. — 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.

Photo 6-1 Caves were examined for the presence of roosting threatened bat species

Photo 6-2 Rocky areas within the subject land provide potential habitat for threatened reptiles

Photo 6-3 Old farm buildings are present within the subject land

Photo 6-4 The interior of old farm buildings within the subject land were examined for evidence of use by threatened fauna

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 BAM.

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Background

In 2020, the NSW Government engaged Transgrid, as NSW's jurisdictional transmission planner at the time, to carry out early development work to guide the planning of new transmission infrastructure for the Central-West Orana REZ.
In December 2020, Transgrid released a preliminary study corridor for the project that ran northwest from the existing network near Merriwa, passing south of Dunedoo before connecting to the existing network east of Wellington. The preliminary study corridor developed by Transgrid included an option to extend the new HV transmission infrastructure for the Central-West Orana REZ south of Wellington towards Lake Burrendong, including an upgrade of the existing substation at Wollar.

In November 2021, the Central-West Orana REZ was formally declared by the Minister for Energy and Environment and EnergyCo was appointed as the Infrastructure Planner to lead the delivery of REZs in NSW. At this time, EnergyCo assumed responsibility for planning and design of the transmission corridor and engaging local communities and stakeholders to inform the development of new transmission network infrastructure within the REZ.

7.1.2 Approach to study corridor development

Since EnergyCo's appointment as the Infrastructure Planner, the project development process included the following steps:

- reaffirming the project need
- developing the project objectives that meet the need
- identifying a revised study corridor based on technical, community and environmental constraints
- iterative refinement of the study corridor to identify a preferred alignment based on preferred energy hub locations, proximity to renewable energy generators, landowner feedback and technical and environmental constraints.

7.1.2.1 EnergyCo's revised study corridor

The revised study corridor that was released in February 2022 was based on the most appropriate location for a connection to the NSW transmission system (as part of the NEM), indicative locations for energy hubs and proximity to proposed renewable energy generation projects.

When considering the most suitable connection points to the NSW transmission system EnergyCo determined that a connection point at Wollar was preferred as it provided a better connection to the existing 500 kV network.

The location and configuration of the revised study corridor was also developed in response to community and environmental constraints. In particular, in response to community feedback received by Transgrid the study corridor was realigned to minimise impacts on Biophysical Strategic Agricultural Land (BSAL) within the Merriwa Cassilis plateau, by relocating it in areas of existing disturbed land to the west of the Goulburn River National Park. Disturbed land in this area includes areas subject to mining activities and existing transmission line easements.

Importantly this section of the study corridor was intentionally narrow the due to the presence of Tier 1 constraints including Goulburn River National Park, Munghorn Gap Nature reserve, mapped Important Regent Honeyeater habitat, and highly sensitive Aboriginal cultural heritage sites. By locating the study corridor in disturbed mining areas and with existing transmission lines, this section of study corridor was able to avoid or minimise impacting these important constraints.

In addition, the revised study corridor more generally incorporated large areas of cleared land, to enable development of a transmission line alignment that avoided or minimised high-quality ecological values while further minimising impacts to private property.

The constraints that were used to develop the revised study corridor were categorised into three tiers as follows:

- Tier 1: Areas generally considered no-go zones, where locating transmission lines, substations and switching stations would result in a low likelihood of obtaining access, combined with the potential impacts to the environment, community and stakeholders at these locations, presenting a high risk for obtaining planning approval. Examples of potential tier 1 locations include town centres, areas of concentrated residential settlement, areas of high environmental value such as national parks, national heritage places and sensitive AHIMS sites. Although some sections of the study corridors included sections of tier 1 constraints, these have largely been avoided through the design development and refinement process.
- Tier 2: Areas which the project has aimed to avoid wherever possible because of the added complexity of obtaining site access, obtaining planning approval and the potential impact on community and stakeholder interests at these locations. Examples include areas containing listed threatened species and ecological communities, significant AHIMS sites, and high value agricultural land.
- Tier 3: Areas where impacts should be minimised and/or mitigated. In addition to the tier 2 constraints, examples include areas of key fish habitat, AHIMS sites, agricultural land and private properties.

This considered approach culminated in a revised study corridor that avoided areas moderate-good quality box gum woodland north of the Goulburn River National Park, and has a narrower traverse of vegetated areas near Tuckland State Forest and avoidance of impact to Tuckland State Forest.

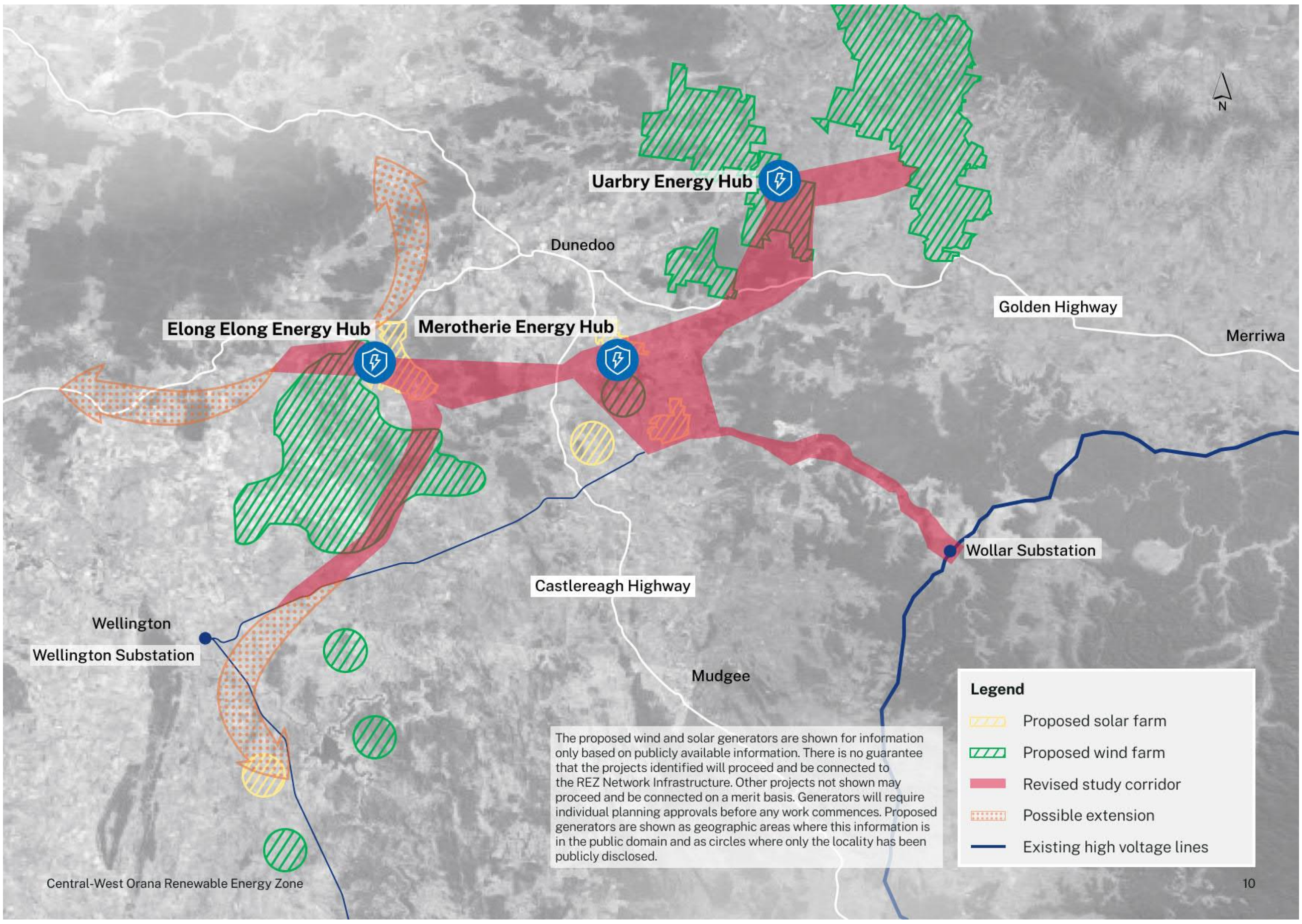


Figure 7-1 February 2022 Revised study corridor

7.1.2.1 Identification of the energy hubs

The next step in the project development process was to identify the preferred locations of energy hubs, to enable the development of transmission line alignments that connected to the NSW transmission system.

Energy hub locations

As identified in the February 2022 revised study corridor, there were three indicative locations for the energy hubs based on their proximity to large approved or proposed renewable energy generation projects in the Central-West Orana REZ.

By positioning energy hubs close to these projects, and with EnergyCo taking a lead role in the development of streamlined connections, the potential cumulative environmental impacts were reduced.

A site identification and selection process was undertaken for the energy hubs having regard to the tiered constraints outlined above and the following selection criteria:

- availability of predominantly cleared and level land with sufficient space requirements for energy hub
- ability to secure land through negotiated agreement (acquisition)
- quality and extent of biodiversity values and heritage sites
- proximity to the existing road network
- ability to secure transmission line easements to proposed renewable energy generation projects
- visibility of the site from residential properties, and/or surrounding areas
- other site constraints that might affect constructability such as topography, slope and geotechnical conditions.

Merotherie energy hub

In consideration the site selection criteria, four options were identified for the location of the Merotherie energy hub, which are listed below and shown on Figure 7-2.

- Option 1 – Gingers Lane
- Option 2 – Merotherie north
- Option 3 – Merotherie south
- Option 4 – Barneys Reef.

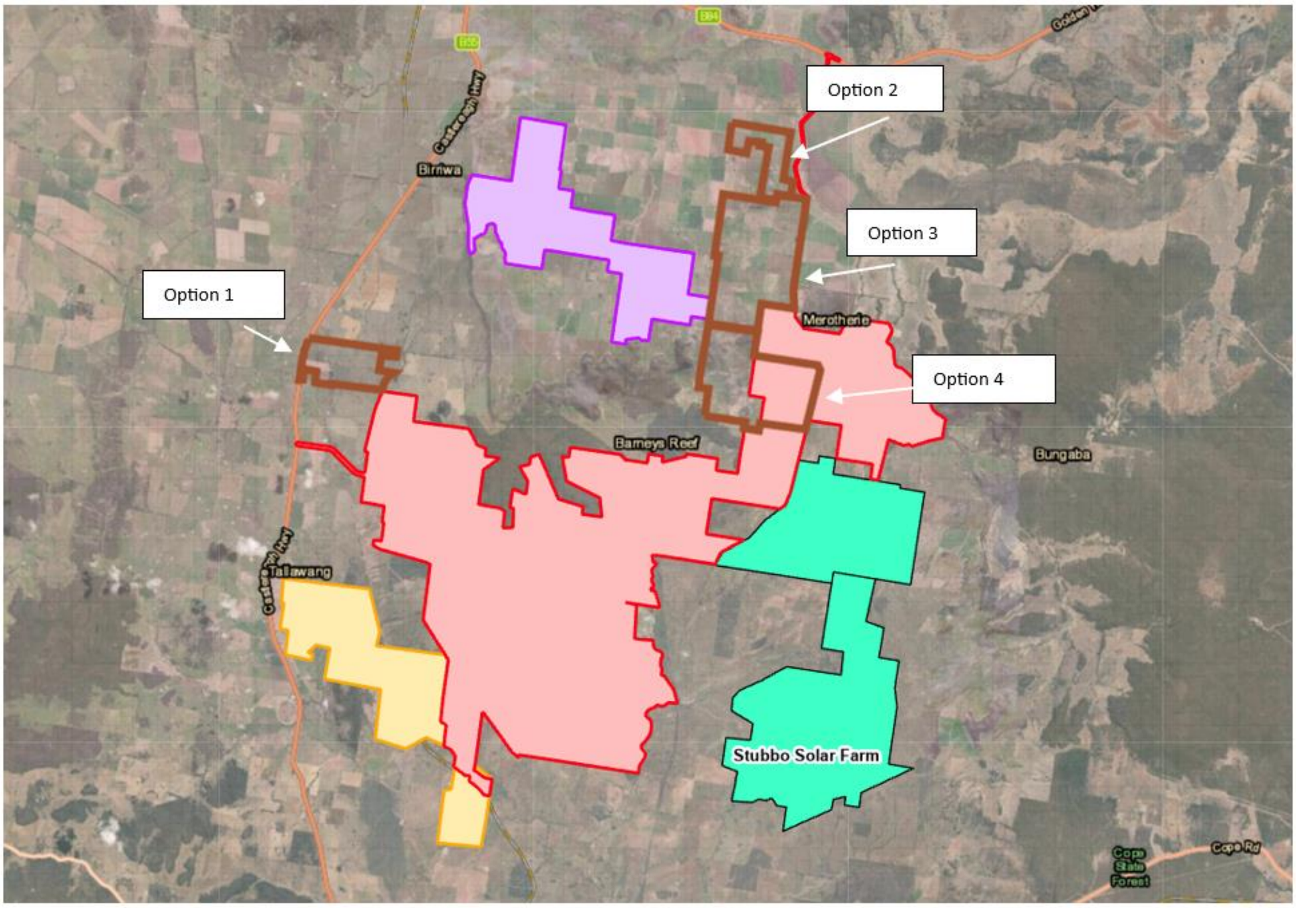


Figure 7-2 Options considered for the location of the Merotherie energy hub

All options avoided Tier 1 constraints, had limited Tier 2 constraints, and comprised predominantly cleared land. While each option contained some areas of vegetation it was considered feasible to avoid or minimise during design development when taking into account the size and configuration of the land at each option.

However, after assessing the relative merits and constraints of each option, EnergyCo selected Option 3 as the preferred location for the energy hub. This option was the largest and contained large areas of predominantly cleared land, including Category 1 land. In this regard, the preferred energy hub site provided further opportunities to avoid biodiversity values further when designing and locating infrastructure.

Option 1 and option 3 were both identified as feasible options for the location of the Merotherie energy hub and both rated similarly against the above site selection criteria. Construction access to Option 3 would require upgrades to Merotherie Road; however, option 3 was identified as the preferred location for the energy hub, when compared with option 1 as:

- it is located more centrally to renewable energy generators that would connect to the Merotherie energy hub, results in the project having less line kilometres of transmission line
- option 1 would be located closer to the Elong Elong energy hub. Having the energy hubs located too close to each other would minimise the benefit of having multiple energy hubs connecting to renewable generators in multiple catchments
- option 1 would be more visible from main roads and a number of surrounding homesteads, compared to option 3 which would be unlikely visible from the nearest residential property.

Elong Elong energy hub

There were three options identified for the location of the Elong Elong energy hub as outlined below and shown in Figure 7-3:

- Option 1 – Cobbora Road and Saxa Road
- Option 2 – Golden Highway along Sweeneys Lane
- Option 3 – Spring Ridge Road.

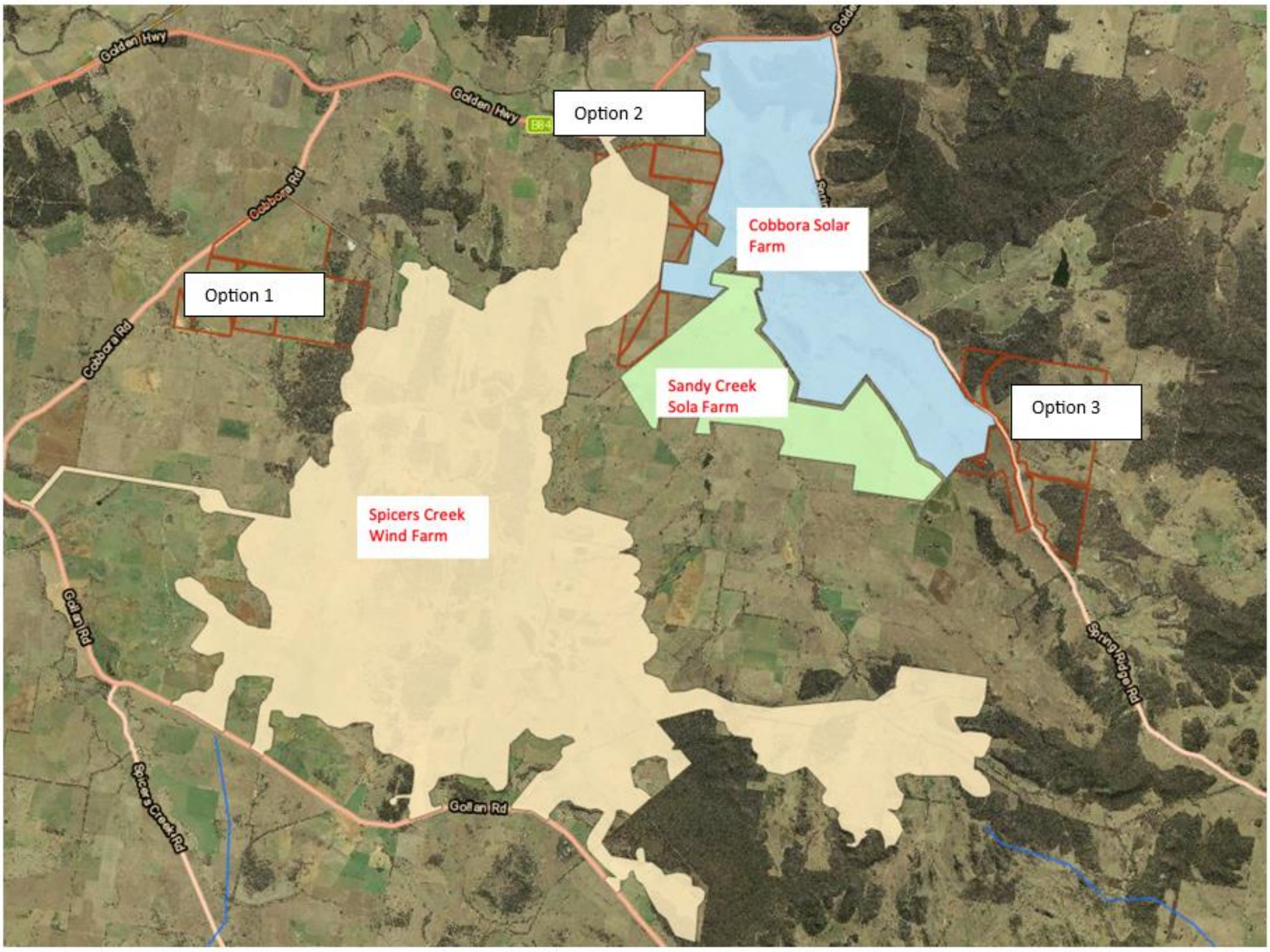


Figure 7-3 Options considered for the Elong Elong Energy Hub

During the initial site selection process, EnergyCo took an approach to identify larger sized options that would ultimately be reduced in size and acquired based on design requirements. Commencing with a larger site also provided opportunities to avoid or minimise environmental constraints as described further below.

The relative performance of each option against the selection criteria found that option 2 was predominantly cleared for grazing whilst option 1 and 3 contained a mix of cleared and vegetated areas. Option 3 also contained mapped threatened ecological communities associated with vegetated areas, property boundaries and creek lines.

The location of Option 1 with respect to proposed renewable energy generators required comparatively longer transmission line infrastructure, including associated vegetation clearing. In addition the comparatively greater impacts on agricultural land and proximity to nearby residential properties meant Option 1 was discarded.

Option 2 was also discarded as the land was subject to flooding from Sandy Creek. Option 2 would have required extensive flood mitigation, earthworks, including vegetation clearance, and potential indirect impacts to Sandy Creek.

Option 3 was selected as it best met the selection criteria, and although it contained vegetated areas and TEC's, the large size meant biodiversity constraints could be avoided or minimised. In this regard, following selection of Option 3, EnergyCo further refined the energy hub site to avoid vegetated areas east of Spring Ridge Road and vegetated areas south of Dapper Road. Whilst TECs remain on the southern and eastern edge of the energy hub, the site is predominantly Category 1 land.

Uarbry energy hub

Three options were considered for the location of the Uarbry energy hub, each requiring transmission infrastructure between the Valley of the Winds project and the Liverpool Range project that traversed a wide valley floor, undulating ridgelines, moderate to good Box Gum Woodland and Biophysical Strategic Agricultural Land. Accordingly, in response to community feedback following publication of the revised study corridor and in line with the tiered approach, EnergyCo elected to consider alternative options that did not require transmission line infrastructure across this wide valley floor.

In this regard EnergyCo removed the Uarbry energy hub as part of the project scope and replaced it with two 330 kV switching stations on the existing 330 kV transmission alignment to the proposed Valley of the Winds project. EnergyCo also developed a transmission alignment to the Liverpool Range Wind Farm project that was further south from the original location. The revised transmission alignment traversed comparatively less Box Gum Woodland.

Transmission alignment

Following selection of the energy hubs, EnergyCo undertook an iterative refinement process for the transmission line alignments when reducing the 5 km study corridor to a 1 km corridor. This involved developing an alignment that on balance sought to minimise multiple constraints using on the tiered approach, and adjusting the alignment in response to further site based information and landowner feedback.

The key changes at this point in the project development process included:

- removal of southern corridor so that the 500 kV network terminated at Elong Elong energy hub, thus avoiding areas of mapped Box Gum Woodland in varying condition (this project element may be investigated in future, but would be subject to a separate assessment and approval).
- adoption of the 330 kV network infrastructure between the energy hubs and large scale renewable energy generation projects. Whilst these new connections did increase the cumulative length of the project, the streamlined connections to Elong Elong Energy Hub were located in cleared agricultural land, predominantly mapped as having no native vegetation
- selecting an east-west corridor alignment between the energy hubs that traversed the narrowest section of intact vegetation that is contiguous with Tuckland State Forest, and locating the transmission corridor in areas devoid of TEC's e.g. east and west of Wallerawang Gwabegar Railway.

In addition, the following project decisions were made when refining the 1 km project corridor shown in the Scoping Report (September 2022) to the 220 m construction area in the EIS:

- rationalising switching station locations, and associated transmission lines, at Elong Elong Energy hub to maximise the use of Category 1 land and avoid a northern connection across Spring Ridge Road to avoid mapped TEC's along Laheys Creek
- realigning the transmission alignment through Moolarben, which minimised the extent of mapped Important Regent Honeyeater Habitat impacted by the project.

In terms of locating the proposal to avoid known biodiversity values, the project has successfully avoided locations of threatened plant species that were identified during field surveys. Surveys undertaken in 2021 located threatened plant species in the area of preliminary alignment options including:

- a population of *Zieria ingramii* near Spring Ridge Road at Cobbora
- a population of *Homoranthus darwinioides* near Spring Ridge Road at Cobbora
- a population of *Diuris tricolor* near Sandy Creek Road at Cobbora.

The current location of the alignment avoids impact to these locations and known populations of these species.

The location of the proposal (including ancillary facilities such as construction compounds and accommodation camps) avoids impact to identified breeding habitat for Little Eagle at Merotherie. The nest will not be impacted.

For detailed description of the approach to the refinement of the design for the project, including the development of design criteria and principles, the approach to the design principles and issues, design options considered and assessment against a range of criteria please refer to the Proposal design development in the EIS.

Photo 7-1 *Zieria ingramii* at Cobbora, impacts to this known population have been avoided

Photo 7-2 *Homoranthus darwinioides* at Cobbora, impacts to this known population have been avoided

7.1.3 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.

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 7-1.

Table 7-1 Efforts to avoid and minimise impacts on native vegetation and habitat during project design

<table>
<tr><th>Principles</th><th>Proposal consistency</th></tr>
<tr><td colspan="2">Designing a proposal to avoid and minimise impact on native vegetation, threatened species, threatened ecological communities and their habitat (section 7.1.2.1 of BAM)</td></tr>
<tr><td>(a) Reducing the proposal's clearing footprint by minimising the number and type of facilities</td><td rowspan="4">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. Briefly, the design incorporates three levels of disturbance scaled to the minimum necessary for each project component. Impacts vary from complete removal in areas of transmission line towers, brake and winch sites, new/upgraded access tracks, construction compounds, and accommodation camps to partial removal and retention of vegetation and habitat along the power line alignment between transmission towers taking into account 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 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 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).</td></tr>
<tr><td>(b) Locating ancillary facilities in areas where there are no biodiversity values</td></tr>
<tr><td>(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)</td></tr>
<tr><td>(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)</td></tr>
<tr><td>(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.</td><td>Mitigation measures have been developed to address the direct and indirect impacts of the proposal, 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.</td></tr>
</table>

7.2 Avoid and minimise prescribed impacts

7.2.1 Project location

Section 7.2.1 of the BAM deals with locating the proposal to avoid or minimise prescribed biodiversity impacts. EnergyCo identified and evaluated a range of alignment corridor options as outlined above in Section 7.1 and in the EIS.

Table 7-2 outlines how the proposal has been located to avoid and minimise impact on prescribed biodiversity impacts.

Table 7-2 Efforts to avoid and minimise impacts on prescribed biodiversity during proposal planning

Prescribed biodiversity impacts	Proposal planning
Locate the proposal 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 ensured that: — impacts to caves have been avoided — 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 ensured that: — 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. Subsurface works are expected to be minor.
(c) locate the proposal 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 ensured that: — 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. 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.

Prescribed biodiversity impacts	Proposal planning
(d) *optimising proposal layout to minimise interactions with threatened entities*	The approach outlined in Section 7.1 has ensured that: — 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 proposal to avoid impacts on water bodies or hydrological processes.*	No waterbodies will be directly impacted. The approach outlined in Section 7.1 has ensured that impacts to water-related values have been avoided and minimised.

7.2.2 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 alignment corridor options as outlined above in Section 7.1 and in the EIS.

Section 7.1 of this BDAR and the EIS outline the design of the project. There are no alternatives to the project and the project has been designed in a sympathetic manner. There are no alternative modes or technologies, alternative routes, alternative locations, or alternative sites that would reduce prescribed biodiversity impacts.

7.3 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: Optimisation and modification of existing transmission line infrastructure (‘do minimum’).
- Strategic option 3: Provision of new transmission capacity to meet known renewable energy demand and allow for future expansion.

7.3.1 Strategic option 1: Base case (‘do nothing’)

The base case option is to do nothing and to rely on the existing electricity generation and transmission network to meet current and future energy demand. This would involve continued reliance on coal-fired power generation to provide the majority of electricity generation in NSW, supplemented by the current extent of known and planned development of renewable energy projects. As outlined in Section 2.1, coal-fired generation is withdrawing faster than anticipated due to large coal-fired power plants closing ahead of originally anticipated retirement dates as competitive and operational pressures intensify with cleaner and lower-cost renewable energy generation. As such, the NEM needs to identify and connect to new low emission energy generation sources to continue to have enough energy to meet future demand, while meeting Australia’s carbon emissions policy commitments.

The ‘do nothing’ option would limit investment in renewable energy generation within the Central-West Orana REZ as no additional transmission infrastructure would be provided to collect and transmit energy from renewable energy projects, and the strategic project objectives would not be able to be achieved.

The base case option has been rejected as a viable strategic alternative because it would not address the identified project need or adequately satisfy the strategic project objectives to decarbonise the NEM and provide an affordable and reliable source of energy.

7.3.2 Strategic option 2: Optimisation and modification of existing transmission line infrastructure (‘do minimum’)

The ‘do minimum’ option would involve the optimisation and modification of existing transmission line infrastructure to accept electricity from renewable energy projects in the Central-West Orana REZ. This alternative would be consistent with some of the objectives of the project, as it would connect renewable energy projects to consumers and would contribute to government decarbonisation targets and the transition of the NEM from traditional energy sources to lower emission alternatives, including renewable energy.

However, this option would not provide the increased network capacity needed to encourage the scale of renewable energy investment required to meet government emission reduction targets and to provide an affordable and reliable source of new energy to meet current and future electricity demand. Further, this option would also result in significant construction of transmission assets from the existing Transgrid transmission Line 79 and Line 72 to connect renewable energy generators to the existing network and would result in needing to de-energise existing lines during construction which would affect energy security.

The ‘do minimum’ option has been rejected as a viable strategic alternative for the project.

7.3.3 Strategic option 3: New transmission capacity to meet known renewable energy demand and allow for future expansion

This option would involve the construction and operation of new HV transmission infrastructure in the Central-West Orana REZ. The transmission infrastructure would include connections from the new HV transmission lines and would be planned so that the transmission alignment considers the location of known renewable energy projects currently under development. In addition, the transmission infrastructure to be provided as part of this option would be designed so that there is sufficient capacity for future renewable energy generators within the Central-West Orana REZ to connect, and there would be flexibility in the project design for it to be expanded and extended in the future to respond to the growing development of renewable energy projects in the Central-West Orana REZ.

This strategic option would be aligned with all of the strategic project objectives and is considered to be the preferred strategic option for the project.

7.4 Summary of measures to avoid and minimise impacts

Table 7-3 documents the measures to avoid and minimise direct, indirect and prescribed impacts.

Table 7-3 Avoidance and minimisation measures for direct, indirect and prescribed impacts

Action	Outcome	Timing	Responsibility
Identified and evaluated a range of alignment corridor options.	The project has sought to maximise avoidance and minimisation of biodiversity impacts. Avoidance of known populations of *Zieria ingramii*, *Homoranthus darwinioides* and *Diuris tricolor* at Cobbora was achieved through the corridor selection process. While efforts have been made to avoid biodiversity impacts, some impacts cannot be avoided.	Design phase	EnergyCo
Locating the proposal to avoid high biodiversity values.	The project has successfully avoided locations of threatened plant species that were identified during field surveys. Surveys undertaken in 2021 located threatened plant species in the area of preliminary alignment options including: — a population of *Zieria ingramii* near Spring Ridge Road at Cobbora — a population of *Homoranthus darwinioides* near Spring Ridge Road at Cobbora — a population of *Diuris tricolor* near Sandy Creek Road at Cobbora. The location of the proposal avoids impact to identified breeding habitat for Little Eagle at Merotherie.	Design phase	EnergyCo
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

Action	Outcome	Timing	Responsibility
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.	Design phase	EnergyCo
Avoiding and minimising prescribed impacts	The approach outlined in Section 7.1 has ensured that: — impacts to caves have been avoided — impacts to rocky habitats have been avoided or minimised — impacts to habitat connectivity and species movement have been avoided or minimised — impacts to water-related values have been avoided and minimised — impacts of vehicle strikes have been avoided and minimised.	Design phase	EnergyCo

8 Impact assessment

Assessment of direct impacts unable to be avoided has been carried out in accordance with Section 8 of the BAM. To assess the construction impacts from each stage, a disturbance area (as defined in Table 8-1) has been used. For this report, the disturbance area has the same meaning as 'development site' as defined in the BAM.

It should be noted that final design the project has not been completed and as a result the disturbance area is based on a reference design. 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 Disturbance area definitions for biodiversity construction impact assessment purposes

Term	Definition
Disturbance area	Refers to the area that would be directly impacted by construction and operation of the proposal including all proposal infrastructure elements (including the proposed proposal disturbance area, substation site works and other ancillary works i.e. the permanent works footprint) as well as locations for currently proposed construction elements such as construction compounds, access tracks and site access points, laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps. The area is identified based on realistic project component locations and areas however it is indicative at this stage. The area would be confirmed during finalisation of design and construction methodology and would be developed as part of the consideration of avoidance and impact minimisation. Also termed the construction impact area.
Disturbance area A	Refers to an area at and around the transmission line towers, areas for brake and winch sites and for new/upgraded access tracks in which vegetation would be removed during construction. The area also includes the proposed construction compounds and accommodation camps. It would include vegetation (including tree) removal and sub-surface impacts through construction activities such as grading, excavation, and full tree removal. Except in areas where only temporary disturbance is required (i.e. temporary access tracks and brake and winch sites), this area would also be subject to ongoing maintenance during operation (i.e. removal to ground level) for operational and safety requirements (including bushfire).
Disturbance area B	Refers to an area between and adjacent to transmission towers in which it is assumed vegetation removal would only be required to meet the vegetation clearance heights. Where trees within this area would or have the potential to exceed vegetation clearance heights with growth heights greater than 2 metres, these trees would be removed and may result in temporary ground disturbance. There is potential for temporary minor changes to understorey composition in these areas due to the temporary ground disturbance activities. Retention of root bases, and or tree stumps of trees identified for removal, would occur where practicable. Vegetation clearance heights take into account operational and safety requirements, including bushfire risk management. This zone is a subset to the disturbance area.

Term	Definition
Disturbance area 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 m. 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. The number of trees that are likely to be at risk of falling are likely to be minimal. A Disturbance area HZ has been mapped and a nominal 10% of this area is taken to likely be impacted. Selective tree removal is posed for Disturbance area HZ. This zone is a subset to the disturbance area.

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 estimated at approximately 1,031.63 ha.

Table 8-3 to Table 8-7 document the impacts likely to occur on 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 Derived Native Grasslands and Derived Native Shrublands 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 are not applicable to Derived Native Grasslands and Derived Native Shrublands as these areas do not contain vegetation over 2 m in height.

Table 8.2 Summary of residual direct impacts to PCTs identified within the subject land

PCT ID	PCT name	Disturbance area A impact (ha)	Disturbance area B impact (ha)	Disturbance area HZ impact (ha)
42	River Red Gum/River Oak riparian woodland wetland in the Hunter Valley	0.38	0.42	0
81	Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	17.17	2.99	0.1
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	0.58	2.36	0.05
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	21.31	7.98	0.19
277	Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	68.66	10.93	0.22
281	Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	161.27	90.98	1.29
440	Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	47.61	37.74	0.65

PCT ID	PCT name	Disturbance area A impact (ha)	Disturbance area B impact (ha)	Disturbance area HZ impact (ha)
461	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	12.44	26.97	0.62
468	Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	0.12	0	0
477	Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	6.91	11.52	0
478	Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	3.36	4.09	0.18
479	Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	51.33	50.53	0.79
481	Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	8.42	19.45	0.35
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	65.59	43.99	0.08
599	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	7.56	5.03	0
618	White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	64.81	25.71	0.35
1176	Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	0.53	1.39	0.04
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	14.25	26.75	0.74
1610	White Box – Black Cypress Pine shrubby woodland of the Western Slopes	20	41	1.03
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	14.73	13.75	0
1674	Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	3.27	7.37	0.12
1696	Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	1.88	1.7	0
	Total impact in each disturbance area (ha)	**592.18**	**432.65**	**6.8**
	Total impact (ha)		**1,031.63**	

Table 8-3 Summary of residual direct impacts for the Inland Slopes IBRA subregion

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)								
						CFG connection to Tallawang Stage			RNI 1 Stage			Stubbo Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Derived Native Grassland	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Not part of the TEC	No	Construction				4.36					
	Moderate_Good		Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia						0.42	1.97	0.06			
	Thinned					0.16			0.05	0.38	0.02			
202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Thinned	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Not a TEC	Yes	Construction	0.12	0.06							
266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Derived Native Grassland	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	Unlikely to be part of the TEC due to poor condition	Yes	Construction				16.65					
	Derived Native Shrubland		Unlikely to be part of the TEC due to poor condition						0.49					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						1.67	3.45	0.08			
	Thinned								2.5	4.53	0.11			
277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Derived Native Grassland	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	Unlikely to be part of the TEC due to poor condition	Yes	Construction	6.61			56.9					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						1.44	4.49	0.1	0.11	0.39	0.01
	Thinned					0.35	0.32		2.56	5.28	0.08			

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha) CFG connection to Tallawang Stage			RNI 1 Stage			Stubbo Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	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	Unlikely to be part of the TEC due to poor condition	Yes	Construction	26.2			42.99			0.73		
	Derived Native Shrubland		Unlikely to be part of the TEC due to poor condition											
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.33	0.3		3.28	1.56	0.05	0.40	1.29	0.02
	Poor		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						0.01	0.1				
	Thinned		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			4.76	7.84		12.42	14.16	0.2	0.38	1.84	
440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				13.07			0.03		
	Derived Native Shrubland								0.01			1.45		
	Moderate_Good								8.5	20.39	0.48	0.68	2.8	0.07
	Poor								0.53	0.33				
	Thinned								4.31	2.65	0.04	0.37	0.35	0.01
461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.33					
	Moderate_Good								1.71	4.28	0.12			
	Thinned									0.01				
478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Moderate_Good	Not a TEC	Not a TEC	No	Construction				0.09	0.15		0.09	0.05	0.01
	Thinned								0.15	0.06				

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)								
						CFG connection to Tallawang Stage			RNI 1 Stage			Stubbo Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				3.19					
	Moderate_Good								3.26	6.91	0.14			
	Poor													
	Thinned								2.00	2.90	0.11			
481 - Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Moderate_Good	Not a TEC	Not a TEC	No	Construction				1.73	4.42	0.12			
	Thinned								0.41	2.75	0.06			
1177 – Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.93					
	Derived Native Shrubland								1.00					
	Moderate_Good								11.36	25.07	0.65			
	Thinned								0.96	1.68	0.09			

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 transmission 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 m. 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 Kerrabee IBRA subregion

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)								
						Liverpool Range Stage			RNI 1 Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
42 – River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	Derived Native Grassland	Not a TEC	Not a TEC	Yes	Construction							0.18		
	Thinned											0.2	0.42	
277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction									
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						0.08	0.07	0.02	0.14		
	Thinned								0.46	0.38	0.01			
281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	1.44			26.51					
	Derived Native Shrubland								1.08					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						12.32	27.49	0.45	3.56	3.11	
	Poor		Not part of the TEC							0.01				
	Thinned		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.09	0.29		14.95	27.3	0.57	2.55	4.33	
440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	0.15			1.67					
	Moderate_Good					0.4	0.86		0.73	1.45		0.48	0.3	
	Thinned					0.03						0.03		
461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Moderate_Good	Not a TEC	Not a TEC	No	Construction				8.36	21.46	0.46			
	Thinned									0.12	0.01			
477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	0.94								
	Moderate_Good					3.81	8.6							
	Thinned					0.74	1.3		0.05	0.61				

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)								
						Liverpool Range Stage			RNI 1 Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.61					
	Moderate_Good								2.4	3.71	0.16			
	Thinned								0.02	0.12	0.01			
479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	0.44			7.35			0.16		
	Derived Native Shrubland								0.31					
	Moderate_Good					8.9	13.99		4.16	4.93	0.2	4.31	4.54	
	Thinned								5.16	11.21	0.34	1.15	1.3	
481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction							0.05		
	Moderate_Good								0.63	1.87	0.04			
	Thinned								3.27	5.8	0.13	0.03	0.09	
483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	0.87			1.45					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland											
	Thinned								0.77	1.96				
599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Derived Native Grassland	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	Not part of the TEC		Construction							1.68		
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland									0.45	1.05	
	Thinned		Not part of the TEC									0.86	1.2	

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)								
						Liverpool Range Stage			RNI 1 Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ	A	B	HZ
618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	Derived Native Grassland	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	Not part of the TEC	Yes	Construction				42.03			9.01		
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						1.72	6.27	0.18	3.03	4.34	
	Thinned								3.22	6.52	0.17	4.25	7	
1176 – Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	Thinned	Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	Central Hunter Valley eucalypt forest and woodland	No	Construction				0.53	1.39	0.04			
1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				1.18					
	Moderate_Good								17.52	37.89	0.96			
	Thinned								1.3	3.11	0.07			
1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	2								
	Moderate_Good													
	Thinned					0.15	0.61							
1674 – Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.02					
	Moderate_Good								3.25	7.37	0.12			

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 transmission 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 m. 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 Liverpool Ranges IBRA subregion

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)					
						Liverpool Range Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ
281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction				0.13		
	Thinned		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						0.13	0.39	
440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.38		
	Thinned								0.25	0.49	
483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	16.47			2.31		
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			4.79	8.23				
	Poor		Not part of the TEC			3.21	3.24	0.03			
	Thinned					9.94	14.33	0.05	3.73	1.85	

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 transmission 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 m. 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 8-6 Summary of residual direct impacts for the Pilliga IBRA subregion

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)					
						Liverpool Range Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ
281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	0.87					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.13	0.69				
	Thinned		Not part of the TEC			6.01	0.28				
477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Moderate_Good	Not a TEC	Not a TEC	No	Construction	1.25	0.9		0.07	0.11	
	Thinned					0.05					
440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				0.2		
	Moderate_Good								2.89	5.09	
	Thinned								0.8	0.62	
479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	7.25					
	Moderate_Good					3.67	4.73				
	Thinned					0.02	0.02				
481 – Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Moderate_Good	Not a TEC	Not a TEC	No	Construction				1.94	4	
	Thinned								0.36	0.52	

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)					
						Liverpool Range Stage			Valley of the Winds Stage		
						A	B	HZ	A	B	HZ
483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	14.07					
	Derived Native Shrubland		Not part of the TEC			0.06					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.11	0.52		0.15	0.79	
	Poor		Not part of the TEC			0.09	0.21				
	Thinned					7.57	12.86				
618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	1.00					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.55	1.58				
599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction				1.62		
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland						0.31	0.71	
	Thinned		Not part of the TEC						0.23	0.38	
1661 – Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction	5.23					
	Moderate_Good					5.3	10.58				
	Thinned					2.05	2.56				
1696 – Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	Derived Native Grassland	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	Not a TEC	Yes	Construction	0.92					
	Derived Native Shrubland					0.67					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.29	1.7				

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 transmission 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 m. 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 8-7 Summary of residual direct impacts for the Talbragar Valley IBRA subregion

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)					
						CFG connection to Spicers Creek wind farm Stage			RNI 1 Stage		
						A	B	HZ	A	B	HZ
81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Derived Native Grassland	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Not part of the TEC	No	Construction	0.04			9.89		
	Derived Native Shrubland		Not part of the TEC								
	Moderate_Good		Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia						0.63	0.18	0.01
	Thinned								1.62	0.46	0.01
202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Moderate_Good	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Not a TEC	Yes	Construction				0.25	1.69	0.04
	Thinned					0.19	0.02		0.02	0.59	0.01
277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate_Good	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	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	Construction	0.01					
440 – Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Derived Native Grassland	Not a TEC	Not a TEC	No	Construction				5.02		
	Moderate_Good								4.93	0.04	
	Thinned								0.7	2.37	0.05
461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Moderate_Good	Not a TEC	Not a TEC	No	Construction				1.44	1.1	0.03
	Thinned								0.6		
468 – Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	Thinned	Not a TEC	Not a TEC	No	Construction				0.12		

PCT name	Condition class	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)					
						CFG connection to Spicers Creek wind farm Stage			RNI 1 Stage		
						A	B	HZ	A	B	HZ
599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Derived Native Grassland	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	Not part of the TEC	Yes	Construction	0.98					
	Moderate_Good		White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			0.46	0.55				
	Thinned		Not part of the TEC			0.97	1.14				

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 transmission 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 m. 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.

8.1.1.1 Change in vegetation integrity score

The BAM has been established under the guiding principle of avoid and minimise impacts to biodiversity values. For impacts that cannot be totally avoided, impacts must be minimised to enable better outcomes for biodiversity values.

Transmission line corridor 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 corridor 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.

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 VI 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, the future vegetation integrity score was calculated as zero (assuming total loss of native vegetation).
- For disturbance area B (partial clearing of the transmission line easement) future vegetation integrity scores have been calculated through changes to mean average scores in attributes associated with composition condition, structure condition, and function condition.
- For disturbance area HZ (Hazard High Risk Trees) future vegetation integrity scores have been calculated through changes to tree species composition and structure.

Table 8-8 outlines how the future means 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.

Table 8-8 Outline of how future means were adjusted for disturbance area B and HZ

Attribute	Vegetation layer	Adjustment for Grassy Woodlands	Adjustment for Dry Sclerophyll Forests
Composition	Canopy	Complete removal	Complete removal
	Shrub	10% reduction	10% reduction
	Understory	10% reduction	10% reduction
Structure	Canopy	Complete removal	Complete removal
	Shrub	0%	20% reduction
	Understory	0%	0%
Function	Canopy	Complete removal	
	Understory	30% Reduction in Leaf Litter and Fallen Timber	

Photo 8-1 The existing powerline easement at Cope possesses a native shrub layer and ground layer and the threatened species *Acacia ausfeldii*

Photo 8-2 A smaller easement at Cope showing intact native ground layer

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 & Koen, 1995).

Specifically, for the project, most Dry Sclerophyll Forest PCTs have existing woody shrub layers that are likely to see increases in the future shrub layers cover scores (as evidenced by shrub layers in existing power line easements in the assessment area), while for those PCTs with greater grassy understorey components (e.g. Grassy Woodlands) similar future increase in vegetation cover for grass and grass like, forb, fern and other species cover attributes is likely (Nobel, 1997; Both *et al*. 1996). These likely increase in mid and understorey layers due to structural canopy change cannot be reflected in BAM-C future vegetation integrity scores due to limitations within BAM-C.

The BAM-C has limited flexibility in the input functions to calculate future vegetation integrity scores, specifically in that attributes can only be decreased from the recorded mean average. Attribute scores cannot be increased when using the clearing module. This limitation means that any composition, structure or function attribute cannot be adequately adjusted to reflect likely changes in vegetation integrity where evidence from existing powerline easements suggests the attributes are likely to increase (e.g. increased shrub cover due to tree removal).

Table 8-9 Impacts to vegetation integrity in the Inland Slopes IBRA subregion – CFG Connection to Tallawang Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	81	Thinned	81_Thinned	101	A	0.16	0	0	0	0	-73.4	-73.4
2	202	Thinned	202_Thinned	101	A	0.12	0	0	0	0	-45.2	-40.3
					B	0.06	23.5	7	20.2	14.9	-30.3	
3	277	DNG	277_DNG	101	A	6.61	0	0	0	0	-16.7	-16.7
4	277	Thinned	277_Thinned	101	A	0.35	0	0	0	0	-57.7	-48.7
					B	0.32	60.7	57.5	1.9	18.9	-38.8	
5	281	DNG	281_DNG	101	A	26.2	0	0	0	0	-22.9	-22.9
6	281	Mod_Good	281_Mod_Good	101	A	0.33	0	0	0	0	-90.5	-66.4
					B	0.3	85.4	67.2	22.6	50.6	-39.9	
7	281	Thinned	281_Thinned	101	A	4.76	0	0	0	0	-81.9	-55.3
					B	7.84	77.7	66.3	15.2	42.8	-39.1	

Table 8-10 Impacts to vegetation integrity in the Inland Slopes IBRA subregion – RNI1 Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	81	DNG	81_DNG	101	A	4.36	0	0	0	0	-13.2	-13.2
2	81	Mod_Good	81_Mod_Good	101	A	0.42	0	0	0	0	-80.4	-47.6
					B	1.97	87.9	49.2	14.4	39.6	-40.8	
					HZ	0.06	87.9	49.2	14.4	39.6	-40.8	
3	81	Thinned	81_Thinned	101	A	0.05	0	0	0	0	-73.4	-39.6
					B	0.38	83.3	49.2	13.4	38	-35.4	
					HZ	0.02	83.3	49.2	13.4	38	-35.4	
4	266	DNG	266_DNG	101	A	16.65	0	0	0	0	-18.4	-18.4
5	266	DNS	266_DNS	101	A	0.49	0	0	0	0	-36.3	-36.3
6	266	Mod_Good	266_Mod_Good	101	A	1.67	0	0	0	0	-83.6	-47.8
					B	3.45	86.9	67.2	25.2	52.8	-30.9	
					HZ	0.08	86.9	67.2	25.2	52.8	-30.9	
7	266	Thinned	266_Thinned	101	A	2.5	0	0	0	0	-55.6	-37.8
					B	4.53	77.8	66.6	3.9	27.3	-28.3	
					HZ	0.11	77.8	66.6	3.9	27.3	-28.3	
8	277	DNG	277_DNG	101	A	56.9	0	0	0	0	-16.7	-16.7
9	277	Mod_Good	277_Mod_Good	101	A	1.44	0	0	0	0	-85	-46.5
					B	4.49	88.3	67.2	21.8	50.6	-34.4	
					HZ	0.1	88.3	67.2	21.8	50.6	-34.4	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
10	277	Thinned	277_Thinned	101	A	2.56	0	0	0	0	-57.7	-44.9
					B	5.28	60.7	57.5	1.9	18.9	-38.8	
					HZ	0.08	60.7	57.5	1.9	18.9	-38.8	
11	281	DNG	281_DNG	101	A	56.9	0	0	0	0	-22.9	-22.9
12	281	Mod_Good	281_Mod_Good	101	A	3.28	0	0	0	0	-90.5	-73.8
					B	1.56	85.4	67.2	22.6	50.6	-39.9	
					HZ	0.05	85.4	67.2	22.6	50.6	-39.9	
13	281	Poor	281_Poor	101	A	0.01	0	0	0	0	-81.9	-43
					B	0.1	77.7	66.3	15.2	42.8	-39.1	
14	281	Thinned	281_Thinned	101	A	12.42	0	0	0	0	-81.9	-59
					B	14.16	77.7	66.3	15.2	42.8	-39.1	
					HZ	0.2	77.7	66.3	15.2	42.8	-39.1	
15	440	DNG	440_DNG	101	A	13.07	0	0	0	0	-7.6	-7.6
16	440	DNS	440_DNS	101	A	0.01	0	0	0	0	-23.4	-23.4
17	440	Mod_Good	440_Mod_Good	101	A	8.5	0	0	0	0	-90.8	-62.3
					B	20.39	79.3	32.6	25.2	40.2	-50.6	
					HZ	0.48	79.3	32.6	25.2	40.2	-50.6	
18	440	Poor	440_Poor	101	A	0.53	0	0	0	0	-25.1	-21.5
					B	0.33	27.6	7.4	4	9.4	-15.7	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
19	440	Thinned	440_Thinned	101	A	4.31	0	0	0	0	-66.5	-55.6
					B	2.65	61.8	32.6	11.3	28.4	-38.1	
					HZ	0.04	61.8	32.6	11.3	28.4	-38.1	
20	461	DNG	461_DNG	101	A	0.33	0	0	0	0	-28.5	-28.5
21	461	Mod_Good	461_Mod_Good	101	A	1.71	0	0	0	0	-83.3	-45.9
					B	4.28	88.4	67.2	23.6	52	-31.4	
					HZ	0.12	88.4	67.2	23.6	52	-31.4	
22	461	Thinned	461_Thinned	101	B	0.01	86.6	67.2	26.8	53.8	-18.9	-18.9
23	478	Mod_Good	478_Mod_Good	101	A	0.09	0	0	0	0	-80.6	-58
					B	0.15	78.2	31.3	19.2	36.1	-44.5	
24	478	Thinned	478_Thinned	101	A	0.15	0	0	0	0	-80.6	-70.3
					B	0.06	78.2	31.3	19.2	36.1	-44.5	
25	479	DNG	479_DNG	101	A	3.19	0	0	0	0	-9.8	-9.8
26	479	Mod_Good	479_Mod_Good	101	A	3.26	0	0	0	0	-90.4	-63.4
					B	6.91	82.2	32.6	23	39.5	-50.9	
					H	0.14	82.2	32.6	23	39.5	-50.9	
27	479	Thinned	479_Thinned	101	A	2	0	0	0	0	-79	-63.1
					B	2.9	78.2	32.6	7.2	26.4	-52.6	
					HZ	0.11	78.2	32.6	7.2	26.4	-52.6	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
28	481	Mod_Good	481_Mod_Good	101	A	1.73	0	0	0	0	-78.4	-48.4
					B	4.42	81.6	51.3	17	41.4	-36.9	
					HZ	0.12	81.6	51.3	17	41.4	-36.9	
29	481	Thinned	481_Thinned	101	A	0.41	0	0	0	0	-85.5	-52.5
					B	2.75	85	43.2	14.8	37.8	-47.7	
					HZ	0.06	85	43.2	14.8	37.8	-47.7	
30	1177	DNG	1177_DNG	101	A	0.93	0	0	0	0	-24.1	-24.1
31	1177	DNS	1177_DNS	101	A	1	0	0	0	0	-36.1	-36.1
32	1177	Mod_Good	1177_Mod_Good	101	A	11.36	0	0	0	0	-68	-50.4
					B	25.07	61.9	7.9	33.5	25.4	-42.6	
					HZ	0.65	61.9	7.9	33.5	25.4	-42.6	
33	1177	Thinned	1177_Thinned	101	A	0.96	0	0	0	0	-49.2	-35.9
					B	1.68	76.9	33.5	3.4	20.5	-28.6	
					HZ	0.09	76.9	33.5	3.4	20.5	-28.6	

Table 8-11 Impacts to vegetation integrity in the Inland Slopes IBRA subregion – Stubbo Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	277	Mod_Good	277_Mod_Good	101	A	0.11	0	0	0	0	-85	-45.3
					B	0.39	88.3	67.2	21.8	50.6	-34.4	
					HZ	0.01	88.3	67.2	21.8	50.6	-34.4	
2	281	DNG	281_DNG	101	A	0.73	0	0	0	0	-22.9	-22.9
3	281	Mod_Good	281_Mod_Good	101	A	0.4	0	0	0	0	-90.5	-51.7
					B	1.29	85.4	67.2	22.6	50.6	-39.9	
					HZ	0.02	85.4	67.2	22.6	50.6	-39.9	
4	281	Thinned	281_Thinned	101	A	0.38	0	0	0	0	-81.9	-46.5
					B	1.84	77.7	66.3	15.2	42.8	-39.1	
5	440	DNG	440_DNG	101	A	0.03	0	0	0	0	-7.6	-7.6
6	440	DNS	440_DNS	101	A	1.45	0	0	0	0	-23.4	-23.4
7	440	Mod_Good	440_Mod_Good	101	A	0.68	0	0	0	0	-90.8	-58.3
					B	2.8	79.3	32.6	25.2	40.2	-50.6	
					HZ	0.07	79.3	32.6	25.2	40.2	-50.6	
8	440	Thinned	440_Thinned	101	A	0.37	0	0	0	0	-66.5	-52.5
					B	0.35	61.8	32.6	11.3	28.4	-38.1	
					HZ	0.01	61.8	32.6	11.3	28.4	-38.1	
9	478	Mod_Good	478_Mod_Good	101	A	0.09	0	0	0	0	-80.6	-66.2
					B	0.05	78.2	31.3	19.2	36.1	-44.5	
					HZ	0.01	78.2	31.3	19.2	36.1	-44.5	

Table 8-12 Impacts to vegetation integrity in the Kerrabee IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	42	DNG	42_DNG	101	A	0.18	0	0	0	0	-54.4	-54.4
2	42	Thinned	42_Thinned	101	A	0.2	0	0	0	0	-97.3	-62.2
					B	0.42	83.5	53.9	30.9	51.8	-45.5	
3	277	Mod_Good	277_Mod_Good	101	A	0.14	0	0	0	0	-89.7	-89.7
4	281	Mod_Good	281_Mod_Good	101	A	3.56	0	0	0	0	-93.6	-68.2
					B	3.11	73.2	72	30.5	54.4	-39.2	
5	281	Thinned	281_Thinned	101	A	2.55	0	0	0	0	-84	-54.7
					B	4.33	61.3	66.6	24.5	46.4	-37.5	
6	440	Mod_Good	440_Mod_Good	101	A	0.48	0	0	0	0	-72.1	-58.4
					B	0.3	57.3	28.4	28.1	35.7	-36.4	
7	440	Thinned	440_Thinned	101	A	0.03	0	0	0	0	-60.4	-60.4
8	479	DNG	479_DNG	101	A	0.16	0	0	0	0	-8.8	-8.8
9	479	Mod_Good	479_Mod_Good	101	A	4.31	0	0	0	0	-75.8	-57.5
					B	4.54	66.7	25.9	26.4	35.8	-40.1	
10	479	Thinned	479_Thinned	101	A	1.15	0	0	0	0	-62.4	-50.4
					B	1.3	58.1	21.7	9.1	22.6	-39.8	
11	481	DNG	481_DNG	101	A	0.05	0	0	0	0	-10.5	-10.5
12	481	Thinned	481_Thinned	101	A	0.03	0	0	0	0	-76.8	-49.7
					B	0.09	70.8	30.8	21.7	36.2	-40.6	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
13	599	DNG	599_DNG	101	A	1.68	0	0	0	0	-14.4	-14.4
14	599	Mod_Good	599_Mod_Good	101	A	0.45	0	0	0	0	-83.7	-46.9
					B	1.05	80.7	70.1	25.8	52.6	-31.1	
15	599	Thinned	599_Thinned	101	A	0.86	0	0	0	0	-54.7	-38.1
					B	1.2	56.4	60.3	6.8	28.5	-26.2	
16	618	DNG	618_DNG	101	A	9.01	0	0	0	0	-16.6	-16.6
17	618	Mod_Good	618_Mod_Good	101	A	3.03	0	0	0	0	-64.8	-42.5
					B	4.34	50.4	47.2	25.6	39.3	-26.4	
18	618	Thinned	618_Thinned	101	A	4.25	0	0	0	0	-45	-25.8
					B	7	48.1	43	14.3	30.9	-14.1	

Table 8-13 Impacts to vegetation integrity in the Kerrabee IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	1.44	0	0	0	0	-26.3	-26.3
2	281	Thinned	281_Thinned	101	A	0.09	0	0	0	0	-84	-53.3
					B	0.29	61.3	66.6	15.9	40.2	-43.8	
3	440	DNG	440_DNG	101	A	0.15	0	0	0	0	-7	-7
4	440	Mod_Good	440_Mod_Good	101	A	0.4	0	0	0	0	-72.1	-53.6
					B	0.86	57.3	24.3	14.4	27.2	-44.9	
5	440	Thinned	440_Thinned	101	A	0.03	0	0	0	0	-60.4	-60.4
6	477	DNG	477_DNG	101	A	0.94	0	0	0	0	-36.2	-36.2
7	477	Mod_Good	477_Mod_Good	101	A	3.81	0	0	0	0	-68.1	-48.5
					B	8.6	78.1	24.7	11.8	28.3	-39.8	
8	477	Thinned	477_Thinned	101	A	0.74	0	0	0	0	-68.1	-50.1
					B	1.3	78.1	24.7	11.8	28.3	-39.8	
9	479	DNG	479_DNG	101	A	0.44	0	0	0	0	-8.8	-8.8
10	479	Mod_Good	479_Mod_Good	101	A	8.9	0	0	0	0	-75.8	-58.5
					B	13.99	66.7	25.9	13.2	28.4	-47.5	
11	483	DNG	483_DNG	101	A	0.87	0	0	0	0	-27.2	-27.2
12	1661	DNG	1661_DNG	101	A	2	0	0	0	0	-12	-12
13	1661	Thinned	1661_Thinned	101	A	0.15	0	0	0	0	-51.7	-31.8
					B	0.61	53.4	19.9	14.3	24.8	-26.9	

Table 8-14 Impacts to vegetation integrity in the Kerrabee IBRA subregion – RNI1 Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	277	Mod_Good	277_Mod_Good	101	A	0.08	0	0	0	0	-89.7	-60.1
					B	0.07	82.8	71.8	29.4	55.9	-33.8	
					HZ	0.02	82.8	71.8	29.4	55.9	-33.8	
2	277	Thinned	277_Thinned	101	A	0.46	0	0	0	0	-59.3	-47.6
					B	0.38	50.9	61.8	5.2	25.4	-33.9	
					HZ	0.01	50.9	61.8	5.2	25.4	-33.9	
3	281	DNG	281_DNG	101	A	26.51	0	0	0	0	-26.3	-26.3
4	281	DNS	281_DNS	101	A	1.08	0	0	0	0	-37.1	-37.1
5	281	Mod_Good	281_Mod_Good	101	A	12.32	0	0	0	0	-93.6	-55.8
					B	27.49	73.2	72	30.5	54.4	-39.2	
					HZ	0.45	73.2	72	30.5	54.4	-39.2	
6	281	Poor	281_Poor	101	A	0	0	0	0	0	-84	-37.5
					B	0.01	61.3	66.6	24.5	46.4	-37.5	
					HZ	0	61.3	66.6	24.5	46.4	-37.5	
7	281	Thinned	281_Thinned	101	A	14.95	0	0	0	0	-84	-53.7
					B	27.3	61.3	66.6	24.5	46.4	-37.5	
					HZ	0.57	61.3	66.6	24.5	46.4	-37.5	
8	440	DNG	440_DNG	101	A	1.67	0	0	0	0	-7	-7

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
9	440	Mod_Good	440_Mod_Good	101	A	0.73	0	0	0	0	-72.1	-49.5
					B	1.45	57.3	24.3	28.1	33.9	-38.2	
10	461	Mod_Good	461_Mod_Good	101	A	8.36	0	0	0	0	-85.6	-44
					B	21.46	89.4	71.8	29.5	57.4	-28.1	
					HZ	0.46	89.4	71.8	29.5	57.4	-28.1	
11	461	Thinned	461_Thinned	101	A	0	0	0	0	0	-75.6	-17.2
					B	0.12	85.9	70.7	32.7	58.4	-17.2	
					HZ	0.01	85.9	70.7	32.7	58.4	-17.2	
12	477	Thinned	477_Thinned	101	A	0.05	0	0	0	0	-68.1	-68.1
13	478	DNG	478_DNG	101	A	0.61	0	0	0	0	-2.4	-2.4
14	478	Mod_Good	478_Mod_Good	101	A	2.4	0	0	0	0	-63.4	-45.3
					B	3.71	59.1	18.1	23.4	29.3	-34.1	
					HZ	0.16	59.1	18.1	23.4	29.3	-34.1	
15	478	Thinned	478_Thinned	101	A	0.02	0	0	0	0	-63.4	-38
					B	0.12	59.1	18.1	23.4	29.3	-34.1	
					HZ	0.01	59.1	18.1	23.4	29.3	-34.1	
16	479	DNG	479_DNG	101	A	7.35	0	0	0	0	-8.8	-8.8
17	479	DNS	479_DNS	101	A	0.31	0	0	0	0	-20.6	-20.6

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
18	479	Mod_Good	479_Mod_Good	101	A	4.16	0	0	0	0	-75.8	-56.1
					B	4.93	66.7	25.9	26.4	35.8	-40.1	
					HZ	0.2	66.7	25.9	26.4	35.8	-40.1	
19	479	Thinned	479_Thinned	101	A	5.16	0	0	0	0	-62.4	-46.8
					B	11.21	58.1	21.7	9.1	22.6	-39.8	
					HZ	0.34	58.1	21.7	9.1	22.6	-39.8	
20	481	Mod_Good	481_Mod_Good	101	A	0.63	0	0	0	0	-68.5	-39.6
					B	1.87	60.8	38.4	24.3	38.5	-30	
					HZ	0.04	60.8	38.4	24.3	38.5	-30	
21	481	Thinned	481_Thinned	101	A	3.27	0	0	0	0	-76.8	-53.5
					B	5.8	70.8	30.8	21.7	36.2	-40.6	
					HZ	0.13	70.8	30.8	21.7	36.2	-40.6	
22	483	DNG	483_DNG	101	A	1.45	0	0	0	0	-27.2	-27.2
23	483	Thinned	483_Thinned	101	A	0.77	0	0	0	0	-76.1	-47.6
					B	1.96	58.5	64.5	16.5	39.6	-36.4	
24	618	DNG	618_DNG	101	A	42.03	0	0	0	0	-16.6	-16.6
25	618	Mod_Good	618_Mod_Good	101	A	1.72	0	0	0	0	-65.7	-34.7
					B	6.27	50.4	47.2	25.6	39.3	-26.4	
					HZ	0.18	50.4	47.2	25.6	39.3	-26.4	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
26	618	Thinned	618_Thinned	101	A	3.22	0	0	0	0	-45	-24.2
					B	6.52	48.1	43	14.3	30.9	-14.1	
					HZ	0.17	48.1	43	14.3	30.9	-14.1	
27	1176	Thinned	1176_Thinned	101	A	0.53	0	0	0	0	-42.2	-23.2
					B	1.39	46.2	15.2	25.5	26.1	-16	
					HZ	0.04	46.2	15.2	25.5	26.1	-16	
28	1610	DNG	1610_DNG	101	A	1.18	0	0	0	0	-22.7	-22.7
29	1610	Mod_Good	1610_Mod_Good	101	A	17.52	0	0	0	0	-70.2	-47.5
					B	37.89	72.6	40.4	12.1	32.8	-37.3	
					HZ	0.96	72.6	40.4	12.1	32.8	-37.3	
30	1610	Thinned	1610_Thinned	101	A	1.3	0	0	0	0	-70.2	-46.9
					B	3.11	72.6	40.4	12.1	32.8	-37.3	
					HZ	0.07	72.6	40.4	12.1	32.8	-37.3	
31	1674	DNG	1674_DNG	101	A	0.02	0	0	0	0	-30.4	-30.4
32	1674	Mod_Good	1674_Mod_Good	101	A	3.25	0	0	0	0	-37.1	-25.7
					B	7.37	34.4	10.8	12	16.4	-20.7	
					HZ	0.12	34.4	10.8	12	16.4	-20.7	

Table 8-15 Impacts to vegetation integrity in the Liverpool Ranges IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	0.13	0	0	0	0	-29.6	-29.6
2	281	Thinned	281_Thinned	101	A	0.13	0	0	0	0	-87	-51.1
					B	0.39	67.3	71.3	22.9	47.9	-39.1	
3	440	DNG	440_DNG	101	A	0.38	0	0	0	0	-7.5	-7.5
4	440	Thinned	440_Thinned	101	A	0.25	0	0	0	0	-69.1	-47.1
					B	0.49	58.4	47.2	13.1	33.1	-36	
5	483	DNG	483_DNG	101	A	2.31	0	0	0	0	-30.9	-30.9
6	483	Thinned	483_Thinned	101	A	3.73	0	0	0	0	-78.3	-64.6
					B	1.85	64.5	67.1	16.4	41.4	-36.9	

Table 8-16 Impacts to vegetation integrity in the Liverpool Ranges IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	483	DNG	483_DNG	101	A	16.47	0	0	0	0	-30.9	-30.9
2	483	Mod_Good	483_Mod_Good	101	A	4.79	0	0	0	0	-85.1	-53.1
					B	8.23	68.4	73.3	25.7	50.5	-34.5	
3	483	Poor	483_Poor	101	A	3.21	0	0	0	0	-33.9	-25.9
					B	3.24	12.6	27.9	11.2	15.8	-18.1	
					HZ	0.03	12.6	27.9	11.2	15.8	-18.1	
4	483	Thinned	483_Thinned	101	A	9.94	0	0	0	0	-78.3	-53.9
					B	14.33	64.5	67.1	16.4	41.4	-36.9	
					HZ	0.05	64.5	67.1	16.4	41.4	-36.9	

Table 8-17 Impacts to vegetation integrity in the Pilliga IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	440	DNG	440_DNG	101	A	0.2	0	0	0	0	-7.5	-7.5
2	440	Mod_Good	440_Mod_Good	101	A	2.89	0	0	0	0	-88.2	-60.8
					B	5.09	72.2	42.3	25.8	42.9	-45.3	
3	440	Thinned	440_Thinned	101	A	0.8	0	0	0	0	-69.1	-54.6
					B	0.62	58.4	47.2	13.1	33.1	-36	
4	477	Mod_Good	477_Mod_Good	101	A	0.07	0	0	0	0	-78.2	-50.7
					B	0.11	83.1	42.8	25.6	45	-33.3	
5	481	Mod_Good	481_Mod_Good	101	A	1.94	0	0	0	0	-85.2	-55.6
					B	4	79.2	59.2	18.3	44.1	-41.2	
6	481	Thinned	481_Thinned	101	A	0.36	0	0	0	0	-92.7	-68.5
					B	0.52	85.3	50.7	15.9	41	-51.7	
7	483	Mod_Good	483_Mod_Good	101	A	0.15	0	0	0	0	-85.1	-42.6
					B	0.79	68.4	73.3	25.7	50.5	-34.5	
8	599	DNG	599_DNG	101	A	1.62	0	0	0	0	-16.3	-16.3
9	599	Mod_Good	599_Mod_Good	101	A	0.31	0	0	0	0	-84.3	-63
					B	0.71	60.7	67.5	7	30.6	-53.7	
10	599	Thinned	599_Thinned	101	A	0.23	0	0	0	0	-57.2	-38.1
					B	0.38	60.7	67.5	7	30.6	-26.6	

Table 8-18 Impacts to vegetation integrity in the Pilliga IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	0.87	0	0	0	0	-29.6	-29.6
2	281	Mod_Good	281_Mod_Good	101	A	0.13	0	0	0	0	-96.4	-49
					B	0.69	80.6	73.5	30.3	56.4	-40.1	
3	281	Thinned	281_Thinned	101	A	6.01	0	0	0	0	-87	-84.8
					B	0.28	67.3	71.3	22.9	47.9	-39.1	
4	477	Mod_Good	477_Mod_Good	101	A	1.25	0	0	0	0	-78.2	-59.4
					B	0.9	83.1	42.8	25.6	45	-33.3	
5	477	Thinned	477_Thinned	101	A	0.05	0	0	0	0	-78.2	-78.2
6	479	DNG	479_DNG	101	A	7.25	0	0	0	0	-10	-10
7	479	Mod_Good	479_Mod_Good	101	A	3.67	0	0	0	0	-90.6	-65.9
					B	4.73	79.9	44.2	24	43.9	-46.7	
8	479	Thinned	479_Thinned	101	A	0.02	0	0	0	0	-78.2	-64.5
					B	0.02	73.8	37.6	7.4	27.4	-50.8	
9	483	DNG	483_DNG	101	A	14.07	0	0	0	0	-30.9	-30.9
10	483	DNS	483_DNS	101	A	0.06	0	0	0	0	-14.2	-14.2
11	483	Mod_Good	483_Mod_Good	101	A	0.11	0	0	0	0	-85.1	-43.4
					B	0.52	68.4	73.3	25.7	50.5	-34.5	
12	483	Poor	483_Poor	101	A	0.09	0	0	0	0	-33.9	-22.8
					B	0.21	12.6	27.9	11.2	15.8	-18.1	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
13	483	Thinned	483_Thinned	101	A	7.57	0	0	0	0	-78.3	-52.3
					B	12.86	64.5	67.1	16.4	41.4	-36.9	
14	618	DNG	618_DNG	101	A	1	0	0	0	0	-15.9	-15.9
15	618	Mod_Good	618_Mod_Good	101	A	0.55	0	0	0	0	-72	-40.7
					B	1.58	61.8	53	22.9	42.2	-29.8	
16	1661	DNG	1661_DNG	101	A	5.23	0	0	0	0	-13.1	-13.1
17	1661	Mod_Good	1661_Mod_Good	101	A	5.3	0	0	0	0	-79.1	-52.8
					B	10.58	80.9	46.5	16.3	39.5	-39.6	
18	1661	Thinned	1661_Thinned	101	A	2.05	0	0	0	0	-66.5	-48.1
					B	2.56	68.6	33.4	15.8	33.1	-33.4	
19	1696	DNG	1696_DNG	101	A	0.92	0	0	0	0	-12	-12
20	1696	DNS	1696_DNS	101	A	0.67	0	0	0	0	-39.1	-39.1
21	1696	Mod_Good	1696_Mod_Good	101	A	0.29	0	0	0	0	-64.5	-31.2
					B	1.7	79.6	31.5	23.6	39	-25.5	

Table 8-19 Impacts to vegetation integrity in the Talbragar Valley IBRA subregion – CFG connection to Spicers Creek wind farm Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	81	DNG	81_DNG	101	A	0.04	0	0	0	0	-14.7	-14.7
2	202	Thinned	202_Thinned	101	A	0.19	0	0	0	0	-36.1	-35.1
					B	0.02	14.6	3.9	20.8	10.6	-25.5	
3	277	Mod_Good	277_Mod_Good	101	A	0.01	0	0	0	0	-91.5	-91.5
4	599	DNG	599_DNG	101	A	0.98	0	0	0	0	-16.3	-16.3
5	599	Mod_Good	599_Mod_Good	101	A	0.46	0	0	0	0	-84.3	-55.6
					B	0.55	85.7	72.5	23.6	52.7	-31.6	
6	599	Thinned	599_Thinned	101	A	0.97	0	0	0	0	-57.2	-40.6
					B	1.14	60.7	67.5	7	30.6	-26.6	

Table 8-20 Impacts to vegetation integrity in the Talbragar Valley IBRA subregion – RNI1 Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	81	DNG	81_DNG	101	A	9.89	0	0	0	0	-14.7	-14.7
2	81	Mod_Good	81_Mod_Good	101	A	0.63	0	0	0	0	-81.2	-71.1
					B	0.18	84.9	59.3	16.1	43.3	-37.9	
					HZ	0.01	84.9	59.3	16.1	43.3	-37.9	
3	81	Thinned	81_Thinned	101	A	1.62	0	0	0	0	-72.6	-63.2
					B	0.46	79.9	59.3	15.1	41.6	-31	
					HZ	0.01	79.9	59.3	15.1	41.6	-31	
4	202	Mod_Good	202_Mod_Good	101	A	0.25	0	0	0	0	-88.2	-44.7
					B	1.69	83.4	49	30	49.7	-38.5	
					HZ	0.04	83.4	49	30	49.7	-38.5	
5	202	Thinned	202_Thinned	101	A	0.02	0	0	0	0	-36.1	-25.8
					B	0.59	14.6	3.9	20.8	10.6	-25.5	
					HZ	0.01	14.6	3.9	20.8	10.6	-25.5	
6	440	DNG	440_DNG	101	A	5.02	0	0	0	0	-7.5	-7.5
7	440	Mod_Good	440_Mod_Good	101	A	4.93	0	0	0	0	-88.2	-87.8
					B	0.04	72.2	42.3	25.8	42.9	-45.3	
8	440	Thinned	440_Thinned	101	A	0.7	0	0	0	0	-69.1	-43.4
					B	2.37	58.4	47.2	13.1	33.1	-36	
					HZ	0.05	58.4	47.2	13.1	33.1	-36	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
9	461	Mod_Good	461_Mod_Good	101	A	1.44	0	0	0	0	-86.2	-60.3
					B	1.1	90.2	73.3	31.1	59	-27.2	
					HZ	0.03	90.2	73.3	31.1	59	-27.2	
10	461	Thinned	461_Thinned	101	A	0.6	0	0	0	0	-76.6	-76.6
11	468	Thinned	468_Thinned	101	A	0.12	0	0	0	0	-77.5	-77.5

8.1.2 Residual direct impacts to TECs

The residual direct impact to BC Act listed TECs is outlined in Table 8-21.

For the Inland Grey Box TEC and the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC, a large proportion of the impact is to Derived Native Grassland & Derived Native Shrubland condition classes in Disturbance Area A.

Table 8-21 Residual direct impact to BC Act listed TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	Associated vegetation zones within the subject land	Impact within subject land (ha)	Impact in Disturbance Area A	Impact in Disturbance Area B	Impact in Disturbance Area HZ
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	20130	V	PCT 1176 (Thinned)	1.96 ha	0.53 ha	1.39 ha	0.04 ha
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	20072	E	PCT 81 (Derived Native Grassland, Mod_Good, Thinned)	20.26 ha 14.29 ha (71%) is impact to Derived Native Grasslands in Disturbance Area A.	17.17 ha	2.99 ha	0.10 ha
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	10335	E	PCT 202 (Mod_Good Thinned)	2.99 ha	0.58 ha	2.36 ha	0.05 ha
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	10837	CE	PCT 266, 277, 281, 483, 599 & 618 (all vegetation zones – Derived Native Grassland, Derived Native Shrubland, Mod_Good, Poor, Thinned)	575.95 ha 272.14 ha (47%) is impact to Derived Native Grassland & Derived Native Shrubland in Disturbance Area A.	389.20 ha	184.62 ha	2.13 ha

8.1.3 Residual direct impacts to ECs

The residual direct impact to EPBC Act listed ECs is outlined in Table 8-22.

For the ECs outlined below in Table 8-22, the majority of the impact would be in Disturbance Area B which is the area between and adjacent to transmission towers in which it is assumed removal of trees with growth heights greater than 2 metres would be required to meet the vegetation clearance heights. The shrub layer and ground layer would not be removed (except for temporary minor changes to understorey composition in these areas due to the temporary ground disturbance activities).

Table 8-22 EPBC Act listed TECs within the subject land

TEC name	EPBC Act status	Associated vegetation zones within the subject land	Impact within subject land (ha)	Impact in Disturbance Area A	Impact in Disturbance Area B	Impact in Disturbance Area HZ
Central Hunter Valley eucalypt forest and woodland	CE	1176 (Thinned)	1.95 ha	0.53 ha	1.39 ha	0.03 ha
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	81 (Moderate/Good, Thinned)	5.98 ha	2.43 ha	3.45 ha	0.10 ha
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	266 (Moderate/Good, Thinned) 277 (Moderate_Good) 281 (Moderate_Good, Thinned) 483 (Moderate_Good, Thinned) 599 (Moderate_Good, Thinned) 618 (Moderate_Good, Thinned)	287.45 ha	110.34 ha	175.09 ha	2.02 ha

8.1.4 Residual direct impacts to species credit species

The residual direct impacts to species credit species are outlined in Table 8-23. Table 8-24 to Table 8-35 provides a breakdown of the impacts to species credit species per IBRA subregion and construction stage.

The residual direct impacts to species credit species take into account the differing impacts that would occur in Disturbance area A compared to Disturbance area B and HZ. The impacts to Disturbance area B and HZ are limited to tree removal and some temporary ground disturbance. Shrub and groundlayer plant species are considered unlikely to be impacted in Disturbance area B and HZ. Likewise, fauna species that are not reliant on tree cover are considered unlikely to be impacted in Disturbance area B and HZ. Table 8-23 outlines which species are subject to impact from each disturbance area.

Table 8-23 to Table 8-35 also outline the known impacts to species recorded during the survey compared to areas of assumed habitat impact for species.

Table 8-23 Residual direct impacts to species credit species

Species	**Known impact (ha)**	**Assumed impact (ha)**	**Disturbance area applicable to the species (full or partial impact)**		
			Disturbance area A	**Disturbance area B**	**Disturbance area HZ**
Acacia ausfeldii / Ausfeld's Wattle	4.35	4.26	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. Acacias are pioneer species that benefit from canopy removal and soil disturbance (demonstrated by the abundance of this species at Cope). This species is able to take advantage of reduced tree canopy in power line easements (see population at Cope, see Section 5.2.1). The recruitment of Acacia seedlings in densely treed forests and woodlands is generally low because of the need for high light levels for the growth of Acacias (Tame *et al.*, 2001). Large scale canopy openings that may occur due to tree fall or canopy leaf loss due to drought, leaf predation or fire or other disturbance allows massed regeneration to take place leading to the periodic establishment of localised even aged stands (Tame *et al.*, 2001). This can be seen with the stands of *Acacia ausfeldii* in the subject land at Cope. This species has a persistent seed bank that is likely stimulated to germinate by disturbance. Most Acacias exhibit a physical dormancy (see Kildisheva *et al.*, 2020) due to the hard waxy coat covering the seed and disturbance is required to break the dormancy. Disturbance events are a key requirement of the life cycle of this species and the disturbance in Disturbance area B is not considered likely to be detrimental to this species. Any temporary ground disturbance may assist in triggering germination of any soil stored seed if present.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Androcalva procumbens / Androcalva procumbens	0	15.9	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. *Androcalva procumbens* is a prostrate shrub with slender trailing stems to 30 cm long. This species has a persistent seed bank that is likely stimulated to germinate by disturbance. Plants in the Malvaceae family possess physical seed dormancy (The seed or fruit coat is impermeable preventing the uptake of water) (Kildisheva *et al.*, 2020). Physical seed dormancy is released when the water-impermeable layer is degraded or damaged to the point that water uptake (imbibition) can occur (Kildisheva *et al.*, 2020). *Androcalva procumbens* is likely to possess physical seed dormancy. Disturbance may benefit the species as it is often found as a pioneer species of disturbed habitats. Fire does not appear to be the only disturbance that will stimulate germination in this species. *Androcalva procumbens* has been recorded colonising disturbed areas such as roadsides, the edges of quarries and gravel stockpiles and a recently cleared easement under power lines (Department of the Environment, Water, Heritage and the Arts, 2008h). Any temporary ground disturbance may assist in triggering germination of any soil stored seed if present. Disturbance events are a key requirement of the life cycle of this species and the disturbance in Disturbance area B is not considered likely to be detrimental to this species.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Anthochaera phrygia / Regent Honeyeater	95.8	0	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Aprasia parapulchella / Pink-tailed Legless Lizard	0	16.36	Yes. Complete impact.	No. *Aprasia parapulchella* spends most of its time underground. The ground layer would not be impacted but may be temporarily disturbed. No removal of rock or tree stumps or roots would occur. As such, the predicted impacts to this species from Disturbance area B are expected to be negligible.	No. Same reasoning applied for Disturbance area B.
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	31.4	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Cercartetus nanus / Eastern Pygmy-possum	0	151.22	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Chalinolobus dwyeri / Large-eared Pied Bat	130.03	0	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Commersonia rosea / Commersonia rosea	0	3.25	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. *Commersonia rosea* is a prostrate shrub 0.1–0.3 m high, producing trailing branches up to 60 cm long. Like *Androcalva procumbens*, this species has a persistent seed bank that is likely stimulated to germinate by disturbance. Plants in the Malvaceae family possess physical seed dormancy (The seed or fruit coat is impermeable preventing the uptake of water) (Kildisheva *et al.*, 2020). Physical seed dormancy is released when the water-impermeable layer is degraded or damaged to the point that water uptake (imbibition) can occur (Kildisheva *et al.*, 2020). *Commersonia rosea* is likely to possess physical seed dormancy. *Commersonia rosea* is likely to possess physical seed dormancy. Disturbance may benefit the species as it is often found as a pioneer species of disturbed habitats.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
				Populations of *Commersonia rosea* have been detected after some form of disturbance, either through fire or roadworks (Bell and Copeland, 2004). *Commersonia rosea* is generally considered to be a fire-ephemeral, flowering and fruiting only after disturbance (Bell and Copeland, 2004). However, fire does not appear to be the only disturbance that will stimulate germination in this species indicated by the detection of this species after roadworks (Bell and Copeland, 2004). Fire ephemerals are short-lived plants with seeds that persist in the soil and germinate after a fire or physical soil disturbance (Downes *et al.*, 2005). Physical soil disturbance is likely all that is required to break seed dormancy in this species (as it is for *Commersonia procumbens*). Fire is likely beneficial but not necessary. Any temporary ground disturbance may assist in triggering germination of any soil stored seed if present. Disturbance events are a key requirement of the life cycle of this species and the disturbance in Disturbance area B is not considered likely to be detrimental to this species.	
Delma impar / Striped Legless Lizard	0	83.4	Yes. Complete impact.	No. *Delma impar* is a grassland specialist. Tree removal will not have a detrimental impact on this species. The ground layer would not be impacted but may be temporarily disturbed. As such, the predicted impacts to this species from Disturbance area B are expected to be negligible.	No. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Dichanthium setosum / Bluegrass	3.8	124.74	Yes. Complete impact.	No. Grass growth forms and ground layer not impacted but may be temporarily disturbed. *Dichanthium setosum* is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and pasture (Department of Climate Change, Energy, the Environment and Water, 2023). It is open to question whether the species tolerates or is promoted by a certain amount of disturbance (Department of Climate Change, Energy, the Environment and Water, 2023). Given the apparent tolerance of this species to disturbance, the level of disturbance predicted in Disturbance area B would not be sufficient to detrimentally impact this species.	No. Grass growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Digitaria porrecta / Finger Panic Grass	0	2.2	Yes. Complete impact.	No. Grass growth forms and ground layer not impacted but may be temporarily disturbed. *Digitaria porrecta* seeds from March to April but also reproduces vegetatively by dying back to the tussock base, from which it resprouts in summer. Given the adaptations of this species, the temporary disturbance is considered unlikely to detrimentally impact this species given its lifecycle.	No. Grass growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Eucalyptus camaldulensis – endangered population / Eucalyptus camaldulensis population in the Hunter catchment	1.4	0	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Eucalyptus cannonii / Capertee Stringybark	12 plants	0	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Euphrasia arguta / Euphrasia arguta	0	7.54	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. *Euphrasia arguta* is an annual that appears to rely on disturbance such as fire or mechanical ground disturbance for persistence. It is a very rare species that was rediscovered in in the Nundle area of the NSW north western slopes and tablelands in 2008 (NSW Scientific Committee, 2012, Binns, 2012). The rediscovery of this species after mechanical disturbance of good condition vegetation at Nundle (see Binns, 2012) suggest that *Euphrasia arguta* may benefit from temporary ground disturbance such aa what would occur in Disturbance area B.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Homoranthus darwinioides / Fairy Bells	0.12	9.39	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. *Homoranthus darwinioides* is a small shrub to 1 to 1.5 m tall so would not be a target for removal. Like other species in the genus *Homoranthus*, it is likely to be an obligate seeder (killed by fire) that relies on soil-stored seed banks for regeneration. Seeds are likely to require fire-related cues for germination, but any temporary ground disturbance may assist in triggering germination of any soil stored seed if present.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Hoplocephalus bitorquatus / Pale-headed Snake	8.2	92.34	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Hoplocephalus bungaroides / Broad-headed Snake	0	10.8	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Leucochrysum albicans subsp. *tricolor* / Hoary Sunray	5 plants	0	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present. Disturbance events are a key requirement of the life cycle of *Leucochrysum albicans* subsp. *tricolor*. Bare ground is required for germination (see Gilfedder & Kirkpatrick 1994a, 1994b). Some disturbance is required for successful establishment, and seedlings often appear on areas that have been scraped (Sinclair, 2010). Although bare ground exposure is important for Hoary Sunray regeneration, heavy soil disturbance can destroy adult plants (Sinclair 2010). The disturbance in Disturbance area B is not considered likely to be detrimental to this species. Heavy soil disturbance is unlikely and any temporary ground disturbance may assist this species to establish through creation of bare ground.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Monotaxis macrophylla / Large-leafed Monotaxis	0	43.7	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present. *Monotaxis macrophylla* is an erect herb to c. 25 cm high. This species has a persistent seed bank that is likely stimulated to germinate by disturbance caused by fire. Plants in the Euphorbiaceae family possess physiological seed dormancy (seeds imbibe water and possess fully developed embryos with a low growth potential, sometimes in combination with a mechanical constraint from the seed/fruit covering layers) (Kildisheva *et al.*, 2020). The embryo of seeds with physiological seed dormancy is fully developed but has a low growth potential and as such the embryo cannot overcome the mechanical constraints of the surrounding tissues without receiving cues from the surrounding environment (Kildisheva *et al.*, 2020). These cues initiate internal chemical signalling (resulting from changes in the ratio and sensitivity of internal seed hormones), which promotes dormancy loss and germination (Kildisheva *et al.*, 2020). Physiological seed dormancy is often alleviated by periods of cold or warm stratification or warm dry after-ripening (Kildisheva *et al.*, 2020). The heat produced by fire is likely a key requirement to break seed dormancy for this species but any temporary ground disturbance may assist in triggering germination of any soil stored seed if present. Disturbance events are a key requirement of the life cycle of this species and the disturbance in Disturbance area B is not considered likely to be detrimental to this species. Removal of trees is not likely to retard the germination ability of any soil stored seed. Any temporary ground disturbance may assist in triggering germination of any soil stored seed if present.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Ninox connivens / Barking Owl	0	23.6	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Ozothamnus tesselatus / Ozothamnus tesselatus	0	3.3	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. *Ozothamnus tesselatus* is a small shrub to 1 m tall so would not be a target for removal. Ozothamnus seeds germinate readily and are non-dormant. If present in Disturbance area B the disturbance created by temporary ground disturbance may assist in germination of seed by creating opportunities due to biomass removal.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Petaurus norfolcensis / Squirrel Glider	107.53	270.31	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Petrogale penicillata / Brush-tailed Rock-wallaby	0	19.9	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Phascolarctos cinereus / Koala	0	608.8	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Polytelis swainsonii / Superb Parrot	0	2.63	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Pomaderris cotoneaster / Cotoneaster Pomaderris	0	21.2	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. Plants in the Rhamnaceae family possess either physical seed dormancy (The seed or fruit coat is impermeable preventing the uptake of water), or a combination of physical seed dormancy and physiological seed dormancy (seeds imbibe water and possess fully developed embryos with a low growth potential, sometimes in combination with a mechanical constraint from the seed/fruit covering layers) (Kildisheva *et al.*, 2020). Heat shock from fire may be necessary to break seed dormancy but any temporary ground disturbance may assist in triggering germination of any soil stored seed if present.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Pomaderris queenslandica / Scant Pomaderris	0	0.73	Yes. Complete impact.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. The disturbance is considered likely to be beneficial for this species if it is present in the soil stored seedbank. *Pomaderris queenslandica* is a shrub 2–3 m high. This species would be removed from Disturbance area B if plants exceeded the 2 m height limit. However, no plants are known to occur. Plants in the Rhamnaceae family possess either physical seed dormancy or a combination of physical seed dormancy and physiological seed dormancy (Kildisheva *et al.*, 2020). Heat shock from fire may be necessary to break seed dormancy but any temporary ground disturbance may assist in triggering germination of any soil stored seed if present.	No. Shrub growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Swainsona recta / Small Purple-pea	0	3.9	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. *Swainsona recta* is an erect and ascending perennial to 20 cm high. Plants in the Fabaceae family possess either physical seed dormancy or a combination of physical seed dormancy and physiological seed dormancy (Kildisheva *et al.*, 2020). The disturbance is considered likely to be beneficial for this species if it is present. Many *Swainsona* species are known to require a form of disturbance to stimulate germination and benefit from disturbance (see Department of the Environment, Water, Heritage and the Arts, 2008i; Tonkinson & Robertson, 2010; Earl *et. al*. 2003).	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Swainsona sericea / Silky Swainson Pea	0.14	15.61	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. *Swainsona recta* is an erect and ascending perennial to 20 cm high. Plants in the Fabaceae family possess either physical seed dormancy or a combination of physical seed dormancy and physiological seed dormancy (Kildisheva *et al.*, 2020). The disturbance is considered likely to be beneficial for this species if it is present. Many *Swainsona* species are known to require a form of disturbance to stimulate germination and benefit from disturbance (see Department of the Environment, Water, Heritage and the Arts, 2008i; Tonkinson & Robertson, 2010; Earl *et. al*. 2003).	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Thesium australe / Austral Toadflax	0	2.2	Yes. Complete impact.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. *Thesium australe* is an erect perennial herb to 40 cm high. The disturbance in Disturbance area B is considered likely to be beneficial for this species if it is present. One of the main identified threats to the *Thesium australe* is lack of disturbance causing lower, mid and upper stratum canopy thickening (Department of the Environment, 2013). Canopy removal is likely to benefit this species if it is present.	No. Forb growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.

Species	Known impact (ha)	Assumed impact (ha)	Disturbance area applicable to the species (full or partial impact)		
			Disturbance area A	Disturbance area B	Disturbance area HZ
Tylophora linearis	0	23.84	Yes. Complete impact.	No. Other growth forms and ground layer not impacted but may be temporarily disturbed. *Tylophora linearis* is a herbaceous twiner that occurs in the ground layer and midstorey. Tree removal would not have a direct impact on this species unless it was twining around the tree to be removed. This species is not reliant on tree cover. If present in Disturbance area B, this species is considered likely to persist.	No. Other growth forms and ground layer not impacted but may be temporarily disturbed. Same reasoning applied for Disturbance area B.
Tyto novaehollandiae / Masked Owl	0	6.63	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.
Vespadelus troughtoni / Eastern Cave Bat	39.28	0	Yes. Complete impact.	Yes. Tree removal in Disturbance area B taken to impact this species. Trees to be removed likely to provide habitat for this species.	Yes. Tree removal in Disturbance area HZ taken to impact this species. Trees to be removed likely to provide habitat for this species.

Table 8-24 Residual direct impacts to species credit species in the Inland Slopes CFG Connection to Tallawang Stage

Species	Known impact (ha)	Assumed impact (ha)
Cercartetus nanus / Eastern Pygmy-possum	0	0.27
Delma impar / Striped Legless Lizard	0	7.3
Dichanthium setosum / Bluegrass	0	27.3
Euphrasia arguta / Euphrasia arguta	0	0.63
Ninox connivens / Barking Owl	0	6.2
Petaurus norfolcensis / Squirrel Glider	0	12.7
Phascolarctos cinereus / Koala	0	12.6
Tyto novaehollandiae / Masked Owl	0	6.1

Table 8-25 Residual direct impacts to species credit species in the Inland Slopes RNI1 Stage

Species	Known impact (ha)	Assumed impact (ha)
Acacia ausfeldii / Ausfeld’s Wattle	1.57	1.93
Anthochaera phrygia / Regent Honeyeater	2.4	0
Aprasia parapulchella / Pink-tailed Legless Lizard	0	13.3
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	5.6
Cercartetus nanus / Eastern Pygmy-possum	0	56.7
Chalinolobus dwyeri / Large-eared Pied Bat	41.5	0
Dichanthium setosum / Bluegrass	0	51.9
Eucalyptus cannonii / Capertee Stringybark	9 plants	0 plants
Euphrasia arguta / Euphrasia arguta	0	6.4
Hoplocephalus bitorquatus / Pale-headed Snake	0	37.2
Ninox connivens / Barking Owl	0	17.4
Petaurus norfolcensis / Squirrel Glider	49.74	88.66
Petrogale penicillata / Brush-tailed Rock-wallaby	0	16.9
Phascolarctos cinereus / Koala	0	116.1
Swainsona recta / Small Purple-pea	0	3.9
Swainsona sericea / Silky Swainson-pea	0	8.2

Table 8-26 Residual direct impacts to species credit species in the Inland Slopes Stubbo Stage

Species	Known impact (ha)	Assumed impact (ha)
Aprasia parapulchella / Pink-tailed Legless Lizard	0	0.14
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	3.7
Cercartetus nanus / Eastern Pygmy-possum	0	4.3
Chalinolobus dwyeri / Large-eared Pied Bat	0.03	0
Dichanthium setosum / Bluegrass	0	0.55
Eucalyptus cannonii / Capertee Stringybark	2 plants	0 plants
Euphrasia arguta / Euphrasia arguta	0	0.51
Hoplocephalus bitorquatus / Pale-headed Snake	0	4.3
Petaurus norfolcensis / Squirrel Glider	0	8.7
Phascolarctos cinereus / Koala	0	8.9

Table 8-27 Residual direct impacts to species credit species in the Kerrabee Liverpool Range Stage

Species	Known impact (ha)	Assumed impact (ha)
Acacia ausfeldii / Ausfeld's Wattle	0	0.21
Androcalva procumbens / Androcalva procumbens	0	3.2
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	4.2
Cercartetus nanus / Eastern Pygmy-possum	0	15.7
Homoranthus darwinioides / Fairy Bells	0	4.6
Hoplocephalus bitorquatus / Pale-headed Snake	0	15.7
Monotaxis macrophylla / Large-leafed Monotaxis	0	4.6
Petaurus norfolcensis / Squirrel Glider	31.35	1.55
Phascolarctos cinereus / Koala	0	27.6
Tylophora linearis / Tylophora linearis	0	11.3

Table 8-28 Residual direct impacts to species credit species in the Kerrabee RNI1 Stage

Species	Known impact (ha)	Assumed impact (ha)
Acacia ausfeldii / Ausfeld’s Wattle	2.78	2.12
Anthochaera phrygia / Regent Honeyeater	93.4	0
Aprasia parapulchella / Pink-tailed Legless Lizard	0	0.78
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	5.5
Cercartetus nanus / Eastern Pygmy-possum	0	43.4
Chalinolobus dwyeri / Large-eared Pied Bat	86.8	0
Commersonia rosea / Commersonia rosea	0	3.25
Delma impar / Striped Legless Lizard	0	47.5
Eucalyptus camaldulensis – endangered population / Eucalyptus camaldulensis population in the Hunter catchment	1.4	0
Homoranthus darwinioides / Fairy Bells	0	3.3
Hoplocephalus bitorquatus / Pale-headed Snake	0	13
Hoplocephalus bungaroides / Broad-headed Snake	0	10.8
Leucochrysum albicans subsp. Tricolor / Hoary Sunray	5 plants	0 plants
Monotaxis macrophylla / Large-leafed Monotaxis	0	18.8
Ozothamnus tesselatus / Ozothamnus tesselatus	0	3.3
Petaurus norfolcensis / Squirrel Glider	0	126.9
Petrogale penicillata / Brush-tailed Rock-wallaby	0	1.3
Phascolarctos cinereus / Koala	0	252.4
Pomaderris cotoneaster / Cotoneaster Pomaderris	0	21.2
Vespadelus troughtoni / Eastern Cave Bat	38.5	0

Table 8-29 Residual direct impacts to species credit species in the Kerrabee Valley of the Winds Stage

Species	Known impact (ha)	Assumed impact (ha)
Androcalva procumbens / Androcalva procumbens	0	4.1
Aprasia parapulchella / Pink-tailed Legless Lizard	0	1.4
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	1.1
Cercartetus nanus / Eastern Pygmy-possum	0	1.4
Chalinolobus dwyeri / Large-eared Pied Bat	1.7	0
Delma impar / Striped Legless Lizard	0	28.6
Dichanthium setosum / Bluegrass	0	2
Hoplocephalus bitorquatus / Pale-headed Snake	0	1.4
Monotaxis macrophylla / Large-leafed Monotaxis	0	4.1
Petaurus norfolcensis / Squirrel Glider	0	14.5
Petrogale penicillata / Brush-tailed Rock-wallaby	0	1.7
Phascolarctos cinereus / Koala	0	44.3
Tylophora linearis / Tylophora linearis	0	3.1
Vespadelus troughtoni / Eastern Cave Bat	0.78	0

Table 8-30 Residual direct impacts to species credit species in the Liverpool Ranges Liverpool Range Stage

Species	Known impact (ha)	Assumed impact (ha)
Dichanthium setosum / Bluegrass	0	7.4
Phascolarctos cinereus / Koala	0	43.4

Table 8-31 Residual direct impacts to species credit species in the Liverpool Ranges Valley of the Winds Stage

Species	Known impact (ha)	Assumed impact (ha)
Aprasia parapulchella / Pink-tailed Legless Lizard	0	0.74
Cercartetus nanus / Eastern Pygmy-possum	0	0.74
Dichanthium setosum / Bluegrass	0	6.3
Hoplocephalus bitorquatus / Pale-headed Snake	0	0.74
Petaurus norfolcensis / Squirrel Glider	9.58	0.56
Phascolarctos cinereus / Koala	0	6.7

Table 8-32 Residual direct impacts to species credit species in the Pilliga Liverpool Range Stage

Species	Known impact (ha)	Assumed impact (ha)
Androcalva procumbens / Androcalva procumbens	0	4.8
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	2.4
Cercartetus nanus / Eastern Pygmy-possum	0	2.2
Dichanthium setosum / Bluegrass	0	25.3
Eucalyptus cannonii / Capertee Stringybark	1 plant	0 plants
Homoranthus darwinioides / Fairy Bells	0	1.3
Hoplocephalus bitorquatus / Pale-headed Snake	0	2.2
Monotaxis macrophylla / Large-leafed Monotaxis	0	12.4
Petaurus norfolcensis / Squirrel Glider	3.62	6.68
Phascolarctos cinereus / Koala	0	62.7
Pomaderris queenslandica / Scant Pomaderris	0	0.73
Swainsona sericea / Silky Swainson-pea	0	6.7
Tylophora linearis / Tylophora linearis	0	1.8

Table 8-33 Residual direct impacts to species credit species in the Pilliga Valley of the Winds Stage

Species	Known impact (ha)	Assumed impact (ha)
Androcalva procumbens / Androcalva procumbens	0	3.8
Calyptorhynchus lathami / Glossy Black-Cockatoo	0	8.9
Cercartetus nanus / Eastern Pygmy-possum	0	9.6
Dichanthium setosum / Bluegrass	0	0.15
Digitaria porrecta / Finger Panic Grass	0	2.2
Homoranthus darwinioides / Fairy Bells	0	0.07
Hoplocephalus bitorquatus / Pale-headed Snake	0	9.6
Monotaxis macrophylla / Large-leafed Monotaxis	0	3.8
Petaurus norfolcensis / Squirrel Glider	9.6	0
Phascolarctos cinereus / Koala	0	17.3
Thesium australe / Austral Toadflax	0	2.2
Tylophora linearis / Tylophora linearis	0	1.8
Tyto novaehollandiae / Masked Owl	0	0.53

Table 8-34 Residual direct impacts to species credit species in the Talbragar Valley CFG Connection to Spicers Creek Wind Farm Stage

Species	Known impact (ha)	Assumed impact (ha)
Cercartetus nanus / Eastern Pygmy-possum	0	0.21
Dichanthium setosum / Bluegrass	0	0.04
Petaurus norfolcensis / Squirrel Glider	0	0.2
Phascolarctos cinereus / Koala	0	0.2
Polytelis swainsonii / Superb Parrot	0	0.13
Swainsona sericea / Silky Swainson-pea	0	0.01
Tylophora linearis / Tylophora linearis	0	0.14

Table 8-35 Residual direct impacts to species credit species in the Talbragar Valley RNI1 Stage

Species	Known impact (ha)	Assumed impact (ha)
Cercartetus nanus / Eastern Pygmy-possum	0	16.7
Dichanthium setosum / Bluegrass	3.8	3.8
Homoranthus darwinioides / Fairy Bells	0.12	0.12
Hoplocephalus bitorquatus / Pale-headed Snake	8.2	8.2
Petaurus norfolcensis / Squirrel Glider	3.64	9.86
Phascolarctos cinereus / Koala	0	16.6
Polytelis swainsonii / Superb Parrot	0	2.5
Swainsona sericea / Silky Swainson-pea	0.14	0.7
Tylophora linearis / Tylophora linearis	0	5.7

8.1.5 Residual direct impacts to scattered trees

One hundred and ninety four scattered trees were recorded within the subject land. The residual direct impacts to scattered trees is summarised in Table 8-36.

Table 8-36 Summary of residual direct impacts to scattered trees

Plant Community Type	Impact (No. trees)
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	6
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	92
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	22
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	3

Plant Community Type	Impact (No. trees)
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	12
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	1
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	4
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	24
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	30
Total	**194**

8.2 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 development footprint or within retained areas. This includes impacts from activities related to the construction or operational phase of the proposal.

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 micro bat species and habitat surrounding a potential Little Eagle nest tree
- 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 site 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 EMF impacts with new infrastructure.

Table 8-37 documents the residual indirect impacts (likely to occur on native vegetation, threatened entities and their habitat beyond the subject site). Figure 14-14 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. The partial vegetation clearing scenarios allow for a direct calculation of indirect partial impacts adjacent to areas of complete vegetation and habitat removal. This directly 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.
- 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 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 area incorporates the indirect impacts that may occur adjacent to Disturbance area B.

The mapping of Disturbance area B and HZ act as management zones adjacent to the area of total impact (Disturbance area A) and the impacts calculated from 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 8-37 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, rehabilitation)	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 (Little Eagle, Large-eared Pied Bat, Eastern Cave Bat, Large Bent-winged Bat, Sloane's Froglet) Threatened ecological communities Aquatic habitat	All PCTs Caves and cliff lines with potential bat habitat (adjacent to the subject land) Potential Little Eagle nest (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 300 m radius buffer of a potential Little Eagle nest (at Merotherie near the northern edge of the Merotherie Hub). Nests may be abandoned if disturbed. The subject land is within a 100 m wide buffer of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments that may be breeding habitat for threatened micro bat species. 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 proposal 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.	Human activities are known to impact raptors in at least three ways: by causing mortality to eggs, young, or adults; by altering habitats; and by disrupting birds' normal behaviour (Postovit and Postovit, 1987). Disturbance of nesting raptors can result in complete desertion of nest, eggs, and young leading to overheating, chilling, or desiccation of eggs or young, predation on eggs or young, or missed feedings (Suter and Jones, 1981). Little Eagle nest abandonment or site shifts have been seen to be associated with human disturbance (e.g. clearing, earthmoving, and construction in or beside the nest patch) (see Larkin *et al.*, 2020). The TBDC indicates that the purpose of the 300 metre nest buffer around a Little Eagle nest is to minimise disturbance/avoid clearing within the area essential for breeding. This includes habitat suitable for feeding/grooming perches and fledgling requirements. 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.
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 (see plot LC46, LC47, LC48, LC49, CWO_609, CWO_610, CWO_611 in Appendix D for evidence of vegetation quality adjacent to an existing power line easement) 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). Threatened species including Brown Treecreeper, Glossy Black-Cockatoo, *Acacia ausfeldii* and *Leucochrysum albicans* var. *tricolor* are present in the edge habitat. New edged 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 & 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 (see 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) (see 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 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 (Murcia, 1995). 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, rehabilitation)	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 the new Wollar switching station and energy hubs at Merotherie and Elong Elong.	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 transmission tower construction, switching station and energy hub construction. Operational phase would result in no lights on the transmission line sections and minimal additional lighting at switching stations and energy hubs. 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 areas. 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 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 compounds and substation works) dust impacts are likely to also be limited and short term in nature. The proposal 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 (DCCEEW, 2023a). 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.	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 area of impact. 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 & 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 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, rehabilitation)	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 / operational	**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 EnergyCo 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 & Groves, 1998; Clarke, G. M., *et al*. 2000; Thorp & 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 as a result of 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, 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 project footprint 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 study area is likely to be impacted by foxes and cats. The magnitude of this impact will be low. During operational phase, all maintenance and associated works would be subject to EnergyCo biosecurity protocols so the potential for a detrimental impact to occur is reduced.
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 one time at the clearing/construction phase of the proposal. 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.** A significant portion of the proposal route has been subject to agricultural development, and only small proportions of the route are made up of native vegetation. Displacement of resident fauna species during native vegetation clearing is considered relatively low due to the modified vegetation structure resulting from long term agricultural stock grazing. Given the linear nature of the proposal 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 proposal is considered low.	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 (see 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, rehabilitation)	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 one time at the clearing / earth works and construction phase of the proposal. 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.	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.
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 transmission lines, 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. — six yearly ground based asset inspection including foundation inspections. This	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 would include protection for these areas and inadvertent impacts such as trampling is considered unlikely. During operational phase any maintenance would be subject to Energy Co 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). The vegetation and habitats within the subject land display the damage caused by stock grazing since the 1800s. The continuous intense grazing by large introduced herbivores that has occurred in the subject land over the last 200+ years has caused significant trampling effects. Any impacts caused by the project are insignificant in the context of current agricultural practices. During operational phase any maintenance would be subject to Energy Co 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, rehabilitation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
			would typically involve two to three maintenance crews driving light vehicles along the easement (accessed from public roads and access tracks), inspecting each transmission line tower from the ground and by personnel climbing the tower. — three to six yearly maintenance of transmission lines to address defects identified from inspections, using a light vehicle(s), an elevated work platform and a 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, rehabilitation)	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 proposal. The risk of ignition and spreading of a bushfire from project construction activities would be extreme. Ignition of bushfires as a result 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 *Electricity Supply Act 1995* and Electricity Supply (Safety and Network Management) Regulation 2014 which requires a network operator to take all reasonable steps to ensure that all aspects of its network are safe. Vegetation maintenance would occur in accordance with EnergyCo 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 EnergyCo 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.
Increased risk of collision with lines and EMF impacts with 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 of bird mortality, mitigation measures would be implemented to ensure the likely impacts are minimised. The proposal is mostly located well away from waterways and major wetlands that would provide habitat for large flocks of water birds which reduces the overall risk. The proposal transmission lines are likely to be below flight paths for a majority of species. Mitigation measures will include line markers (i.e. bird flappers / divertors).	It is widely known and observed that, of all fauna groups, birds most regularly use electrical power lines, and their associated infrastructure, such as towers and poles, for perching and nesting. A detailed analysis of potential powerline impacts and ameliorative measures for birds is provided in Appendix I. 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. A review of available scientific literature on EMF indicates that it is likely that EMF's may influence the physiology of birds nesting on transmission 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 proposal 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.'* 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 Electromagnetic Fields (EMFs) on birds including increased fertility in two breeding events studied in American Kestrels

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, rehabilitation)	Likelihood and consequences	Evidence-based justification for predictions of impacts (including any limitations to data, assumptions and predictions)
							(*Falco sparverius*) (Fernie and Reynolds, 2005). Furthermore, a study conducted over nine (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 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 & 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. & 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. 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 tower designs that discourage birds from building nest on them. As an important priority for managers maintaining power transmission lines to ensure that nesting birds do not constitute a risk to power delivery, towers being considered are currently designed to discourage their use by birds.

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 8-38 below.

Table 8-38 Prescribed impacts within subject land

BDAR Staging	Nature	Extent	Duration	Consequence
Karst, caves, crevices, cliffs, rocks or other geological features of significance				
CFG connection to Spicers Creek wind farm	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this area	Impacts will be negligible; the rocky environment would be minimally impacted and these habitats would remain post-construction.	The minor impacts to the rocky woodlands would be permanent.	The consequence of the impacts would be minor and non-significant as a result of the pro-active design process (e.g. micro-siting).
CFG connection to Tallawang	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this area			
Liverpool Range	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this area			
RNI 1	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within the study area. Small, rocky cliff lines are present outside of the study area in association with forest around the Barney's Reef.			

BDAR Staging	Nature	Extent	Duration	Consequence
RNI 2	A small amount of potential breeding habitat for threatened bat species (Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat) is likely to be impacted by the project north of Cope State Forest and at the southern end of Goulburn River National Park. Known habitat (caves and cliff lines) where Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat were recorded occurs within 150 m of the subject site but is unlikely to be directly impacted by the project. It is important to note that there are no caves in the subject land.			
RNI 3	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this area.			
Stubbo	No features of geological significance (karsts, caves, cliff lines, rocky outcrops) occur within this area.			
Valley of Winds	A small amount of potential breeding habitat for threatened bat species (Eastern Cave Bat, Large Bentwing Bat and Large-eared Pied Bat) is likely to be impacted by the project in a small, woodland patch, northeast of Melrose Road. It is important to note that there are no caves in the subject land.			

BDAR Staging	Nature	Extent	Duration	Consequence
Human-made structures				
CFG connection to Spicers Creek wind farm	Several old farm buildings were recorded within the subject land. These buildings were assessed for any evidence of use by threatened bat species during surveys.	The project is located predominantly in agricultural land. Several old farm buildings were recorded within the subject land, however no evidence of potential use by threatened species was recorded. However, it is noted that, the project is likely to require removal of these structures, along with wooden fence posts. Wooden posts can be used by microbats including threatened species. Mitigation measures are recommended to minimise the risk of mortality of bats during vegetation clearing and the removal of all human-made structures.	The minor impacts to human-made structures would be permanent.	The consequence of the impacts would be minor and non-significant as a result of the micro-siting process
CFG connection to Tallawang				
Liverpool Range				
RNI 1				
RNI 2				
RNI 3				
Stubbo				
Valley of Winds				
Non-native vegetation				
CFG connection to Spicers Creek wind farm	Areas of non-native vegetation are present in the subject land and includes cropping land and improved pastures dominated by exotic species (refer to Section 4.1.2 for further detail). Areas of cropped and exotic-dominated vegetation would be impacted, however this are of comparatively minimal value for the native species and communities along the alignment.	Impacts would be negligible; the extensive cropped and exotic vegetation habitats would remain post-construction.	The minor impacts to the extensive cropped and exotic vegetation habitats would be permanent.	The consequence of the impacts would be minor and non-significant as a result of the micro-siting process
CFG connection to Tallawang				
Liverpool Range				
RNI 1				
RNI 2				
RNI 3				
Stubbo				
Valley of Winds				

BDAR Staging	Nature	Extent	Duration	Consequence
Habitat connectivity				
CFG connection to Spicers Creek wind farm	Impacts on habitat connectivity at this stage are minimal as the alignment largely traverses cleared agricultural land.	The project would result in a highly permeable structure for biodiversity and connectivity is expected to remain largely unaffected for all species.	The impacts to connectivity area expected to be permanent, though minor. They are likely to reduce over time as biodiversity acclimatises to the presence of the towers and powerlines.	The consequence of the impacts would be minor and non-significant as a result of the micro-siting process
CFG connection to Tallawang	Impacts on habitat connectivity at this stage are minimal as the alignment largely traverses cleared agricultural land. Connectivity is limited to roads and creek lines, paddock and small patches of remnant woodland proving 'stepping stone' connectivity for native species.			
Liverpool Range	This stage has impacts on habitat connectivity where the alignment bisects vegetation associated with Durridgere SCA and surrounding native vegetation. Fragmentation impacts to Squirrel Glider habitat may occur where the alignment bisects this vegetation.			

BDAR Staging	Nature	Extent	Duration	Consequence
RNI 1	This stage has impacts on habitat connectivity where the alignment bisects vegetation directly to the north of Tuckland State Forest. Habitat fragmentation impacts may also be associated with any vegetation removal associated with the Spring Range Road corridor and nearby riparian corridor. A number of threatened species were recorded and have habitat along these corridors including threatened woodland birds, Squirrel Glider and Eel-tailed Catfish.	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 and 10 m growth height along the easement would be retained, providing cover for native species and connectivity — much of the project is co-located with existing transmission easements and along roadside, substantially reducing the overall extent of impact to connectivity.		
RNI 2	This stage has impacts on habitat connectivity where the project runs between vegetation in Goulburn River National Park and Cope State Forest. The alignment also runs between larger patches of woodland in the locality including Goulburn River National Park and Munghorn Gap Nature Reserve. Threatened bat species and threatened woodland birds that occur within this area have potential to be impacted by habitat fragmentation.			

BDAR Staging	Nature	Extent	Duration	Consequence
RNI 3	Impacts on habitat connectivity at this stage are minimal as the alignment largely traverses cleared agricultural land. Larger areas of remnant woodland occur south of the alignment around Bungaba, connected to vegetation in the north only by 'stepping stone' connectivity (i.e., small patches of woodland, paddock trees).			
Stubbo	Impacts on habitat connectivity at this stage are minimal as the alignment largely traverses cleared agricultural land.			
Valley of Winds	Impacts on connectivity at this stage are associated with the largest patches of remnant vegetation in the northern sections of the alignment (north of Golden Highway), which are bisected by the alignment in some sections.			

<table>
<tr><th>BDAR Staging</th><th>Nature</th><th>Extent</th><th>Duration</th><th>Consequence</th></tr>
<tr><td colspan="5">Waterbodies, water quality and hydrological processes</td></tr>
<tr><td>CFG connection to Spicers Creek wind farm</td><td>The alignment crosses one waterway in this stage including:
— Sandy Creek.
The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.</td><td rowspan="2">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.</td><td rowspan="2">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.</td><td rowspan="2">The consequence of the predicted low-level of impact to water-values is minor and expected to be able to be appropriately managed.</td></tr>
<tr><td>CFG connection to Tallawang</td><td>The alignment crosses one waterway in this stage including:
— Tallawang Creek.
The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.</td></tr>
</table>

BDAR Staging	Nature	Extent	Duration	Consequence
Liverpool Range	The alignment crosses several waterways at this stage including: — Salty Creek — Curryall Creek — Wagrobil Creek — Murrumbline Creek — Yellow Waterholes Gully — Ironbark Creek — Four Mile Creek — Turill Creek. The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.			
RNI 1	The alignment crosses several waterways at this stage including: — White Creek — Browns Creek — Huxleys Creek — Tallawang Creek — Tucklan Creek — Laheys Creek. The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity			

BDAR Staging	Nature	Extent	Duration	Consequence
RNI 2	The alignment crosses several waterways at this stage including: — Stubbo Creek — Copes Creek — Sportsmans Hollow Creek — Moolarben Creek — Wilpinjong Creek — Planters Creek — Cumbo Creek — Spring Flat Creek — Wollar Creek. The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.			
RNI 3	The alignment crosses one waterway in this stage including: — Mona Creek. The project has the potential to impact on water quality, water bodies and hydrological processes that sustain threatened biodiversity.			
Stubbo	The alignment crosses only a small, unnamed creek in this stage. The project is unlikely to impact on waterbodies at this stage.			

BDAR Staging	Nature	Extent	Duration	Consequence
Valley of Winds	The alignment crosses several waterways at this stage including: — Salty Creek — Talbragar River — Cainbil Creek — Back Creek — Moreton Bay Creek. 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.			
Vehicle strikes				
CFG connection to Spicers Creek wind farm CFG connection to Tallawang Liverpool Range RNI 1 RNI 2 RNI 3 Stubbo Valley of Winds	Vehicle strike has the potential to occur within the subject land in the construction phase, and to a small extent in the operation phase of the project as a result 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.	The most vehicular movements would be generated during construction. 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.

8.3.1.1 Vehicle strikes

Table 8-39 documents the residual predicted impacts of vehicle strike on: 1) threatened fauna species, and 2) protected fauna species that are part of a TEC, identified in Chapter 5.7. 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, e*t 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 three major roads in north-eastern 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.

Table 8-39 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 5.7)	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. Squirrel Gliders are unevenly located across the alignment with habitat limited to two main patches in the south (Spring Ridge Road) and north (remnant vegetation north of Golden Highway). 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), the residual impact for Squirrel Glider is likely to be minor.
Spotted-tailed Quoll (*Dasyurus maculatus*)	No	Low	These species were not recorded within the subject land during surveys, however, were assessed as potential species based on the availability of potential habitat recorded. 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 lack of records for the vulnerable species in the subject land and minor rate of traffic increase the overall risk of vehicle strike for these species is low.	Due to the low likelihood of vehicle strike, lack of threatened species records and mitigation measures that would be undertaken (i.e., detailed design of access routes, implementation of road signs and speed limits), the residual impact for these threatened species is minor.
New Holland Mouse (*Pseudomys novaehollandiae*)	No			
Eastern Pygmy-possum (*Cercartetus nanus*)				
Yellow-bellied Glider (*Petaurus australis*)	No			
Malleefowl (*Leipoa ocellata*)	No			
Sloane’s Froglet (*Crinia sloanei*)	No			
Booroolong Frog (*Litoria booroolongensis*)	No			
Pink-tailed Legless Lizard (*Aprasia parapulchella*)	No			
Striped Legless Lizard (*Delma impar*)	No			
Pale-headed Snake (*Hoplocephalus bitorquatus*)	No			

Threatened fauna or protected fauna that are part of a TEC that are at risk of vehicle strike (identified in Chapter 5.7)	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
Bush Stone-curlew (*Burhinus grallarius*)	No			
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	Yes			
Brush-tailed Phascogale (*Phascogale tapoatafa*)	No			
Koala (*Phascolarctos cinereus*)	No			
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 (see Vestjens, 1973). Taylor and Goldingay (2004) showed that roadkill rates of vertebrate species on three major roads in north-eastern NSW equated to 0.3 road-kills km^{-1} $week^{-1}$ or one 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), the residual impacts are likely to be minor.
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 (see 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), the residual impacts are likely to be minor.

Threatened fauna or protected fauna that are part of a TEC that are at risk of vehicle strike (identified in Chapter 5.7)	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
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 (see 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), the residual impacts are likely to be minor.
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 (see Vestjens, 1973). Taylor and Goldingay (2004) showed that roadkill rates of vertebrate species on three major roads in north-eastern NSW equated to 0.3 road-kills km^{-1} $week^{-1}$ or one 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), the residual impacts are likely to be minor.

8.3.1.2 Habitat connectivity

Table 8-39 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species. Evidence-based justification for predicted impacts is provided. Detailed discussion on regional terrestrial habitat connectivity including mitigation options is provided in Appendix J. Connectivity is illustrated in Figure 14-17 and Figure 14-18.

The project has the potential to further fragment habitat within the development footprint 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 ensure the retention of native vegetation up to 4 and 10 m 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 towers and powerlines. This has been demonstrated by some threatened raptors, namely the Black Falcon (*Falco subniger*).

To facilitate the movement of species within and surrounding the project area, a 20-metre-wide connectivity corridor located near densely vegetated woodland areas within the development footprint would be established. This is supported by Mony *et al.* (2022) which demonstrates a generally positive effect on dispersal, abundance, genetic diversity and species richness when connecting habitat patches. For areas of the project 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).

8.3.1.3 Human-made structures

Table 8-39 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species. Evidence-based justification for predicted impacts is provided.

There are several old farm buildings in the subject land, predominantly in areas of agricultural use, some of which would require removal to facilitate the development of the project. The impact to the structures would be permanent, but the consequence of such action is likely to be minor and non-significant. There is a need however, to consider native species that might benefit from the existing structures as habitat, in particular bat species.

The roosting requirements of bat species are an important consideration to the species persistence, particularly in areas dominated by humans or where natural habitat has been reduced, modified, or removed (Lumsden et al. 2002). Lumsden et al. (2002) found that in the absence of suitable trees, some bat species will utilise buildings and other human-made structures as roosting locations.

The buildings located in the subject land were assessed for indications of use by threatened bat species, with no substantiative evidence recorded. It is noted though, that the removal of these structures may also include the removal of wooden fence posts, the utilisation of which has been documented by Gibbons and Lindenmayer (2002) as roosting habitat for bats. Although no evidence of fence post roosting was recorded in the subject land, mitigation measures are recommended to minimise adverse impacts on bat species during vegetation clearing and the removal of human-made structures in the subject land.

8.3.1.4 Non-native vegetation

Table 8-39 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species. Evidence-based justification for predicted impacts is provided.

The successful introduction of non-native vegetation to novel habitats can have significant ecological impacts across the entire recipient ecosystem (Leege & 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 area in the form of cropping 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-significant, the risk to native species or communities is also likely to be minor and non-significant.

8.3.1.5 Karst, caves, crevices, cliffs, rocks and other geological features of significance

Table 8-39 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species. Evidence-based justification for predicted impacts is provided.

Karst, caves, crevices, cliffs, rocks, and other geological features of significance are absent from a large proportion of the subject area. However, a small amount of potential breeding habitat for threatened bat species was located within the subject area in the form of small, forested cliff-lines and caves north of Cope State Forest and at the southern end of Goulburn River National Park. Sandstone outcrop cliffs and caves were also found in a small woodland patch northeast of Melrose Road, also representing potential bat habitat.

Each of these locations were identified as potential breeding habitat for Eastern Cave Bat (*Vespadelus troughtoni*), Large Bentwing Bat (*Miniopterus orianae oceanensis*), and Large-eared Pied Bat (*Chalinolobus dwyeri*). The three bat species were recorded within 150 metres of the subject land at the first two locations (near Cope State Forest, and near Goulburn River National Park), but those sites are unlikely to be directly impacted by the project, and so populations in those areas would likely remain unaffected. The Melrose Road location however, has been identified as likely to be impacted by the project. These impacts while permanent, are likely to be negligible to minimal, as the habitats would be retained post-construction and the pro-active design process would account for these geological features in the planning stages.

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 study area 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 area are likely to preference their existing habitat over new roosting sites in the identified potential habitat inside the project.

8.3.1.6 Waterbodies, water quality and hydrological processes

Table 8-39 documents the residual predicted impacts of on 1) aerial species, and 2) terrestrial species. Evidence-based justification for predicted impacts is provided.

The project crosses a number of waterways at various stages of the proposed development. However, the extent of impact to waterbodies, water quality and hydrological processes is expected to be minor throughout the project, 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 project 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 waterways, and a reduction in the ability to filter overland run-off contaminants from waterways (Chua et al., 2019). Such changes to waterways also have the potential to impact both the aquatic and terrestrial biodiversity associated with affected habitats (Lind et al., 2019). Recognising this, the Recommended 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), 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.

Transmission line towers would be located 50 metres away from waterways, 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.

Key fish habitats

Impacts from the proposed development on aquatic habitats, particularly mapped key fish habitats (Strahler 4/5th Order streams) are considered likely to be negligible. Avoiding and minimising impacts on aquatic habitats would be a priority of detailed design and any residual indirect impacts would be subject to mitigation measures. Transmission line structures would be located around 50 to 100 metres from the waterways 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 to ensure that 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)* (Department of Primary Industries, 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 farm tracks and crossing points. An overview of each temporary water crossing is presented in Figure 14-19. These impacts have been restricted to eight mapped key fish habitats (Strahler 4/5th Order streams) being:

- L1W1 Wilpinjong Creek (Strahler 5)
- L1W2 Wilpinjong Creek (Strahler 5)
- L1W3 Wilpinjong Creek (Strahler 4)
- L1W4 Sportsmans Hollow Creek (Strahler 5)
- L1W7 Wilpinjong Creek (Strahler 5)
- L2W4 Talbragar Creek (Strahler 6)
- L2W8 Wagrobil Creek (Strahler 4)
- L3W4 Laheys Creek (Strahler 5).

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.

Listed aquatic threatened species, populations or ecological communities

The subject land contains mapped habitat for the FM Act listed endangered species Southern Purple Spotted Gudgeon, and the Eel Tailed Catfish in the Murray-Darling Basin and Darling River Hardyhead in the Hunter River Catchment endangered populations.

As outlined above, it is considered unlikely that temporary impacts would result in any long-term degradation of mapped key fish habitat 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)* (Department of Primary Industries, 2013).

The extent of impact to waterbodies, water quality and hydrological processes is expected to be minor throughout the project, subsequently reducing the risk of impacts on threatened species within the subject land.

Section 221ZV of the FM Act outlines the 'test of significance' that is to be undertaken to determine whether the proposal is likely to significantly affect threatened species listed under the FM Act. Assessments of significance have been completed for Southern Purple Spotted Gudgeon, and the Eel Tailed Catfish in the Murray-Darling Basin and Darling River Hardyhead in the Hunter River Catchment endangered populations (see Appendix L). A significant impact to these species is considered unlikely.

Groundwater dependent ecosystems

Impacts to groundwater associated with the proposed development are identified in Technical paper 17 and include the construction of concrete pilings, energy hubs and switching stations and blasting. These potential impacts on groundwater and subsequent GDEs is considered very low and restricted to direct impact areas.

In terms of impacts, concrete pilings may intercept the local water table where the water table is close to surface. 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.

Energy hubs and switching station construction are considered unlikely to lead to groundwater level decline at surrounding sensitive receivers because of any hillside excavation. If shallow groundwater is encountered, it is likely to be perched, non-permanent and localised (that is, not connected regionally). Therefore, there would be very limited to no groundwater inflow to the hillslope cuttings and no change in groundwater levels at nearby receivers.

Blasting may be required for construction of some transmission line towers and for the establishment of energy hubs and switching stations in areas of shallow hard rock. The associated blasting halo is expected to be minor and not extend more than 10 metres from the origin of the blast(s), and not result in any take of groundwater, it is unlikely to result in an impact to the groundwater environment within the proposed development or adjacent sensitive receivers.

None of the structures or construction activities within the proposed development would result in any permanent groundwater take that would alter the groundwater flow outside of the direct impact areas. Given this, native vegetation assessment under BAM is considered adequate to address the direct impacts on terrestrial GDE native vegetation and the proposed development is considered unlikely to result in any indirect additional impact on GDEs.

8.4 Mitigating residual impacts – management measures and implementation

The proposed mitigation and management measures for the project are outlined in Table 8-40. These measures are focuses on the residual impacts from the project. In terms of the statutory or policy basis for the mitigation measures outlined below in Table 8-40, 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 Construction Environmental Management Plan (CEMP), or the Network Operator's operational environmental management framework (or similar system). These environmental management documents or systems would include:

- processes for managing non-conformances, including identifying and implementing corrective and preventative actions to rectify the non-conformance and prevent recurrence
- processes for demonstrating compliance with the commitments made in the EIS and relevant approval conditions
- the roles and responsibilities of all key personnel
- procedures for the control of environmental records
- a compliance tracking and auditing program.

The timing and responsibility for the implementation of the safeguards would also be outlined in the CEMP or operational environmental management system. EnergyCo will provide oversight to ensure compliance with the conditions of approval. 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.

Table 8-40 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)	MNES (when relevant)
B1. Sensitive areas to be avoided during detailed design and micro siting of transmission line infrastructure.	Sensitive areas to be avoided during detailed design and sensitive areas (incl. species polygons, buffered threatened species locations (including off site features adjacent to the subject land and areas of Threatened Ecological Communities)) will be identified on sensitive area plans using spatial data. The detailed design process will avoid and minimise impacts on sensitive areas where feasible and reasonable including: — micro siting of transmission line infrastructure — prioritising areas with a Vegetation Integrity score <17 as per section 9 of the Biodiversity Assessment Method (2020).	Pre-construction. Construction activities will not be carried out within the Little Eagle nest tree buffer during the breeding season (from Spring until after young have fledged in early Summer), unless the nest is deemed unoccupied during the breeding season following inspection by an ecologist. Construction activities will not be carried out within 100 metres of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments during the breeding season for the Large-eared Pied Bat, Eastern Cave Bat, Large Bent-winged Bat (November to February), unless applicable areas are deemed unoccupied during the relevant breeding season following inspection by an ecologist. If present, an impact assessment of proposed activities will be completed to determine what, if any, activities can take place within the buffer area, 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.	To occur prior to finalisation of designs.	Network Operator	Efficacy: Moderate. Risk of failure: Moderate. Network Operator must consider sensitive areas in final designs.	Central Hunter Valley eucalypt forest and woodland Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland *Dichanthium setosum* *Leucochrysum albicans* var. *tricolor* Regent Honeyeater Large-eared Pied Bat Brush-tailed Rock-wallaby

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)	MNES (when relevant)
B2. Develop and implement guidelines and procedures for operation and maintenance of the proposal as part of the OEMP or EMS.	These guidelines and procedures will cover the following: — vegetation clearing and maintenance commitments in the BDAR and EIS — avoiding access and disturbance in any biodiversity exclusion zones outside of the areas required for construction — avoiding access and disturbance in areas of high biodiversity conservation significance outside of the areas required for construction; and — avoiding maintenance of vegetation that does not need to be maintained during operation.	Prior to operation.	N/A	Network Operator	Efficacy: High Risk of failure: Low.	All MNES
B3. Micro-siting of associated works and access tracks.	Locating of site offices, compounds, ancillary facilities and access tracks in areas of low biodiversity value. Access tracks should utilise existing tracks, where feasible and waterway crossings should be located at narrow width locations. All micro-siting should select topography to minimise requirements for any significant earth works (i.e. cut and fill).	Pre-construction. This may also occur during site setup at the beginning of the construction works.	As required, prior to set up of each construction site area.	Network Operator.	Efficacy: low. Risk of failure: high.	Central Hunter Valley eucalypt forest and woodland Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland *Dichanthium setosum* *Leucochrysum albicans* var. *tricolor* Regent Honeyeater Large-eared Pied Bat Brush-tailed Rock-wallaby

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)	MNES (when relevant)
B4. Connectivity corridors.	Connectivity corridors are to be investigated in the form of installation of under-transmission line glider poles (in accordance with clearance requirements for transmission line and infrastructure) where the construction area will impact habitat connectivity for arboreal species (see Appendix J for an examination of regional and terrestrial habitat connectivity and target species for mitigation). The exact location and design of under-transmission line glider poles 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. Where poles are proposed to be installed on land adjacent to the easement, they would be subject to landowner agreement and captured in the property management plan. This strategy will require ongoing management of connectivity corridors.	To be completed prior to commencement of construction / vegetation clearing.	A Connectivity Strategy is to be finalised prior to construction/ vegetation clearing. This strategy will require ongoing management of connectivity corridors.	Network Operator	Efficacy: Moderate – high. Risk of failure: Moderate.	Pink-tailed Legless Lizard Striped Legless Lizard Regent Honeyeater (foraging) Gang-gang Cockatoo (foraging) Glossy Black-Cockatoo (foraging) Brown Treecreeper (eastern subspecies) Spotted-tailed Quoll Painted Honeyeater White-throated Needletail Swift Parrot (foraging) Malleefowl Hooded Robin (south-eastern form) Diamond Firetail Superb Parrot Yellow-bellied Glider New Holland Mouse Large-eared Pied Bat Greater Glider Brush-tailed Rock-wallaby Koala Grey-headed Flying-fox (foraging)
B5. Installation of nest boxes or other hollow creation methods as part of a Supplementary Hollow and Nest Strategy.	A Supplementary Hollow and Nest Strategy will be developed and implemented for the creation of nest boxes or other hollow creation method to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing. A target ratio for the provision of three artificial hollows/nest boxes for every occupied hollow removed will be implemented. Where supplementary hollows are proposed to be established on land adjacent to the easement, these would be subject to landowner agreement and captured in any property management plan.	To be installed prior to commencement of construction/vegetation clearing. The suggested timing for installation of nest boxes is three months in advance of clearing where possible.	Prior to the commencement of clearing works where possible in each construction area.	Network Operator	Efficacy: ranges from low to high depending on target species. Risk of failure: low, subject to the implementation of ongoing management	Yellow-bellied Glider Greater Glider Superb Parrot
B6. Controls of weed and pathogen transport from the site to adjacent vegetation.	Implementation of Energy Co biosecurity protocols. This may include the cleaning of vehicles and machinery (incl. floor pans), boots and clothing to kill pathogens and remove weed seed &/or plant bodies. All trucks containing loads of weed contaminated material will be covered. Mechanical and chemical weed control will be done in consultation with landowners.	All personnel entering and exiting the site each day must adhere to biosecurity protocols	Daily	Network Operator	Efficacy: low (mostly due to the absence of checks). Risk of failure: high.	All MNES

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)	MNES (when relevant)
B7. Demarcation of vegetation clearing areas and habitats.	This will include marking of hollow-bearing trees, nests (e.g. Little Eagle), burrows and other habitat features within or in close proximity to the clearing areas. Installation of 'no go area' fencing to clearly mark the extent of clearing incorporating any buffers to habitat features.	Pre-construction	To be installed prior to the commencement of clearing works in each construction area. 'No go area' fencing and other tags/marks must be maintained throughout the construction phase.	Network Operator	Efficacy: high. Risk of failure: low.	All MNES
B8. Installation of tree protection measures.	In accordance with AS 4970-2009 – Protection of Trees on Development Sites.	Prior to vegetation clearing.	Must remain installed and be maintained throughout the construction phase.	Network Operator	Efficacy: high. Risk of failure: low.	All MNES
B9. Sediment and erosion controls.	A Sediment and Erosion Control Plan is to be prepared, detailing the location and types of controls required to reduce potential impacts from erosion, sedimentation and enriched run-off on waterways and adjoining habitats.	Sediment and erosion controls must be installed prior to commencement of construction.	Sediment and erosion controls should be checked daily and maintained as required.	Network Operator	Efficacy: moderate. Risk of failure: high, if not sufficiently maintained.	All MNES
B10. Pre-clearing surveys.	Pre-clearing surveys are to be completed prior to clearing at each location by a suitability qualified ecologist. The proposed clearing extents would be marked out on site prior to the pre-clearing surveys. During the surveys, the ecologist would: — survey the proposed clearing extent — identify any fauna that would require relocation prior to clearing, including inspection of any built structures and wooden fence posts to be demolished — confirm the location and mark out the extents of any biodiversity exclusion zones — 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.	Pre-construction	To be undertaken within 48 hours prior to the commencement of clearing works in each construction area.	Network Operator	Efficacy: high. Risk of failure: moderate.	All MNES

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy (including risk of failure)	MNES (when relevant)
B11. Ecology inductions, toolbox talks, targeted training.	All relevant project personnel, including relevant sub-contractors are to be trained on biodiversity management protocols and requirements for the project, through inductions, toolbox talks and targeted training, and provided with sensitive area maps (showing clearing boundaries and exclusion zones) and updates as required.	Inductions and training must be completed prior to commencement of work for all relevant personnel.	Inductions and training is to be completed once prior to commencing work. Toolbox talks will be undertaken daily or as required.	Network Operator	Efficacy: High. Risk of failure: Low.	All MNES
B12. Retention of understorey vegetation in riparian areas.	Understorey vegetation is to be protected within vegetated riparian zones where reasonable and feasible (within the definition of *Water Management Act 2000*). Vegetation clearing will be limited to the tree stratum and shrubs above 2 metres in height only, with trunk bases being retained in-situ.	N/A	N/A	Network Operator	Efficacy: High. Risk of failure: Low.	All MNES
B13. Rehabilitation of riparian areas.	Activities within vegetated riparian zones would be managed to minimise impacts to aquatic environments. Riparian areas subject to disturbance would be progressively stabilised and rehabilitated.	Implementation of an approved Riparian Vegetation Management Plan (RVMP) is commenced within 3 months prior to any disturbance to a riparian area.	The schedule of works will be stipulated within the approved RVMP.	Network Operator	Efficacy: Moderate. Risk of failure: Moderate.	All MNES
B14. Installation of bird diverters.	Located within 1 km (at a minimum) of wetland/riverine habitats to reduce impacts on aerial fauna species from collision with transmission lines and infrastructure. The exact position and diverter model is to be finalised during design refinement.	To be installed within two weeks of transmission line installation or as soon as practical.	To remain in place and inspected and/ or replaced as required.	Network Operator	Likely efficacy: Moderate. Risk of failure: Moderate.	Bird and bat MNES
B15. Exact clearing extent provided for offset requirements.	The predicted clearing of native vegetation by the proposal would be monitored against the recorded clearing. A revised BAM-C calculation on the project's final project disturbance post construction would be completed and any additional credit liability identified would be met as part of the biodiversity offset requirements within the biodiversity offset package.	Construction	Monitored at each stage of clearing when completed, or as often as needed	Network Operator	Efficacy: high. Risk of failure: low	All MNES
B16. Minimise direct impacts to threatened species or ecological communities.	A species unexpected finds protocol would be implemented if threatened ecological communities or flora and fauna species, not assessed in the biodiversity assessment, are identified in the disturbance area.	Construction	Daily	Network Operator	Efficacy: high. Risk of failure: low	All MNES
B17. Minimise direct impacts to threatened aquatic species and endangered populations listed under the FM Act.	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)* (Department of Primary Industries, 2013).	Construction	Daily	Network Operator	Efficacy: high. Risk of failure: low	NA
B18. Minimise indirect impacts from light spill.	Lighting designs to be in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023a).	Construction	Daily	Network Operator	Efficacy: high. Risk of failure: low	All MNES

8.5 Adaptive management strategy for uncertain impacts

An adaptive management plan would need to be developed to deal with uncertain impacts. This adaptive management plan would be developed as part of the OEMP or managed as part of the Network Operators accredited EMS. 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 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 construction or operational phases. The management actions can be targeted at minimising or mitigating the prescribed impact, or in response to meeting or exceeding a threshold or trigger.

9 Serious and irreversible impacts

This section identifies every potential serious and irreversible impact (SAII) entity that are listed in the Guidance to assist a decision-maker to determine a serious and irreversible impact.

Impact assessment of potential entities of SAII impacts on biodiversity values are outlined under Chapter 9 of the BAM and addressed below.

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.

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 Species at risk of an SAII

Common name	**Scientific name**	**Reason for inclusion in assessment**
Fuzzy Box Woodland	Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
White Box Yellow Box Blakely’s Red Gum Woodland	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	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
Regent Honeyeater	*Anthochaera phrygia*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal

Common name	Scientific name	Reason for inclusion in assessment
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 proposal
Eastern Cave Bat	*Vespadelus troughtoni*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
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 proposal
Broad-headed Snake	*Hoplocephalus bungaroides*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
Euphrasia arguta	*Euphrasia arguta*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
Commersonia rosea	*Commersonia rosea*	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal

Table 9-2 SAII principles that apply to each SAII entity subject to assessment

TEC / Species	Principle 1	Principle 2	Principle 3	Principle 4
Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	✓	✓	✓	
White Box Yellow Box Blakely’s Red Gum Woodland	✓	✓		
Regent honeyeater	✓	✓		
Large-eared pied bat				✓
Eastern cave bat				✓
Brush-tailed Rock-wallaby				✓
Broad-headed Snake				✓
Euphrasia arguta			✓	
Commersonia rosea		✓		

9.1.1 *Additional impact assessment provisions for TECs at risk of an SAII*

Figure 14-15 shows the extent of TECs at risk of Serious and Irreversible Impacts within the subject land.

9.1.1.1 Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions

Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions 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 three SAII principles.

The following SAII principles is 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 an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status (excluding impacts of the proposal)

Table 9-3 Current status – Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South 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	8,765 ha	NSW Bionet Vegetation Database	No extent data available for one of the three PCTs listed as part of this TEC (PCT 1384). Extent is therefore an underestimate.
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 greater than 95%.	NSW Scientific Committee, 2021	Data deficient

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)
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 woodland to open forest. 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.	NSW Scientific Committee, 2021	Based on limited data available and inferences made from other woodland threatened ecological communities.
Change in species composition	Species composition of the community is influenced by the size of the site, past disturbances and recent environmental conditions. Individuals from all stratum can be present above ground, below ground or absent at any one time. Threats noted above can alter the species composition of the community. Similarly, to the White Box Yellow Box Blakely's Red Gum threatened ecological community grazing and other disturbances may lead to the prevention of overstorey species regenerating and can lead to a reduction in native understorey species diversity and cover. The extent of this change is likely linked to the type and severity of the threat.	NSW Scientific Committee, 2021 Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	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)
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, 2021 Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	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	Land degradation and the area of the landscape this community occupies have led to weed invasion being a common threat for the community. Where weed invasion is prolific it is likely to alter abiotic factors such as species composition and structure.	NSW Scientific Committee, 2021	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.	NSW Scientific Committee, 2021	Based on limited data available and inferences made from other woodland threatened ecological communities.
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.	NSW Scientific Committee, 2021	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)
Evidence of restricted geographic distribution (Principle 3) based on the TEC's geographic range in NSW			
Extent of occurrence (ha)	19,741,238 ha	NSW TEC profile (OEH, 2022) and IBRA subregions	Assumptions that extent of occurrence is the IBRA subregion as outlined in TEC profile
Area of occupancy (ha)	8,765 ha	NSW Bionet Vegetation Database	No extent data available for one of the three PCTs listed as part of this TEC (PCT 1384). Area of occupancy is therefore an underestimate.
Number of threat-defined locations	Not identified	Not available	Unknown
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 (OEH, 2022)	High confidence that threatening processes are the main issue rather than reproductive characteristics.
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	NSW TEC profile (OEH, 2022)	High confidence in knowledge of key threatening processes and limited control options.

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 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.		

Impact assessment

Table 9-4 Impact assessment – Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South 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 proposal (ha)	2.99 ha, consisting of: — Disturbance Area A – 0.58 ha. — Disturbance Area B – 2.36 ha. — Disturbance Area HZ – 0.05 ha.	N/A	N/A
Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%)	Based on the current total geographic extent (ha) of the TEC in NSW of 8,765 ha, the area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW is 0.03%.	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)
Direct/indirect impacts likely as a result of the proposal to contribute to loss of flora/fauna species characteristic of the TEC (BAM Subsection 9.1.1(4.a.ii.))	The project would include clearing of approximately 2.99 ha of this TEC. The proposal would impact isolated patches and patches with limited connectivity subject to grazing and high edge effects from agricultural activities. It is not considered to be habitat that would be important for the long-term survival of characteristic species of the TEC. Refer to Section 8.1 and 8.3 for detailed discussion of impacts. Direct and indirect impact would be managed through mitigation measures outlined in Section 8.4.	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 Fuzzy Box Woodland (excluding derived condition class) with patch size area greater than 10 ha in size has been undertaken for the project impact and within the locality (20 km buffer to the project). The project will not impact any patches of the TEC that exceed 10 ha in size. All the patches to be impacted are much smaller. In the locality there are 15 patches >10 ha in size. The project will not have an impact on any of the larger better quality patches in the locality.	GIS analysis	Relies on available datasets.
Average distance between remaining remnants – remnant is retained (m)	75.6 m	GIS analysis	Relies on available datasets.
Average distance between remaining remnants – remnant is removed (m)	86.1 m The average distance between remnants post impact is small enough to still be considered as the same patch (i.e. less than 100 m).	GIS analysis	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)
Estimated maximum dispersal distance of species associated with the TEC (km)	100 m The average distance between remaining remnants post impact is less than the distance considered to be the same patch and considered to maintain ecologically functional connectivity.	BAM 2020	Dispersal distance for species within this TEC is based on the definition of patch in BAM, i.e. 100 m for woody vegetation. It is noted however that dispersal distances for species within this community will vary greatly from limited dispersal of small ground dwelling species, or herbs, to migratory bird species.
Area to perimeter ratio of remaining remnants (ratio)	9:1	GIS analysis	Underestimate as analysis restricted to study area (200 m wide corridor).

Table 9-5 Vegetation integrity analysis – Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling River in the Inland Slopes IBRA subregion – CFG Connection to Tallawang Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
2	202	Thinned	202_Thinned	101	A	0.12	0	0	0	0	-45.2	-40.3
					B	0.06	23.5	7	20.2	14.9	-30.3	

Table 9-6 Vegetation integrity analysis – Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling River in the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
2	202	Thinned	202_Thinned	101	A	0.19	0	0	0	0	-36.1	-35.1
					B	0.02	14.6	3.9	20.8	10.6	-25.5	

Table 9-7 Vegetation integrity analysis – Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling River in the Talbragar Valley IBRA subregion RNI1 stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
4	202	Mod_Good	202_Mod_Good	101	A	0.25	0	0	0	0	-88.2	-44.7
					B	1.69	83.4	49	30	49.7	-38.5	
					HZ	0.04	83.4	49	30	49.7	-38.5	
5	202	Thinned	202_Thinned	101	A	0.02	0	0	0	0	-36.1	-25.8
					B	0.59	14.6	3.9	20.8	10.6	-25.5	
					HZ	0.01	14.6	3.9	20.8	10.6	-25.5	

9.1.1.2 White Box Yellow Box Blakely’s Red Gum Woodland

White Box Yellow Box Blakely’s Red Gum Woodland 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).

This assessment takes into account these two SAII principles.

The following SAII principles is not applicable to this TEC:

- 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this TEC at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status (excluding impacts of the proposal)

Table 9-8 Current status – White Box Yellow Box Blakely's Red Gum Woodland

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)
Current total geographic extent (ha) of the TEC in NSW	250,729 ha as of 2006. Reported estimate annual losses for the period 2009-2016 of 395 ha for agriculture and a further 155 ha/annum due to infrastructure projects equates to an overall additional annual loss of 550 ha for that period. Estimate losses of Box Gum Woodland rose during the period 2016-17 to 654 ha for agriculture and 216 ha for infrastructure and rose again in the period 2017-18 to 1,344 ha for agriculture and 589 ha for infrastructure. Considering these losses and carrying the 2017-18 losses forward to 2023 the estimated loss of Box Gum Woodland from the 2006 estimate would be 16,035 ha. Based on these estimates, the current total geographic extent of Box Gum Woodland in NSW is projected to be about 234,694 ha. Interestingly, since the White Box Yellow Box Blakely's Red Gum Woodland threat status was upgraded from endangered to critically endangered in 2020, the final determination listing has removed reference to condition state. This has resulted in all occurrences of the ecological community, independent of condition, to form part of the CEEC listing.	Threatened Species Scientific Committee, 2006 (referenced within Tozer and Simpson 2020) NSW Threatened Species Scientific Committee – Notice of and reason for the Final Determination of White Box Yellow Box Blakely's Red Gum Grassy Woodland and derived Native Grassland listing as a Critically Endangered Ecological Community (CEEC) (17/07/2020) NSW BioNet Vegetation Classification (2023) NSW State Vegetation Type Map (2022) – current release C1.1.M1.1 (December 2022)	There is uncertainty surrounding both the current extent of Box –Gum Grassy Woodland and Derived Grassland and its previous extent (Tozer and Simpson, 2020). The assumption of the 250,729 ha estimate has been based from the Commonwealth listing advice where specific key diagnostic and condition threshold need to be meet in order to form part of the ecological community listing. This uncertainty has only been heightened through the lack of available data to enable condition or structure threshold to be established under the NSW CEEC final determination listing. Due to this, and the intent of the listing that all occurrences of the ecological community independent of their condition are covered by the determination, current total geographic extent is considered much higher that previously stated by Tozer and Simpson (2020).

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)
	In this context all NSW PCTs that are considered likely to form part of the CEEC need to be considered in terms of establishing a best estimate of current extent in NSW. Using a BioNet TEC PCT power query, a total of 114 PCTs have been identified to be associated with the CEEC. Taking a conservative approach, these PCTs were further filtered to 73 and only include those PCTs listed with a classification confidence level of medium, high and very high. The estimated current extent of these PCTs using the NSW State Vegetation Type Map 2022 data set is 1,657,493 ha (includes derived) or 1,370,658 ha (excludes derived).	NSW State Vegetation Type Map (Pre-clearing)	This project, along with many other major projects, include patches of the CEEC in all condition states including derived condition where vegetation integrity scores are below the NSW biodiversity offset scheme threshold for a CEEC of <15. When taking this literal approach of all occurrences of the ecological community independent of condition into account, it is necessary to provide greater context in terms of best estimate current total geographic extent of Box Gum Woodland in NSW. In establishing a better contextual estimate of Box Gum Woodland extent in NSW the use of the NSW BioNet Vegetation Classification system and associated NSW State Vegetation Type Map has been adopted. Due to uncertainty around PCT association with Box Gum Woodland classification confidence level and taking a conservative approach, BioNet TEC PCT power query results were filtered to remove those PCTs with low to very low confidence.
Estimated reduction in geographic extent of the TEC since 1970	The estimated reduction in geographic extent of the TEC since 1970 is unknown although the scientific determination for Box Gum Woodland estimates that the annual rate of loss for the TEC between the period 2009–2018 for the NSW Brigalow Belt South was 2,630 ha, South Western Slopes was 746 ha and the Sydney Basin Bioregion was 1320 ha. Clearing since 1750 to 2006 is estimated at more than 90% with a reduction in extent from 3,717,366 ha to 234,694 ha (TSSC 2006). Using the current data available in the NSW BioNet Vegetation Classification system and associated NSW State Vegetation Type Map the pre 1750 estimate of Box Gum Woodland is 2,364,886 ha whilst the estimate of current extent is 1,657,493 ha (includes derived) or 1,370,658 ha (excludes derived) giving an overall reduction in extent of 30-42% (refer Figure 9-1 and Figure 9-2).	Threatened Species Scientific Committee, 2006 (Tozer and Simpson 2020 NSW BioNet Vegetation Classification (2023) NSW State Vegetation Type Map (2022) – current release C1.1.M1.1 (December 2022) NSW State Vegetation Type Map (Pre-clearing)	

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)
			Taking a further conservative approach in understanding the best estimate of the current total geographic extent of the TEC in NSW all derived PCTs were removed from the SVTM data set.

SVM CURRENT	
Row Labels	Sum of Area_ha
Brigalow Belt South	641148
Nandewar	345876
New England Tablelands	73078
NSW North Coast	7753
NSW South Western Slopes	530584
Riverina	6195
South East Corner	1095
South Eastern Highlands	48976
Sydney Basin	2789
Grand Total	1657493

1750 SVM	
Row Labels	Sum of Area_ha
Brigalow Belt South	690701
Nandewar	413048
New England Tablelands	215567
NSW North Coast	26729
NSW South Western Slopes	731983
Riverina	6193
South East Corner	5966
South Eastern Highlands	269435
Sydney Basin	5264
Grand Total	2364886

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)
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	Reduction in ecological function is evident in areas subject to threats such as grazing, land clearing, salinity and inappropriate fire regimes. The community's national listing advice identifies three states in which the community occurs in response to such threats. These states include: — overstorey exists, but there is no substantial native understorey — native understorey exists, but the trees have been cleared (derived grasslands) — both native understorey and overstorey exist in conjunction. Ecological function across these three states would differ.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	High confidence that alterations to the community's structure would affect ecological function.
Change in species composition	Threats noted above can alter the species composition within the community. For example grazing can lead to the prevention of overstorey species regeneration and can to a reduction in native understorey species diversity and cover. The extent of this change is likely to be linked to the type and severity of the threat.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	High confidence based on field survey and research.

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)
Disruption of ecological processes	Impacts to the community to date make the possibility of re-establishment of ecological processes, species composition and structure back to its original extent unlikely, even with human intervention.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	Estimated based on past research. Further research on ecological processes probably required to confirm.
Invasion and establishment of exotic species	The national listing advice states that there are essentially no fully intact remnants left as most patches have at least some degree of weed invasion. The threats noted above can however lead to the introduction, establishment and spread of new exotic species. Intact areas are more resistant to large-scale weed invasion. Where weed invasion is prolific it can alter abiotic factors such as species composition and structure.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	High confidence that most remnants area already altered by some degree of weed invasion.
Degradation of habitat	Land clearing and other land practices have led to the degradation of large areas of this community throughout its extent. It has occurred at both a patch and landscape scale. Degradation can affect the community's structure, species composition, functionality and viability.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	High confidence based on field survey, research and modelled vegetation mapping.

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.	Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee 2006)	High confidence based on field survey, research and modelled vegetation mapping.
Evidence of restricted geographic distribution (Principle 3) based on the TEC's geographic range in NSW – note that Principle 3 is not applicable to this TEC			
Extent of occurrence (ha)	702,800 km^2	NSW threatened species scientific committee, 2020.	The best estimates are derived from a compilation of maps from multiple sources. Not all of the areas occupied by White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland are covered by maps of appropriate scale and accuracy. Therefore, the values quoted may underestimate the true values.
Area of occupancy (ha)	The area of occupancy (AOO) in NSW has been estimated to be 151,100 km^2 however the extant of Box Gum Woodland within this AOO is estimated to be 1,657,493 ha.	NSW threatened species scientific committee, 2020. Tozer and Simpson 2020	
Number of threat-defined locations	Not identified	Not available	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 that 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 do not severely limit the ability to increase the area of extent/occupancy of the community.	National Recovery Plan White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Department of Environment, Climate Change and Water 2010)	High confidence that threatening processes are the main issue rather than reproductive characteristics.
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 community identifies the following threats: — land use and management change such as agriculture and horticultural development, rural residential and urban development, mining, public infrastructure — conflicting management practices such as grazing regimes and pasture management, firewood collection and 'tidying up', changed fire regimes, increased soil nutrients and use of chemicals, mowing and slashing regimes and revegetation management — degrading landscape processes such as weed invasion, climate change, salinity, acid soils, declining tree health and regeneration — other potential threats such as animal pests, disease and collection/removal of native flora. Some of these threats such as stochastic events like wildlife and prolonged drought, climate change and pests cannot be effectively managed on a biodiversity stewardship site.	National Recovery Plan White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Department of Environment, Climate Change and Water 2010)	High confidence in knowledge of key threatening processes and limited control options.

Impact assessment

Table 9-9 Impact assessment – White Box Yellow Box Blakely's Red Gum Woodland

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) – note that Principle 3 is not applicable to this TEC			
Area of TEC to be impacted by the proposal (ha)	The proposal will impact 575.95 ha of the TEC. Of this, 272.14 ha (47%) of the TEC is relatively poor condition Derived Native Grassland (agricultural paddocks) and Derived Native Shrubland which is not limiting in the subregion. The inclusion of Derived Native Grassland (agricultural paddocks) as part of the TEC inflates the impact to the TEC and does not provide a realistic assessment of impacts to the more valuable components of the TEC that are structurally intact or relatively structurally intact. A breakdown of impact for each condition class is presented below: — 110.93 ha of mod-good condition — 204.97 ha of thinned condition — 7.20 ha of poor condition — 1.62 ha of derived native shrubland condition — 270.51 ha of derived native grassland condition. In terms of floristic composition and structural changes to Box Gum Woodland, the proposal will impact 389.17 ha within disturbance area A where all vegetation will be removed to ground level, thereby substantially changing the vegetation structure and composition. Approximately 184.61 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. There would be an impact to 10% of tree in the hazard tree zone with an estimated impact of 2.15 ha.	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)
	Change in VI score per disturbance area and total VI loss can be viewed in Table 9-10 to Table 9-20.		
Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%)	Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW is 0.03%. This is based on the predicted impact of 575.95 ha of the TEC (this includes derived native grassland) when compared to the mapped extent (SVTM) at 1,657,493 ha (this includes derived native grassland). When impacts to derived grassland and shrubland are removed from the calculation, the Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW is 0.02%. This is based on the predicted impact of 303.81 ha of the TEC (excluding derived native grassland) when compared to the mapped extent (SVTM) at 1,370,658 ha (this excluded mapped derived native grassland).	NSW State Vegetation Type Map (2022) – current release C1.1.M1.1 (December 2022) and GIS analysis	NSW State Vegetation Type Map (2022) – current release C1.1.M1.1 (December 2022) is assumed to be correct.
Direct/indirect impacts likely as a result of the proposal to contribute to loss of flora/fauna species characteristic of the TEC (BAM Subsection 9.1.1(4.a.ii.))	The project would include clearing of approximately 575.95 ha of this TEC. The project would impact isolated patches and patches with limited connectivity, including area of derived grassland, subject to grazing and edge effects from agricultural activities. These areas are not considered to be habitat that would be important for the long-term survival of characteristic species of the TEC. Refer to Section 8.1 and 8.3 for detailed discussion of impacts. Direct and indirect impact will be managed through mitigation measures outlined in Section 8.4. Refer to Section 8.1 and 8.3.	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)	An analysis of Box Gum Woodland (excluding derived condition class) with patch size area greater than 10 ha in size has been undertaken for the project impact and within the locality (20 km buffer to the project). The project has been identified to impact 17 patches of the TEC that exceed 10 ha whilst within the locality there is a total of 1,397 patches. This equates to the project impacting on about 1% of Box Gum Woodland patches greater than 10 ha in the locality.	GIS analysis of ground-truthed vegetation within the study area NSW BioNet Vegetation Classification (2023) NSW State Vegetation Type Map (2022) – current release C1.1.M1.1 (December 2022)	An underestimate of remaining extent in locality as this area has been calculated based on vegetation within narrow study area corridor.
Average distance between remaining remnants – remnant is retained (m)	128.9 m	GIS analysis	Calculation based on vegetation within study area corridor.
Average distance between remaining remnants – remnant is removed (m)	49.3 m The average distance between remnants post impact is small to still be considered as the same patch enough (i.e. less than 75 m).	GIS analysis	Calculation based on vegetation within study area corridor.

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)
Estimated maximum dispersal distance of species associated with the TEC	75 m The average distance between remaining remnants post impact is less than the distance considered to be the same patch and considered to maintain ecologically functional connectivity.	Department of the Environment and Heritage, 2006a	75 m is based on the gap between trees of Box Gum Woodland that are considered to be a single "patch". It is noted however that dispersal distances for species within this community would vary greatly from limited dispersal of small ground dwelling species, or herbs, to migratory bird species.
Area to perimeter ratio of remaining remnants (ratio)	24:1	GIS analysis	Underestimate as analysis restricted to study area (200 m wide corridor).

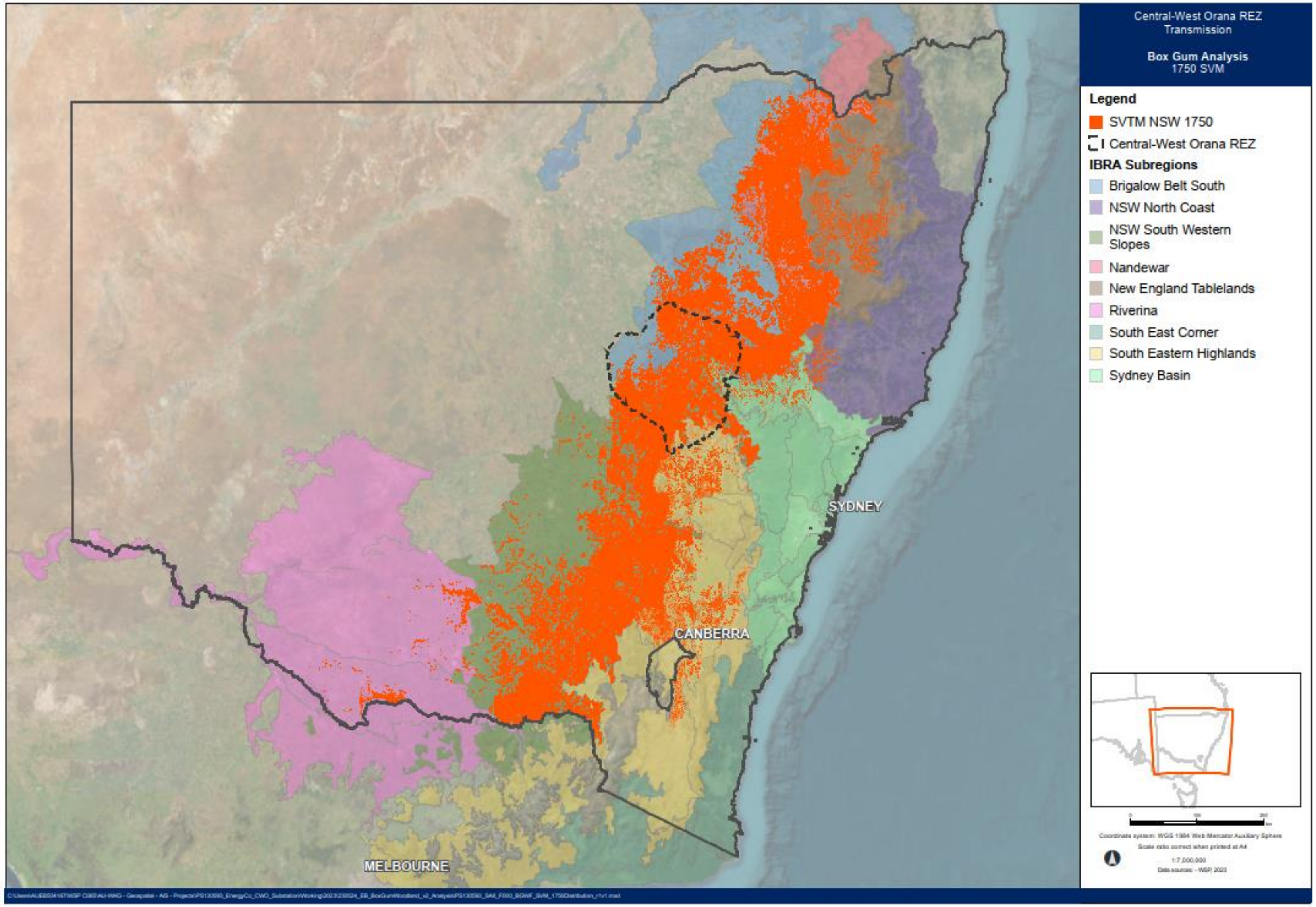


Figure 9-1 Box Gum Analysis SVTM NSW 1750 extent

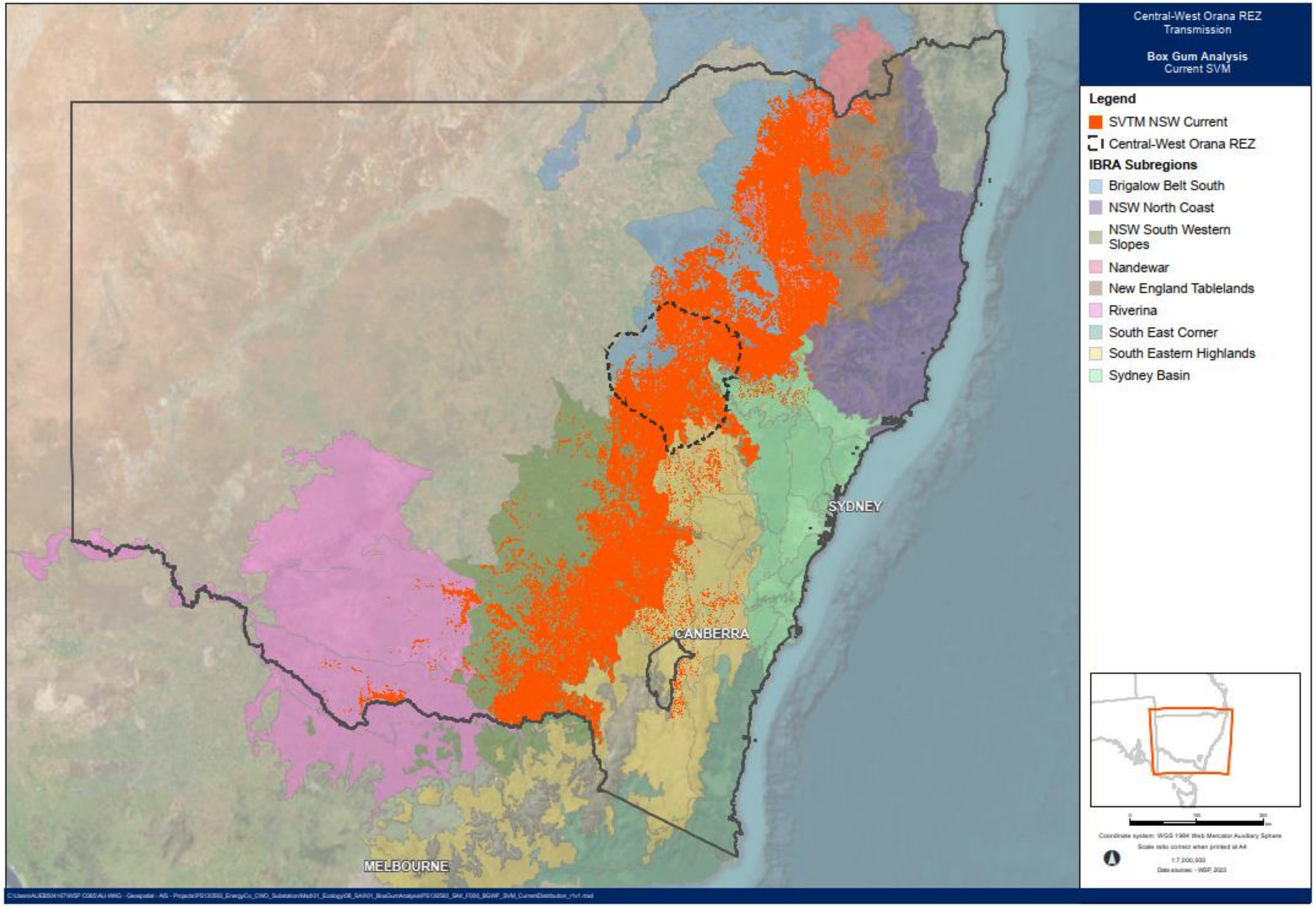


Figure 9-2 Box Gum Analysis SVTM NSW current extent

Table 9-10 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Inland Slopes IBRA subregion – CFG Connection to Tallawang Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
2	202	Thinned	202_Thinned	101	A	0.12	0	0	0	0	-45.2	-40.3
					B	0.06	23.5	7	20.2	14.9	-30.3	
3	277	DNG	277_DNG	101	A	6.61	0	0	0	0	-16.7	-16.7
4	277	Thinned	277_Thinned	101	A	0.35	0	0	0	0	-57.7	-48.7
					B	0.32	60.7	57.5	1.9	18.9	-38.8	
5	281	DNG	281_DNG	101	A	26.2	0	0	0	0	-22.9	-22.9
6	281	Mod_Good	281_Mod_Good	101	A	0.33	0	0	0	0	-90.5	-66.4
					B	0.3	85.4	67.2	22.6	50.6	-39.9	
7	281	Thinned	281_Thinned	101	A	4.76	0	0	0	0	-81.9	-55.3
					B	7.84	77.7	66.3	15.2	42.8	-39.1	

Table 9-11 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Inland Slopes IBRA subregion – RNI1 Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
4	266	DNG	266_DNG	101	A	16.65	0	0	0	0	-18.4	-18.4
5	266	DNS	266_DNS	101	A	0.49	0	0	0	0	-36.3	-36.3
6	266	Mod_Good	266_Mod_Good	101	A	1.67	0	0	0	0	-83.6	-47.8
					B	3.45	86.9	67.2	25.2	52.8	-30.9	
					HZ	0.08	86.9	67.2	25.2	52.8	-30.9	
7	266	Thinned	266_Thinned	101	A	2.5	0	0	0	0	-55.6	-37.8
					B	4.53	77.8	66.6	3.9	27.3	-28.3	
					HZ	0.11	77.8	66.6	3.9	27.3	-28.3	
8	277	DNG	277_DNG	101	A	56.9	0	0	0	0	-16.7	-16.7
9	277	Mod_Good	277_Mod_Good	101	A	1.44	0	0	0	0	-85	-46.5
					B	4.49	88.3	67.2	21.8	50.6	-34.4	
					HZ	0.1	88.3	67.2	21.8	50.6	-34.4	
10	277	Thinned	277_Thinned	101	A	2.56	0	0	0	0	-57.7	-44.9
					B	5.28	60.7	57.5	1.9	18.9	-38.8	
					HZ	0.08	60.7	57.5	1.9	18.9	-38.8	
11	281	DNG	281_DNG	101	A	56.9	0	0	0	0	-22.9	-22.9
12	281	Mod_Good	281_Mod_Good	101	A	3.28	0	0	0	0	-90.5	-73.8
					B	1.56	85.4	67.2	22.6	50.6	-39.9	
					HZ	0.05	85.4	67.2	22.6	50.6	-39.9	

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
13	281	Poor	281_Poor	101	A	0.01	0	0	0	0	-81.9	-43
					B	0.1	77.7	66.3	15.2	42.8	-39.1	
14	281	Thinned	281_Thinned	101	A	12.42	0	0	0	0	-81.9	-59
					B	14.16	77.7	66.3	15.2	42.8	-39.1	
					HZ	0.2	77.7	66.3	15.2	42.8	-39.1	

Table 9-12 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Inland Slopes IBRA subregion – Stubbo Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	277	Mod_Good	277_Mod_Good	101	A	0.11	0	0	0	0	-85	-45.3
					B	0.39	88.3	67.2	21.8	50.6	-34.4	
					HZ	0.01	88.3	67.2	21.8	50.6	-34.4	
2	281	DNG	281_DNG	101	A	0.73	0	0	0	0	-22.9	-22.9
3	281	Mod_Good	281_Mod_Good	101	A	0.4	0	0	0	0	-90.5	-51.7
					B	1.29	85.4	67.2	22.6	50.6	-39.9	
					HZ	0.02	85.4	67.2	22.6	50.6	-39.9	
4	281	Thinned	281_Thinned	101	A	0.38	0	0	0	0	-81.9	-46.5
					B	1.84	77.7	66.3	15.2	42.8	-39.1	
					HZ	0.01	78.2	31.3	19.2	36.1	-44.5	

Table 9-13 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Kerrabee IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
3	277	Mod_Good	277_Mod_Good	101	A	0.14	0	0	0	0	-89.7	-89.7
4	281	Mod_Good	281_Mod_Good	101	A	3.56	0	0	0	0	-93.6	-68.2
					B	3.11	73.2	72	30.5	54.4	-39.2	
5	281	Thinned	281_Thinned	101	A	2.55	0	0	0	0	-84	-54.7
					B	4.33	61.3	66.6	24.5	46.4	-37.5	
13	599	DNG	599_DNG	101	A	1.68	0	0	0	0	-14.1	-14.1
14	599	Mod_Good	599_Mod_Good	101	A	0.45	0	0	0	0	-83.5	-47
					B	1.05	77.8	70.8	25.8	52.2	-31.4	
15	599	Thinned	599_Thinned	101	A	0.86	0	0	0	0	-52.7	-36.6
					B	1.2	50.5	61	6.8	27.6	-25.1	
16	618	DNG	618_DNG	101	A	9.01	0	0	0	0	-16.3	-16.3
17	618	Mod_Good	618_Mod_Good	101	A	3.03	0	0	0	0	-64.8	-42
					B	4.34	49	46.4	25.6	38.8	-26.1	
18	618	Thinned	618_Thinned	101	A	4.25	0	0	0	0	-44.3	-25.4
					B	7	46.5	42.4	14.3	30.4	-13.9	

Table 9-14 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Kerrabee IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	1.44	0	0	0	0	-26.3	-26.3
2	281	Thinned	281_Thinned	101	A	0.09	0	0	0	0	-84	-53.3
					B	0.29	61.3	66.6	15.9	40.2	-43.8	
11	483	DNG	483_DNG	101	A	0.87	0	0	0	0	-27.2	-27.2

Table 9-15 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Kerrabee IBRA subregion – RNI1 Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	277	Mod_Good	277_Mod_Good	101	A	0.08	0	0	0	0	-89.7	-60.1
					B	0.07	82.8	71.8	29.4	55.9	-33.8	
					HZ	0.02	82.8	71.8	29.4	55.9	-33.8	
2	277	Thinned	277_Thinned	101	A	0.46	0	0	0	0	-59.3	-47.6
					B	0.38	50.9	61.8	5.2	25.4	-33.9	
					HZ	0.01	50.9	61.8	5.2	25.4	-33.9	
3	281	DNG	281_DNG	101	A	26.51	0	0	0	0	-26.3	-26.3
4	281	DNS	281_DNS	101	A	1.08	0	0	0	0	-37.1	-37.1
5	281	Mod_Good	281_Mod_Good	101	A	12.32	0	0	0	0	-93.6	-55.8
					B	27.49	73.2	72	30.5	54.4	-39.2	
					HZ	0.45	73.2	72	30.5	54.4	-39.2	
6	281	Poor	281_Poor	101	A	0	0	0	0	0	-84	-37.5
					B	0.01	61.3	66.6	24.5	46.4	-37.5	
					HZ	0	61.3	66.6	24.5	46.4	-37.5	
7	281	Thinned	281_Thinned	101	A	14.95	0	0	0	0	-84	-53.7
					B	27.3	61.3	66.6	24.5	46.4	-37.5	
					HZ	0.57	61.3	66.6	24.5	46.4	-37.5	
22	483	DNG	483_DNG	101	A	1.45	0	0	0	0	-27.2	-27.2

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
23	483	Thinned	483_Thinned	101	A	0.77	0	0	0	0	-76.1	-47.6
					B	1.96	58.5	64.5	16.5	39.6	-36.4	
24	618	DNG	618_DNG	101	A	42.03	0	0	0	0	-16.6	-16.6
25	618	Mod_Good	618_Mod_Good	101	A	1.72	0	0	0	0	-65.7	-34.7
					B	6.27	50.4	47.2	25.6	39.3	-26.4	
					HZ	0.18	50.4	47.2	25.6	39.3	-26.4	
26	618	Thinned	618_Thinned	101	A	3.22	0	0	0	0	-45	-24.2
					B	6.52	48.1	43	14.3	30.9	-14.1	
					HZ	0.17	48.1	43	14.3	30.9	-14.1	

Table 9-16 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Liverpool Ranges IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	0.13	0	0	0	0	-29.6	-29.6
2	281	Thinned	281_Thinned	101	A	0.13	0	0	0	0	-87	-51.1
					B	0.39	67.3	71.3	22.9	47.9	-39.1	
5	483	DNG	483_DNG	101	A	2.31	0	0	0	0	-30.9	-30.9
6	483	Thinned	483_Thinned	101	A	3.73	0	0	0	0	-78.3	-64.6
					B	1.85	64.5	67.1	16.4	41.4	-36.9	

Table 9-17 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Liverpool Ranges IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	483	DNG	483_DNG	101	A	16.47	0	0	0	0	-30.9	-30.9
2	483	Mod_Good	483_Mod_Good	101	A	4.79	0	0	0	0	-85.1	-53.1
					B	8.23	68.4	73.3	25.7	50.5	-34.5	
3	483	Poor	483_Poor	101	A	3.21	0	0	0	0	-33.9	-25.9
					B	3.24	12.6	27.9	11.2	15.8	-18.1	
					HZ	0.03	12.6	27.9	11.2	15.8	-18.1	
4	483	Thinned	483_Thinned	101	A	9.94	0	0	0	0	-78.3	-53.9
					B	14.33	64.5	67.1	16.4	41.4	-36.9	
					HZ	0.05	64.5	67.1	16.4	41.4	-36.9	

Table 9-18 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Pilliga IBRA subregion – Valley of the Winds Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
7	483	Mod_Good	483_Mod_Good	101	A	0.15	0	0	0	0	-85.1	-42.6
					B	0.79	68.4	73.3	25.7	50.5	-34.5	
8	599	DNG	599_DNG	101	A	1.62	0	0	0	0	-16.3	-16.3
9	599	Mod_Good	599_Mod_Good	101	A	0.31	0	0	0	0	-84.3	-63
					B	0.71	60.7	67.5	7	30.6	-53.7	
10	599	Thinned	599_Thinned	101	A	0.23	0	0	0	0	-57.2	-38.1
					B	0.38	60.7	67.5	7	30.6	-26.6	

Table 9-19 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Pilliga IBRA subregion – Liverpool Range Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
1	281	DNG	281_DNG	101	A	0.87	0	0	0	0	-29.6	-29.6
2	281	Mod_Good	281_Mod_Good	101	A	0.13	0	0	0	0	-96.4	-49
					B	0.69	80.6	73.5	30.3	56.4	-40.1	
3	281	Thinned	281_Thinned	101	A	6.01	0	0	0	0	-87	-84.8
					B	0.28	67.3	71.3	22.9	47.9	-39.1	
9	483	DNG	483_DNG	101	A	14.07	0	0	0	0	-30.9	-30.9
10	483	DNS	483_DNS	101	A	0.06	0	0	0	0	-14.2	-14.2
11	483	Mod_Good	483_Mod_Good	101	A	0.11	0	0	0	0	-85.1	-43.4
					B	0.52	68.4	73.3	25.7	50.5	-34.5	
12	483	Poor	483_Poor	101	A	0.09	0	0	0	0	-33.9	-22.8
					B	0.21	12.6	27.9	11.2	15.8	-18.1	
13	483	Thinned	483_Thinned	101	A	7.57	0	0	0	0	-78.3	-52.3
					B	12.86	64.5	67.1	16.4	41.4	-36.9	
14	618	DNG	618_DNG	101	A	1	0	0	0	0	-15.9	-15.9
15	618	Mod_Good	618_Mod_Good	101	A	0.55	0	0	0	0	-72	-40.7
					B	1.58	61.8	53	22.9	42.2	-29.8	

Table 9-20 Vegetation integrity analysis – White Box Yellow Box Blakely's Red Gum Woodland in the Talbragar Valley IBRA subregion – CFG connection to Spicers Creek wind farm Stage

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total VI loss
3	277	Mod_Good	277_Mod_Good	101	A	0.01	0	0	0	0	-91.5	-91.5
4	599	DNG	599_DNG	101	A	0.98	0	0	0	0	-16.3	-16.3
5	599	Mod_Good	599_Mod_Good	101	A	0.46	0	0	0	0	-84.3	-55.6
					B	0.55	85.7	72.5	23.6	52.7	-31.6	
6	599	Thinned	599_Thinned	101	A	0.97	0	0	0	0	-57.2	-40.6
					B	1.14	60.7	67.5	7	30.6	-26.6	

9.1.2 Additional impact assessment provisions for species at risk of an SAII

Figure 14-15 shows the extent of species at risk of Serious and Irreversible Impacts within the subject land.

9.1.2.1 Regent Honeyeater

Regent Honeyeater 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 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).

This assessment takes into account these two SAII principles.

The following SAII principles are not applicable to this 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), 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status

Table 9-21 Current status – 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 two 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	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 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 decline is lacking. Population estimates are difficult to determine given the mobile nature and irregular movements of the species.

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)
	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 south-east Australia. Given this information, and additional monitoring, the species is thought to have undergone a past population decline of >80% over three generations (24 years).	National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Department of the Environment 2016)	
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 (Department of Environment 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.
Decline in species' population size in 3 years or one 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 (Department of Environment 2015).	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015)	Lack of data on population and evidence of the rate of decline for this species (Department of Environment 2015).

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 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 (Department of Environment 2015).	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 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.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	600,000 km^2	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015)	Current sources include data up to 2015, more recent data lacking.
Area of occupancy (ha)	300 km^2	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015)	Current sources include data up to 2015, more recent data lacking.
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 (Department of the Environment 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.	BAM – Important Areas Viewer. National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Department of the Environment 2016)	Data provided in the BAM – Important Areas Viewer and National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Department of the Environment 2016) assumed to be correct.

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)
	In the absence of a published threat-defined location map or other information, we assume the Regent Honeyeater Important Habitat Map applies here.		
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 (Department of Environment 2015)	Current sources include data up to 2015, more recent data on population numbers are lacking.
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 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*) (Department of the Environment 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 Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015) National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Department of the Environment 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 wildlife 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*) (Department of the Environment 2016)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impact assessment

Table 9-22 Impacts assessment – 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	Unknown	NA	No surveys for this species have been done on the subject land.

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 (%)	Unknown	NA	No surveys for this species have been done on the subject land.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown	NA	No surveys for this species have been done on the subject land.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown	NA	No surveys for this species have been done on the subject land.
Area of habitat to be impacted (ha) (for species measured by area only)	95.8 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 proposal (ha)	95.8 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. 95.8 ha = 0.958 km^2. Approximately 0.32% of the species' geographic range would be impacted (based on area of occupancy).	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015)	Data in the Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015) is assumed to be correct.
Individuals impacted	No individuals will be directly impacted, some habitat will be impacted	NA	Assuming impact is to 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)
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 (Department of Environment 2015). There is no evidence to suggest that the population would become unviable.	Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015)	Data in the Conservation Advice, *Anthochaera phrygia*, regent honeyeater (Department of Environment 2015) is assumed to be correct.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in BDAR Chapter 8.		

9.1.2.2 Large-eared Pied Bat

Large-eared Pied Bat 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 because:

- 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).

This assessment takes into account this SAII principle.

The following SAII principles are not applicable to this 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), 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

The project is not anticipated to have any direct impacts on geological features like karst, caves, cliffs, crevices, and other formations that are essential for the cave-dependent bat species. No confirmed breeding habitat for this species has been recorded within the subject land (there are no caves in the subject land). The project would have a 35.97 ha impact on vegetation within the BAM prescribed SAII threshold buffer areas but would not directly impact on assumed breeding locations (i.e. no direct impact on caves). Indirect impacts are outlined in Section 8.2.

Current status

Table 9-23 Current status – 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 (Department of Agriculture Water and the Environment 2021)
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) (Department of Agriculture Water and the Environment 2021)	Population numbers for this species are poorly known, as the species is poorly recorded across its range (Department of Agriculture Water and the Environment 2021)
Decline in species' population size in 3 years or one 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) (Department of Agriculture Water and the Environment 2021)	Population numbers for this species are poorly known, as the species is poorly recorded across its range (Department of Agriculture Water and the Environment 2021)

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 (Department of Agriculture Water and the Environment 2021)
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) (Department of Agriculture Water and the Environment 2021)	This species is broad-ranging and there is a paucity of information available on the exact extent of occurrence.
Area of occupancy (ha)	1,500 km²	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (Department of Agriculture Water and the Environment 2021)	There is a general paucity of information available on this species in regard to population size or dynamics, and occupied area.
Number of threat-defined locations	Not identified in TBDC. Assume that identified maternity roost sites would be considered as threat-defined locations.	TBDC	Unknown
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.

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	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 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 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 however 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.

Impact assessment

Table 9-24 Impacts assessment – 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	Unknown	NA	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 (%)	Unknown	NA	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 proposal	Unknown	NA	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)
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown	NA	Counts of the entire population that may use the subject land have not been done.
Area of habitat to be impacted (ha) (for species measured by area only)	130.03 ha No caves are present within the subject land. It is important to note that the quality of the habitat to be impacted is influenced heavily by existing open cut coal mines, power line corridors and other infrastructure. The impact is not to undisturbed habitats.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the proposal (ha)	130.03 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. 130.03 ha = 1.3003 km^2. Area of the species' geographic range to be impacted is approximately 0.008%.	Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (Department of Agriculture Water and the Environment 2021)	The data in the Conservation Advice for *Chalinolobus dwyeri* (Large-eared Pied Bat) (Department of Agriculture Water and the Environment 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.

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 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.	NA	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 BDAR Chapter 8.		

9.1.2.3 Eastern Cave Bat

Eastern Cave Bat 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 because:

- 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).

This assessment takes into account this SAII principle.

The following SAII principles are not applicable to this 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), 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

The project is not anticipated to have any direct impacts on geological features like karst, caves, cliffs, crevices, and other formations that are essential for the cave-dependent bat species. No confirmed breeding habitat for this species has been recorded within the subject land (there are no caves in the subject land). The project would have a 56.5 ha impact on vegetation within the BAM prescribed SAII threshold buffer areas but would not directly impact on assumed breeding locations (i.e. no direct impact on caves). Indirect impacts are outlined in Section 8.2.

Current status

Table 9-25 Current status – Eastern cave 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 a paucity of information available on population size of this species or change in population over time and the species was listed as Vulnerable in NSW prior to 1996. Occurs along eastern Australia from Cape Melville in northern Queensland to northern NSW, with isolated records in inland Queensland and NSW South Coast. Species breeding habitat is highly specific and has <1 average offspring because females do not give birth every year (often miscarry etc).	TBDC Bionet Atlas of NSW Wildlife (Department of Planning and Environment 2023a)	There is a general paucity of information available on this species in regard to population size or structure.
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, species occurs 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. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. Maternity colonies of up to 500 females congregate during November in NSW.	TBDC Australian Bats (Churchill 2008)	There is a general paucity of information available on this species in regard to population size or structure.

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 one generation	There is a paucity of information available on population size of this species or change in population over time. However, the species is vulnerable to a number of known threats, and the species has presumably undergone declines over time, particularly in relation to habitat clearing and disturbance of breeding habitats. Species breeding habitat is highly specific and has <1 average offspring because females do not give birth every pregnancy (often miscarry etc).	TBDC Bionet Atlas of NSW Wildlife (Department of Planning and Environment 2023a)	There is a general paucity of information available on this species in regard to population size or structure.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	There is currently insufficient information available on population numbers or trends to indicate that extreme population fluctuations are likely.	TBDC Australian Bats (Churchill 2008) Bionet Atlas of NSW Wildlife (Department of Planning and Environment 2023a)	There is a general paucity of information available on this species in regard to population size or structure.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	Extent of occurrence is unknown. Distributed along eastern Australia from Cape Melville in northern Queensland to northern NSW, with isolated records in inland Queensland and NSW South Coast.	TBDC Australian Bats (Churchill 2008)	This species is broad-ranging and there is a paucity of information available on the exact extent of occurrence.
Area of occupancy (ha)	Area of occupancy is unknown.	TBDC Australian Bats (Churchill 2008) Bionet Atlas of NSW Wildlife (Department of Planning and Environment 2023a)	There is a general paucity of information available on this species in regard to population size or dynamics, and occupied area.

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	Not identified. Assume that identified maternity roost sites would be considered as threat-defined locations.	Not available	Unknown
Whether the species' population is likely to undergo extreme fluctuations	There is currently insufficient information available on population numbers or trends to indicate that extreme population fluctuations are likely.	TBDC Australian Bats (Churchill 2008) Bionet Atlas of NSW Wildlife (Department of Planning and Environment 2023a)	There is a general paucity of information available on this species in regard to population size or structure.
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 and disused mine workings. 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 as they rely on such features for roosting and breeding. Habitat constraints linked to the species reproductive characteristics cannot be readily re-created limiting opportunities to increase breeding habitat.	TBDC Eastern Cave Bat species profile (Department of Planning and Environment, 2023)	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.

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, 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 Eastern Cave Bat species profile (Department of Planning and Environment, 2023)	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 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 however threats such as fox and cat predation cannot be effectively managed.	Eastern Cave Bat species profile (Department of Planning and Environment, 2023)	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impact assessment

Table 9-26 Impacts assessment – Eastern Cave 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	Unknown	NA	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 (%)	Unknown	NA	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)
Number of individuals (mature and immature) to be impacted by the proposal	Unknown	NA	Counts of the entire population that may use the subject land have not been done.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown	NA	Counts of the entire population that may use the subject land have not been done.
Area of habitat to be impacted (ha) (for species measured by area only)	39.28 ha No caves are present within the subject land. It is important to note that the quality of the habitat to be impacted is influenced heavily by existing open cut coal mines, power line corridors and other infrastructure. The impact is not to undisturbed habitats.	Surveys undertaken for the BDAR.	Representative samples undertaken.
Area of the species' geographic range to be impacted by the proposal (ha)	39.28 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.
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.	NA	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 BDAR Chapter 8.		

9.1.2.4 Brush-tailed Rock-wallaby

Brush-tailed Rock-wallaby 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 because:

- 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).

This assessment takes into account this SAII principle.

The following SAII principles are not applicable to this 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), 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).

Brush-tailed Rock-wallaby has been retained for assessment in parts of the subject land where habitat constraints are met. The TBDC defines habitat as areas where rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines are present within 1 km of the subject land. Associated PCT's within 1 km of rocky habitat has been mapped as potential habitat for this species. Species polygons were created for areas of potential habitat lacking survey effort in PCT 81, 202, 266, 277, 281, 440, 477, 1177, and 1674 in the Inland Slopes and Kerrabee IBRA subregions where these PCTs are within 1 km of Narrabeen Sandstone cliff lines.

Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low. In New South Wales, Brush-tailed Rock-wallaby is no longer found from virtually all sites west of the Great Dividing Range (including Coombie, Gundabooka, Mount Oxley and the Weddin Mountains) with the remaining small populations occurring in the Warrumbungle Range near Coonabarabran, and on Mt Kaputar (Department of Agriculture, Water and the Environment, 2021f).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status

Table 9-27 Current status – 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) – 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)	No details on evidence of rapid decline or change in population size in NSW in the past 10 years or 3 generations is available. Rapid decline likely occurred early after European colonisation due to hunting, feral predators and feral herbivores (Department of Agriculture, Water and the Environment, 2021f) as opposed to the last 10 years.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	Brush-tailed Rock-wallaby is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of 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 2008, the total population size was estimated to be between 15,000 and 30,000 individuals, with approximately 80 percent of individuals in north-eastern NSW, 17 percent in south-eastern Qld, two percent in central and south-eastern NSW and less than one percent in Vic (Department of Agriculture, Water and the Environment, 2021f).	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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 small population size.
Decline in species' population size in 3 years or one generation	No data available on decline in the species' population size in 3 years or one generation.	No data available.	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 small population size.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	The Brush-tailed Rock-wallaby lives in colonies, typically comprising fewer than 30 individuals, with many colonies consisting of only two to four mature individuals (Department of Agriculture, Water and the Environment, 2021f).	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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 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)
	No data available on the number or percentage of mature individuals in each subpopulation.		
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	Not provided in any published documents. Brush-tailed Rock-wallaby is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN. Brush-tailed Rock-wallaby is assumed to have an extent of occurrence (sensu IUCN 2017) of >100 km^2.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	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 limited geographic range.
Area of occupancy (ha)	Not provided in any published documents. Brush-tailed Rock-wallaby is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN. Brush-tailed Rock-wallaby is assumed to have an area of occupancy (sensu IUCN 2017) of >10 km^2.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	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 limited geographic range.
Number of threat-defined locations	Threat-defined locations are not specifically defined or mapped. Brush-tailed Rock-wallaby is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN and is known to inhabit more than three locations in New South Wales.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019). Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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 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	Brush-tailed Rock-wallaby is not known to be subject to extreme fluctuations in extent of occurrence; area of occupancy; number of locations or subpopulations; number of mature individuals.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019). Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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 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	Brush-tailed Rock-wallaby produces an average of 1.1 young per year. The apparent mortality rate of individuals in their first year of life is 69 percent, suggesting predation is the strongest extrinsic factor limiting population growth (Department of Agriculture, Water and the Environment, 2021f). Known reproductive characteristics do not severely limit the ability to increase the existing population.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	High confidence that predation pressure is 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	Brush-tailed Rock-wallaby is reliant on habitat components that cannot readily be re-created (rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines).	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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).	Predation by feral predators and competition with feral herbivores are considered key threatening processes affecting the species that cannot be effectively managed.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	High confidence in knowledge of key threatening processes and limited control options meet the criteria for Principle 4.

Impact assessment

Table 9-28 Impacts assessment – 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	Unknown, but likely to be none. Brush-tailed Rock-wallaby has been retained for assessment in parts of the subject land where habitat constraints are met, and survey has not been undertaken. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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.

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 proposal	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	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 as a percentage of total NSW population (%) to be known.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for Brush-tailed Rock-wallaby to be impacted is approximately 19.9 ha. There are no potential refuge sites within the subject land so impact to habitat is restricted to potential foraging range.	Field survey and mapped species polygon based on buffers from rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines where these features are present within 1 km of the subject land.	Based on field survey and assumptions of potential habitat.
Area of the species' geographic range to be impacted by the proposal (ha)	Estimated area of assumed habitat for Brush-tailed Rock-wallaby to be impacted is approximately 19.9 ha.	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 (%)	Unknown. Extent of occurrence is at least 10,000 ha. Impact would be to 0.2% of the extent of occurrence at maximum. Area of occupancy is at least 1,000 ha. Impact would be to 2% of the area of occupancy at maximum.	TBDC. Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	Extent of occurrence and area of occupancy are unknown.

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	Unknown, but likely to be none. impact will affect some habitat, but no individuals of the species will be directly impacted.	Field survey and mapped species polygon.	Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low.
Viability of a fragmented population.	Due to the combined effects of habitat loss and fragmentation, predation and other threats, colonies are now highly fragmented and isolated from one another (Department of Agriculture, Water and the Environment, 2021f). Decline and extirpation is likely inevitable at most smaller colonies without intensive management (Department of Agriculture, Water and the Environment, 2021f).	Conservation Advice for Petrogale penicillata (Brush-tailed Rock-wallaby) (Department of Agriculture, Water and the Environment, 2021f).	Populations are already fragmented, and viability of any fragmented population is assumed to be low. Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low. Any subpopulation in the subject land would be very small and unlikely to be considered viable. The project is unlikely to influence this outcome.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in BDAR Section 8.		

9.1.2.5 Broad-headed Snake

Broad-headed Snake 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 because:

- 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).

This assessment takes into account this SAII principle.

The following SAII principles are not applicable to this 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), 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status

Table 9-29 Current status – Broad-headed Snake

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)	No details on evidence of rapid decline or change in population size in NSW in the past 10 years or 3 generations is available.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	Broad-headed Snake is not listed as a SAII entity due to Principle 1. As such, it is assumed that there is no evidence of rapid decline.
Evidence of small population size (Principle 2) – Note that this principle is not applicable to this species			
Current population size in NSW	No details on current population size in NSW.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	Broad-headed Snake is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of small population size.
Decline in species' population size in 3 years or one generation	No details on decline in species' population size in 3 years or one generation.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	Broad-headed Snake is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of 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	No details on number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	Broad-headed Snake is not listed as a SAII entity due to Principle 2. As such, it is assumed that there is no evidence of small population size.
Evidence of limited geographic range (Principle 3) – Note that this principle is not applicable to this species			
Extent of occurrence (ha)	Broad-headed Snake is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN. Brush-tailed Rock-wallaby is assumed to have an extent of occurrence (sensu IUCN 2017) of >100 km^2.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	Broad-headed Snake is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Area of occupancy (ha)	Broad-headed Snake is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN. Brush-tailed Rock-wallaby is assumed to have an area of occupancy (sensu IUCN 2017) of >10 km^2.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	Broad-headed Snake is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Number of threat-defined locations	Threat-defined locations are not specifically defined or mapped. Broad-headed Snake is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN and is known to inhabit more than three locations in New South Wales.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	Broad-headed Snake is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	Broad-headed Snake is not known to be subject to extreme fluctuations in extent of occurrence; area of occupancy; number of locations or subpopulations; number of mature individuals.	Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019).	Broad-headed Snake is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of 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	Juvenile growth of the Broad-headed Snake is very slow and the time to maturity is six years for female snakes and five years for males. Females reproduce every second year (Department of the Environment, 2014). The known reproductive characteristics severely limit the ability to increase the existing population.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	High confidence that known reproductive characteristics severely limit the ability to increase the existing population satisfying 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	Broad-headed Snake is reliant on habitat components that cannot readily be re-created (exposed rocky sites on sandstone outcrops and benching). Requires shelter sites in rock crevices and under flat sandstone rocks on exposed cliff edges, especially in areas with a west to north-west aspect and large hollow-bearing trees. In summer, it shelters in hollows of large trees within 200 m of escarpments	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (broad-headed snake) (Department of the Environment, 2014a).	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).	The main potential threats to the broad-headed snake include: — habitat disturbance by feral goats (*Capra hircus*) — predation by European red foxes (*Vulpes vulpes*) and cats (*Felis catus*) — vehicle strike. — intentional and unintentional killing of snakes during bush rock collection and other activities. — the loss of habitat caused by climate change. — illegal collection. With the exception of loss of habitat caused by climate change, these threats can be managed on a biodiversity stewardship site.	TBDC. Approved Conservation Advice for *Hoplocephalus bungaroides* (Broad-headed Snake) (Department of the Environment, 2014a).	High confidence in knowledge of key threatening processes and confidence that they can be controlled on a biodiversity stewardship site (except for loss of habitat caused by climate change).

Impact assessment

Table 9-30 Impacts assessment – Broad-headed Snake

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	Unknown as surveys have not been done in all areas of potential habitat. This species is assumed to occur based on the presence of potential habitat	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.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown as surveys have not been done in all areas of potential habitat. This species is assumed to occur based on the presence of potential habitat.	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.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown as surveys have not been done in all areas of potential habitat. This species is assumed to occur based on the presence of potential habitat	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 proposal to be known.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown as surveys have not been done in all areas of potential habitat. This species is assumed to occur based on the presence of potential habitat	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 proposal as a percentage of total NSW population (%) to be known.
Area of habitat to be impacted (ha) (for species measured by area only)	Unknown. Broad-headed snake has potential habitat within the Kerrabee IBRA subregion. Approximately 10.8 ha of associated PCT 1674 is expected to be removed as a result of the project.	Field survey.	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 proposal (ha)	Approximately 10.8 ha of associated PCT 1674 is expected to be removed as a result of the project.	Field survey and assumed species polygons.	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 (%)	Unknown.	Geographic range not published.	Extent of occurrence and area of occupancy are unknown.
Individuals impacted	This species is assumed to occur based on the presence of potential habitat. It is not known whether individuals would be impacted.	Field survey and assumed species polygons.	Based on field survey and assumptions of potential habitat.
Viability of a fragmented population	Unknown whether specific habitats will be impacted. This species has low rates of dispersal and a small geographic range. Habitat specificity means that this species is restricted to areas that provide access to sun exposed rock-on-rock exfoliations, and to suitable areas of surrounding forest that provide tree hollows (Croak *et al.*, 2013). The habitat area required to support the remaining population and habitat available within dispersal distance will be considerable.	Field survey and assumed species polygons.	High confidence that the project will not break apart habitat and create barriers between sun exposed rock-on-rock exfoliations, and to suitable areas of surrounding forest that provide tree hollows.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in BDAR Section 8.		

9.1.2.6 Euphrasia arguta

Euphrasia arguta 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 because:

- 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 considers this SAII principle.

The following SAII principles are not applicable to this 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), 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
- 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 an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status

Table 9-31 Current status – Euphrasia arguta

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)	No details on evidence of rapid decline or change in population size in NSW in the past 10 years or 3 generations is available. Rapid decline may have occurred following the two vegetation clearing episodes that occurred in 2009 and 2010 (refer below).	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011)	*Euphrasia arguta* 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	No current population size is known, however in 2009 it was estimated to have a total population size of 16,000 individuals.	Approved Conservation Advice for *Euphrasia arguta* (a herb) (Department of Sustainability, Environment, Water, Population and Communities 2011) Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b) *Euphrasia arguta* SPRAT Profile (Department of Climate Change, Energy, the Environment and Water, 2023c)	There is no current data available on the species current abundance.
Decline in species' population size in 3 years or one generation	The largest population (containing approximately 15,000 individuals in 2009) was subject to two vegetation clearing episodes in 2007 and 2009. As of May 2010, no regeneration of the species was observed at that site.		There is insufficient quantitative data available to determine the species decline since 2010.
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 2009, it was estimated that there 16,000 individuals all occurring within 25 km of one another from three locations in two areas. In 2009, the largest population was estimated to contain 15,000 individuals (>90% of the species total abundance). In 2007, the other two smaller populations were estimated to contain six and 1,120 individuals. The species may undergo fluctuations in response to disturbance (such as repeated clearing episodes) or in response to seasonal environmental factors.		There is no current data on the species current abundance. There is insufficient data available to determine whether the species undergoes extreme fluctuations.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence (ha)	Estimated to be 26 km^2 in 2009	*Euphrasia arguta* SPRAT Profile (Department of Climate Change, Energy, the Environment and Water, 2023c)	No current data available on the species extent of occurrence.

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)	Estimated to be 0.03 km^2 in 2009. Species is known from six sites spanning 25 km all within the Nandewar IBRA Bioregion. Sites are located within Nundle State Forest and adjoining or nearby private land.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	No current data available on the species area of occupancy.
Number of threat-defined locations	Threat-defined locations are not specifically defined or mapped. It does not have a very limited geographic distribution as defined by the IUCN as it is known to inhabit more than three locations in NSW. Despite this, the species is known to have a narrow geographical distribution as it is restricted to six sites that are highly fragmented and isolated from one another with a total area of occupancy of 0.03 km^2.	TBDC Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019) Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	N/A
Whether the species' population is likely to undergo extreme fluctuations	Species was rediscovered in 2008 after having been presumed extinct. The number of populations has remained consistent since the species was rediscovered. It is largely unknown whether the species is subject to fluctuations in area of occupancy, number of locations or individuals other than the potential reduction observed in 2010 following clearing of habitat for the largest known population. Based on this, the species may undergo fluctuations in response to repeated clearing episodes.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	There is no current data on the species current abundance. There is insufficient data available to determine whether the species undergoes extreme fluctuations to confirm the 2010 observation made.

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	Little is known about the species reproductive characteristics. It is an annual species that flowers between January and April, occasionally recorded to flowering between June and October. The species has been recorded to die off over winter. As an annual species it may undergo fluctuations in population size in response to seasonal environmental conditions.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	Insufficient data available on the ecology of the species. Further research is required.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	There is little known about the ecology of the species. The species is known to occur in eucalypt forest and shrub understorey that show signs of regeneration after past clearing. It is unknown whether the species is reliant on specific abiotic habitats that cannot be replaced or restored in biodiversity stewardship sites.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	Insufficient data available on the ecology of the species. Further research is required.
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).	There is little known about the species ecology. Threatening processes listed for the species include land degradation by rabbits, road/track/fire break maintenance, grazing/trampling by stock and natives and land clearing. These threats could be managed on a biodiversity stewardship site.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	Insufficient data available on the ecology of the species. Further research is required.

Impact assessment

Table 9-32 Impacts assessment – Euphrasia arguta

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	Unknown, but likely to be none. *Euphrasia arguta* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to lack of access. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	TBDC Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	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.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	TBDC Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	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.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	TBDC Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011)	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.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	TBDC Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	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 as a percentage of total NSW population (%) to be known.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Euphrasia arguta* is approximately 7.54 ha.	Field survey and mapped species polygon based on areas of potential habitat unable to be surveyed.	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 proposal (ha)	Unknown, likely to be none. Subject land occurs outside the species current known geographic range and extent of occupancy (nearest recent record is >100 km north-east of the subject land).	Field survey and mapped species polygon. BioNet (Department of Planning and Environment 2023) Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	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	Unknown, but likely to be none. Impact will affect a small area of potential habitat, but no individuals of the species are likely to be directly impacted.	Field survey and mapped species polygon.	Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low.
Viability of a fragmented population	Due to the combined effect of clearing for roads and fire breaks populations of the species are already highly fragmented and isolated from one another. Further, most populations contain small numbers. Without intensive management or protection the decline and extirpation of these existing populations is likely inevitable.	Commonwealth Listing Advice on *Euphrasia arguta* (Threatened Species Scientific Committee 2011b)	Populations are already fragmented, and viability of any fragmented population is assumed to be low. Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low. Any subpopulation in the subject land would be very small and unlikely to be considered viable. The project is unlikely to influence this outcome.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in BDAR Chapter 8.		

9.1.2.7 Commersonia rosea

Commersonia rosea 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 because:

- 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).

This assessment takes into account this SAII principle.

The following SAII principles are not applicable to this 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), 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).

Actions to avoid and minimise direct and indirect impacts

Actions to avoid and minimise direct and indirect impacts to this species at risk of an SAII is provided in Chapter 7. This includes aspects of project location and design.

Current status

Table 9-33 Current status – Commersonia rosea

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)	No details on evidence of rapid decline or change in population size in NSW in the past 10 years or 3 generations is available. It is suspected that the species has undergone a decline in numbers however there is insufficient data to determine whether the decline would be severe or substantial.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	*Commersonia rosea* 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	No current population size if known. In 2006 it was estimated that the total population was 300 individuals. Earlier estimates indicated that there were an additional 300-350 individuals at another two locations.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	There is no current data available on the species current abundance.

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 one generation	No details on evidence of rapid decline or change in population size in NSW in the past 10 years or one generation is available. It is suspected that the species has undergone a decline in numbers at some stage however there is insufficient data to determine whether the decline would be severe or substantial (refer below for more information). Decline in mature individuals at three of the populations was observed in 2006 following a prolonged drought period. However the species is likely to undergo extreme fluctuations in population size due to its fire ecology.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	There is insufficient quantitative data available to determine species decline.
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 2006, the species was estimated to have a total population of 300 individuals all occurring within six populations in the vicinity of Sandy Hollow in NSW. Most of the populations occur within 10 km of the Sandy Hollow township and there is one disjunct population that occurs approximately 80 km to the west of Sandy Hollow. The species is likely to undergo extreme fluctuations in population size due to its fire ecology. Survival of the species appears to be linked to fire intensity and frequency to retain a viable seedbank. It appears to be short-lived and undergoes germination following fire.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	There is no current data on the species current abundance. There is insufficient data available to determine whether the species undergoes extreme fluctuations. Given the species life history it is difficult to determine accurate population changes. Repeated surveys are required to following fire events to assist in determining potential declines.

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)	Extent of occurrence in the listing nomination was <100 km^2. This is likely an underestimate as it was determined prior to subsequent discoveries of additional populations. In the Commonwealth listing advice it is estimated that the extent of occurrence is approximately 2,000 km^2.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	*Commersonia rosea* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Area of occupancy (ha)	Estimated to be less than 10 km^2. This figure is likely an underestimate based on subsequent discoveries of additional populations since it was determined.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	*Commersonia rosea* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Number of threat-defined locations	Threat-defined locations are not specifically defined or mapped. *Commersonia rosea* is listed as Endangered under the BC Act. As such, does not have a very limited geographic distribution as defined by the IUCN and is known to inhabit more than three locations in NSW.	TBDC Guidance to assist a decision-maker to determine a serious and irreversible impact (State of New South Wales and Department of Planning, Industry and Environment, 2019) Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	*Commersonia rosea* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of limited geographic range.
Whether the species' population is likely to undergo extreme fluctuations	The species is likely to undergo extreme fluctuations in population size due to its fire ecology. Survival of the species appears to be linked to fire intensity and frequency to retain a viable seedbank. It appears to be short-lived and undergoes germination following fire.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	*Commersonia rosea* is not listed as a SAII entity due to Principle 3. As such, it is assumed that there is no evidence of 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	Production of reproductive material (flowers and seed) appears to be reliant on a suitable fire regime. This suggests that recruitment may be reliant on the existence of a viable soil seed bank and an appropriate fire regime (fire-ephemeral species). These characteristics are unlikely to prevent the ability to increase the population or area of habitat with the exception of wildfire which could impact the soil seed bank.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	Insufficient data available on the ecology of the species. Further research is required.
The species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	Species is known to occupy skeletal soils in scrub and heath vegetation that occurs within the region. The species does not appear to be reliant on abiotic habitats that cannot be restored or replaced.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	Insufficient data available on the ecology of the species. Further research is required.
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).	There is little known about the species ecology. Threatening processes listed for the species include vegetation clearance, inappropriate fire regimes, changes of land use, disturbance associated with track/road maintenance, stock grazing/trampling and prolonged drought. Most of these could be managed on a biodiversity stewardship site with the exception of prolonged drought and wildfire.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	Insufficient data available on the ecology of the species. Further research is required.

Impact assessment

Table 9-34 Impacts assessment – Commersonia rosea

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	Unknown, but likely to be none. *Commersonia rosa* has been retained for assessment in parts of the subject land where associated PCTs occur, and survey could not be undertaken due to lack of access. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	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.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	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.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	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.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown, but likely to be none. This species is assumed to occur based on the presence of potential habitat and absence of survey even though the likelihood of a sub-population being present in the locality is low.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	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 as a percentage of total NSW population (%) to be known.
Area of habitat to be impacted (ha) (for species measured by area only)	Estimated area of assumed habitat for *Commersonia rosea* is approximately 3.25 ha.	Field survey and mapped species polygon based on areas of potential habitat unable to be surveyed.	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 proposal (ha)	Unknown, likely to be none. Subject land occurs outside the species current known geographic range and extent of occupancy (nearest recent record is >16 km north-east of the subject land).	Field survey and mapped species polygon. BioNet (Department of Planning and Environment 2023) Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	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	Unknown, but likely to be none. Impact will affect a small area of potential habitat, but no individuals of the species are likely to be directly impacted.	Field survey and mapped species polygon.	Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low.
Viability of a fragmented population	Most populations contain small numbers of individuals and known populations are naturally fragmented and somewhat isolated from one another. Viability of populations is likely linked to the species relationship with fire as the species appears to be reliant on an appropriate fire regime to maintain a viable seedbank.	Approved Conservation Advice for *Commersonia rosea* (Sandy Hollow Commersonia) (Department of the Environment 2014b)	Populations are already fragmented, and viability of any fragmented population is assumed to be moderate to low due to the species reliance on fire. Importantly, this species is assumed to occur based on the presence of potential habitat even though the likelihood of a sub-population being present in the locality is low.
Changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds.	Identified in BDAR Chapter 8.		

10 Impact summary

10.1 Determine an offset requirement for impacts

10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

10.1.1.1 Impacts that do not require an offset

Table 10-1 to Table 10-10 outline the impacts that do not require an offset as per BAM Subsection 9.2.1(3).

Figure 14-16 illustrates the areas that do not require offsetting of impacts.

Table 10-1 Impacts that do not require an offset – ecosystem credits for the Inland Slopes IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
25	479_DNG	9.8	3.2 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		0
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
15	440_DNG	7.6	13.1 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
1	81_DNG	13.2	4.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		0

Table 10-2 Impacts that do not require an offset – ecosystem credits for the Inland Slopes IBRA subregion Stubbo stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
5	440_DNG	7.6	0.03 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0

Table 10-3 Impacts that do not require an offset – ecosystem credits for the Kerrabee IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion									
13	599_DNG	14.1	1.7 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	0
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
8	479_DNG	8.8	0.16 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		0
Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region									
11	481_DNG	10.5	0.05 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		0

Table 10-4 Impacts that do not require an offset – ecosystem credits for the Kerrabee IBRA subregion Liverpool Range stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin									
12	1661_DNG	12	2 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		0
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
9	479_DNG	8.8	0.44 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		0
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
3	440_DNG	7	0.15 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0

Table 10-5 Impacts that do not require an offset – ecosystem credits for the Kerrabee IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
17	479_DNG	8.3	7.4 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		0
Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion									
14	478_DNG	2.4	0.61 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		0
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
8	440_DNG	6.7	1.7 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0

Table 10-6 Impacts that do not require an offset – ecosystem credits for the Liverpool Ranges IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
3	440_DNG	7.5	0.38 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0

Table 10-7 Impacts that do not require an offset – ecosystem credits for the Pilliga IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
1	440_DNG	7.5	0.2 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0

Table 10-8 Impacts that do not require an offset – ecosystem credits for the Pilliga IBRA subregion Liverpool Range stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter									
19	1696_DNG	12	0.92 hectares	Low Sensitivity to Loss	PCT Cleared - 46%	High Sensitivity to Gain	1.5		0
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
10	483_DNS	14.2	0.06 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	0
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin									
16	1661_DNG	13.1	5.2 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		0
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
6	479_DNG	10	7.3 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		0

Table 10-9 Impacts that do not require an offset – ecosystem credits for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
1	81_DNG	14.7	0.04 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		0

Table 10-10 Impacts that do not require an offset – ecosystem credits for the Talbragar Valley IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
6	440_DNG	7.5	5 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		0
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
1	81_DNG	14.7	9.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		0

10.1.1.2 Impacts that require an offset

Table 10-11 to Table 10-22 outline the impacts that require an offset.

Figure 14-16 illustrates the areas that require offsetting of impacts.

Table 10-11 Impacts that require an offset – ecosystem credits for the Inland Slopes IBRA subregion CFG connection to Tallawang stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
3	277_DNG	16.7	6.6 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	69
4	277_Thinned	48.7	0.67 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	20
									Subtotal: 89
Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion									
2	202_Thinned	40.3	0.18 hectares	High Sensitivity to Loss	Geographic Distribution	High Sensitivity to Gain	2	True	4
									Subtotal: 4
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
5	281_DNG	22.9	26.2 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	375
6	281_Mod_Good	66.4	0.63 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	26
7	281_Thinned	55.3	12.6 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	435
									Subtotal: 836

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
1	81_Thinned	73.4	0.16 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		6
									Subtotal: 6
									Total: 935

Table 10-12 Impacts that require an offset – ecosystem credits for the Inland Slopes IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
8	277_DNG	16.7	56.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	593
9	277_Mod_Good	46.5	6 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	175
10	277_Thinned	44.9	7.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	222
									Subtotal: 990
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
26	479_Mod_Good	63.4	10.3 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		245
27	479_Thinned	63.1	5 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		119
									Subtotal: 364

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion									
23	478_Mod_Good	58	0.24 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		5
24	478_Thinned	70.3	0.21 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		6
									Subtotal: 11
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
16	440_DNS	23.4	0.01 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		1
17	440_Mod_Good	62.3	29.4 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		686
18	440_Poor	21.5	0.86 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		7
19	440_Thinned	55.4	7 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		146
									Subtotal: 840
Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region									
28	481_Mod_Good	48.4	6.3 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		114
29	481_Thinned	52.5	3.2 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		63
									Subtotal: 177

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
11	281_DNG	22.9	43 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	615
12	281_Mod_Good	73.8	4.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	226
13	281_Poor	43	0.11 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	3
14	281_Thinned	59	26.8 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	987
									Subtotal: 1831
Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion									
30	1177_DNG	24.1	0.93 hectares	Moderate Sensitivity to Loss	PCT Cleared - 65%	High Sensitivity to Gain	1.75		10
31	1177_DNS	36.1	1 hectares	Moderate Sensitivity to Loss	PCT Cleared - 65%	High Sensitivity to Gain	1.75		16
32	1177_Mod_Good	50.4	37.1 hectares	Moderate Sensitivity to Loss	PCT Cleared - 65%	High Sensitivity to Gain	1.75		818
33	1177_Thinned	35.9	2.7 hectares	Moderate Sensitivity to Loss	PCT Cleared - 65%	High Sensitivity to Gain	1.75		43
									Subtotal: 887

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion									
20	461_DNG	28.5	0.33 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		4
21	461_Mod_Good	45.9	6.1 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		123
22	461_Thinned	18.9	0.01 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		1
									Subtotal: 128
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
2	81_Mod_Good	47.6	2.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		58
3	81_Thinned	39.6	0.45 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		9
									Subtotal: 67
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion									
4	266_DNG	18.4	16.7 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	191
5	266_DNS	36.3	0.49 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	11
6	266_Mod_Good	47.8	5.2 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	155
7	266_Thinned	37.8	7.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	169
									Subtotal: 526
									Total: 5821

Table 10-13 Impacts that require an offset – ecosystem credits for the Inland Slopes IBRA subregion Stubbo stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
1	277_Mod_Good	45.3	0.51 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	14
									Subtotal: 14
Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion									
9	478_Mod_Good	66.2	0.15 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		4
									Subtotal: 4
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
6	440_DNS	23.4	1.5 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		13
7	440_Mod_Good	58.3	3.6 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		78
8	440_Thinned	52.5	0.73 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		14
									Subtotal: 105
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
2	281_DNG	22.9	0.73 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	10
3	281_Mod_Good	51.7	1.7 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	55
4	281_Thinned	46.5	2.2 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	64
									Subtotal: 129
									Total: 252

Table 10-14 Impacts that require an offset – ecosystem credits for the Kerrabee IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
3	277_Mod_Good	89.7	0.14 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	8
									Subtotal: 8
Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion									
14	599_Mod_Good	47	1.5 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	44
15	599_Thinned	36.6	2.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	47
									Subtotal: 91
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
9	479_Mod_Good	57.5	8.9 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		191
10	479_Thinned	50.4	2.5 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		46
									Subtotal: 237
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
6	440_Mod_Good	58.4	0.78 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		17
7	440_Thinned	60.4	0.03 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		1
									Subtotal: 18

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
River Red Gum / River Oak riparian woodland wetland in the Hunter Valley									
1	42_DNG	54.4	0.18 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2	True	5
2	42_Thinned	62.2	0.62 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2	True	19
									Subtotal: 24
Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region									
12	481_Thinned	49.7	0.12 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		2
									Subtotal: 2
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
4	281_Mod_Good	68.2	6.7 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	284
5	281_Thinned	54.7	6.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	235
									Subtotal: 519

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley									
16	618_DNG	16.3	9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	92
17	618_Mod_Good	42	7.4 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	194
18	618_Thinned	25.4	11.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	178
									Subtotal: 464
									Total: 1363

Table 10-15 Impacts that require an offset – ecosystem credits for the Kerrabee IBRA subregion Liverpool Range stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
11	483_DNG	27.2	0.87 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	15
									Subtotal: 15
Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion									
6	477_DNG	36.2	0.94 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		13
7	477_Mod_Good	48.5	12.4 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		226
8	477_Thinned	50.1	2 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		38
									Subtotal: 277
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin									
13	1661_Thinned	31.8	0.76 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		11
									Subtotal: 11

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
10	479_Mod_Good	58.5	22.9 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		502
									Subtotal: 502
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
4	440_Mod_Good	53.6	1.3 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		25
5	440_Thinned	60.4	0.03 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		1
									Subtotal: 26
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
1	281_DNG	26.3	1.4 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	24
2	281_Thinned	53.3	0.38 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	13
									Subtotal: 37
									Total: 868

Table 10-16 Impacts that require an offset – ecosystem credits for the Kerrabee IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
1	277_Mod_Good	60.1	0.17 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	6
2	277_Thinned	47.6	0.85 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	25
									Subtotal: 31
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
22	483_DNG	27.2	1.5 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	25
23	483_Thinned	47.6	2.7 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	81
									Subtotal: 106
Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion									
12	477_Thinned	68.1	0.05 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		1
									Subtotal: 1
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
17	479_DNS	20.6	0.31 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		2

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
18	479_Mod_Good	56.1	9.3 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		195
19	479_Thinned	46.8	16.7 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		293
									Subtotal: 490
Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion									
14	478_Mod_Good	45.3	6.3 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		107
15	478_Thinned	38	0.15 hectares	Low Sensitivity to Loss	PCT Cleared - 29%	High Sensitivity to Gain	1.5		2
									Subtotal: 109
Red Ironbark - Brown Bloodwood - Black Pine heathy open forest on sandstone ranges of the Sydney Basin									
31	1674_DNG	30.4	0.02 hectares	Low Sensitivity to Loss	PCT Cleared - 19%	High Sensitivity to Gain	1.5		1
32	1674_Mod_Good	25.7	10.7 hectares	Low Sensitivity to Loss	PCT Cleared - 19%	High Sensitivity to Gain	1.5		103
									Subtotal: 104
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
9	440_Mod_Good	49.5	2.2 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		41
									Subtotal: 41

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region									
20	481_Mod_Good	39.6	2.5 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		38
21	481_Thinned	53.5	9.2 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		185
									Subtotal: 223
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
3	281_DNG	26.3	26.5 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	435
4	281_DNS	37.1	1.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	25
5	281_Mod_Good	55.8	40.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	1405
6	281_Poor	37.5	0.01 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	1
7	281_Thinned	53.7	42.8 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	1438
									Subtotal: 3304
Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion									
27	1176_Thinned	23.2	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	1.75		20
									Subtotal: 20

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion									
10	461_Mod_Good	44	30.3 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		583
11	461_Thinned	17.2	0.13 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		1
									Subtotal: 584
White Box - Black Cypress Pine shrubby woodland of the Western Slopes									
29	1610_DNG	22.7	1.2 hectares	Moderate Sensitivity to Loss	PCT Cleared - 67%	High Sensitivity to Gain	1.75		12
30	1610_Mod_Good	47.5	56.4 hectares	Moderate Sensitivity to Loss	PCT Cleared - 67%	High Sensitivity to Gain	1.75		1172
31	1610_Thinned	46.9	4.5 hectares	Moderate Sensitivity to Loss	PCT Cleared - 67%	High Sensitivity to Gain	1.75		92
									Subtotal: 1276
White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley									
24	618_DNG	16.6	42 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	435
25	618_Mod_Good	34.7	8.2 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	177
26	618_Thinned	24.2	9.9 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	TRUE	150
									Subtotal: 762
									Total: 7051

Table 10-17 Impacts that require an offset – ecosystem credits for the Liverpool Ranges IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
5	483_DNG	30.9	2.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	45
6	483_Thinned	64.6	5.6 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	225
									Subtotal: 270
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
4	440_Thinned	47.1	0.74 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		13
									Subtotal: 13
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
1	281_DNG	29.6	0.13 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	2
2	281_Thinned	51.1	0.52 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	17
									Subtotal: 19
									Total: 302

Table 10-18 Impacts that require an offset – ecosystem credits for the Liverpool Ranges IBRA subregion Liverpool Range stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
1	483_DNG	30.9	16.5 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	318
2	483_Mod_Good	53.1	13 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	432
3	483_Poor	25.9	6.5 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	105
4	483_Thinned	53.9	24.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	819
									Subtotal: 1674
									Total: 1674

Table 10-19 Impacts that require an offset – ecosystem credits for the Pilliga IBRA subregion Valley of the Winds stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion									
8	599_DNG	16.3	1.6 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	16
9	599_Mod_Good	63	1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	40
10	599_Thinned	38.1	0.61 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	15
									Subtotal: 71
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
7	483_Mod_Good	42.6	0.94 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	25
									Subtotal: 25
Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion									
4	477_Mod_Good	50.7	0.18 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		3
									Subtotal: 3
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
2	440_Mod_Good	60.8	8 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		182
3	440_Thinned	54.6	1.4 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		29
									Subtotal: 211

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region									
5	481_Mod_Good	55.6	5.9 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		124
6	481_Thinned	68.5	0.88 hectares	Low Sensitivity to Loss	PCT Cleared - 28%	High Sensitivity to Gain	1.5		23
									Subtotal: 147
									Total: 457

Table 10-20 Impacts that require an offset – ecosystem credits for the Pilliga IBRA subregion Liverpool Range stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter									
20	1696_DNS	39.1	0.67 hectares	Low Sensitivity to Loss	PCT Cleared - 46%	High Sensitivity to Gain	1.5		10
21	1696_Mod_Good	31.2	2 hectares	Low Sensitivity to Loss	PCT Cleared - 46%	High Sensitivity to Gain	1.5		23
									Subtotal: 33
Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley									
9	483_DNG	30.9	14.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	272
11	483_Mod_Good	43.4	0.63 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	17
12	483_Poor	22.8	0.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	4
13	483_Thinned	52.3	20.4 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	667
									Subtotal: 960
Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion									
4	477_Mod_Good	59.4	2.2 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		48
5	477_Thinned	78.2	0.05 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		1
									Subtotal: 49

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin									
17	1661_Mod_Good	52.8	15.9 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		367
18	1661_Thinned	48.1	4.6 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		97
									Subtotal: 464
Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion									
7	479_Mod_Good	65.9	8.4 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		208
8	479_Thinned	64.5	0.04 hectares	Low Sensitivity to Loss	PCT Cleared - 40%	High Sensitivity to Gain	1.5		1
									Subtotal: 209
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion									
1	281_DNG	29.6	0.87 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	16
2	281_Mod_Good	49	0.82 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	25
3	281_Thinned	84.8	6.3 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	334
									Subtotal: 375

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley									
14	618_DNG	15.9	1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	10
15	618_Mod_Good	40.7	2.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	54
									Subtotal: 64
									Total: 2154

Table 10-21 Impacts that require an offset – ecosystem credits for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion									
3	277_Mod_Good	91.5	0.01 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	1
									Subtotal: 1
Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion									
4	599_DNG	16.3	0.98 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	10
5	599_Mod_Good	55.6	1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	35
6	599_Thinned	40.6	2.1 hectares	Very High Sensitivity to Loss	Population size	High Sensitivity to Gain	2.5	True	54
									Subtotal: 99
Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion									
2	202_Thinned	35.1	0.21 hectares	High Sensitivity to Loss	Geographic Distribution	High Sensitivity to Gain	2	True	4
									Subtotal: 4
									Total: 104

Table 10-22 Impacts that require an offset – ecosystem credits for the Talbragar Valley IBRA subregion RNI1 stage

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion									
4	202_Mod_Good	44.7	2 hectares	High Sensitivity to Loss	Geographic Distribution	High Sensitivity to Gain	2	True	44
5	202_Thinned	25.8	0.62 hectares	High Sensitivity to Loss	Geographic Distribution	High Sensitivity to Gain	2	True	8
									Subtotal: 52
Narrow-leaved Ironbark - Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)									
11	468_Thinned	77.5	0.12 hectares	Low Sensitivity to Loss	PCT Cleared - 33%	High Sensitivity to Gain	1.5		3
									Subtotal: 3
Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion									
7	440_Mod_Good	87.8	5 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		164
8	440_Thinned	43.4	3.1 hectares	Low Sensitivity to Loss	PCT Cleared - 34%	High Sensitivity to Gain	1.5		51
									Subtotal: 215
Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion									
9	461_Mod_Good	60.2	2.6 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		68
10	461_Thinned	76.6	0.6 hectares	Moderate Sensitivity to Loss	PCT Cleared - 50%	High Sensitivity to Gain	1.75		20
									Subtotal: 88

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion									
2	81_Mod_Good	71.1	0.82 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		29
3	81_Thinned	63.2	2.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	2		66
									Subtotal: 95
									Total: 467

10.1.2 Impacts on scattered trees (ecosystem credits)

Table 10-23 Impacts that require an offset – ecosystem credits for scattered trees in the Inland Slopes IBRA subregion CFG Connection to Tallawang stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion				
3	7	Yes	1.00	7
			Subtotal	**7**
			Total credits	**7**

Table 10-24 Impacts that require an offset – ecosystem credits for scattered trees in the Inland Slopes IBRA subregion RNI1 stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion				
3	14	Yes	1.00	14
2	6	No	0.50	3
3	6	Yes	1.00	6
3	66	Yes	1.00	66
			Subtotal	**89**
PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion				
3	1	Yes	1.00	1
2	1	Yes	0.75	1
3	1	Yes	1.00	1
3	1	Yes	1.00	1
3	1	Yes	1.00	1
			Subtotal	**5**
			Total credits	**94**

Table 10-25 Impacts that require an offset – ecosystem credits for scattered trees in the Inland Slopes IBRA subregion Stubbo stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
281-Rough-Barked Apple – Red Gum– Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion				
3	3	Yes	1.00	3
			Subtotal	**3**
			Total credits	**3**

Table 10-26 Impacts that require an offset – ecosystem credits for scattered trees in the Kerrabee IBRA subregion Liverpool Range stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion				
3	2	Yes	1.00	2
			Subtotal	**2**
			Total credits	**2**

Table 10-27 Impacts that require an offset – ecosystem credits for scattered trees in the Kerrabee IBRA subregion Valley of the Winds stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 281 – Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South western slopes Bioregion and Brigalow Belt South Bioregion				
3	7	Yes	1.00	7
			Subtotal	**7**
PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley				
3	2	Yes	1.00	2
			Subtotal	**2**
			Total credits	**9**

Table 10-28 Impacts that require an offset – ecosystem credits for scattered trees in the Kerrabee IBRA subregion RNI1 stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion				
3	9	Yes	1.00	9
3	3	Yes	1.00	3
			Subtotal	**12**
			Total credits	**12**

Table 10-29 Impacts that require an offset – ecosystem credits for scattered trees in the Liverpool Range IBRA subregion Valley of the Winds stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 618 – White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley				
3	2	Yes	1.00	2
			Subtotal	**2**
			Total credits	**2**

Table 10-30 Impacts that require an offset – ecosystem credits for scattered trees in the Pilliga IBRA subregion Liverpool Range stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley				
3	1	Yes	1.00	1
			Subtotal	**1**
PCT 477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion				
3	1	Yes	1.00	1
			Subtotal	**1**
			Total credits	**2**

Table 10-31 Impacts that require an offset – ecosystem credits for scattered trees in the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion				
3	30	Yes	1.00	30
			Subtotal	30
PCT 202 – Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion				
3	6	Yes	1.00	6
			Subtotal	**6**
			Total credits	**36**

Table 10-32 Impacts that require an offset – ecosystem credits for scattered trees in the Talbragar Valley IBRA subregion RNI1 stage

Class	No. scattered trees	Contains hollows	Ecosystem credits required per tree	Number of ecosystem credits required
PCT 81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion				
2	1	Yes	0.75	1
3	12	Yes	1.00	12
2	2	Yes	0.75	2
2	1	No	0.50	1
2	4	Yes	0.75	3
3	1	Yes	1.00	1
3	2	Yes	1.00	2
3	1	Yes	1.00	1
			Subtotal	**23**
			Total credits	**23**

10.1.3 Impacts on threatened species and their habitat (species credits)

The impacts on threatened species (species credits) that require an offset (as per BAM Subsection 9.2.2(2)) are outlined below.

Table 10-33 Impacts that require an offset – species credits for the Inland Slopes IBRA subregion CFG connection to Tallawang stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
81_Thinned	73.4	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	6
202_Thinned	40.3	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
									Subtotal: 8
Delma impar / Striped Legless Lizard (Fauna)									
277_DNG	16.7	6.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	41
277_Thinned	48.7	0.67 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	12
									Subtotal: 53

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Dichanthium setosum / Bluegrass (Flora)									
81_Thinned	73.4	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	6
281_DNG	22.9	21.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	250
281_Mod_Good	66.4	0.24 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	8
281_Thinned	55.3	5.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	140
									Subtotal: 404
Euphrasia arguta / Euphrasia arguta (Flora)									
281_Mod_Good	66.4	0.63 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	31
									Subtotal: 31

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Ninox connivens / Barking Owl (Fauna)									
281_DNG	22.9	2.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	28
281_Thinned	55.3	3.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	104
									Subtotal: 132
Petaurus norfolcensis / Squirrel Glider (Fauna)									
81_Thinned	73.4	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	6
202_Thinned	40.3	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
277_Thinned	48.7	0.41 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	10
281_Mod_Good	66.4	0.63 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	21

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
281_Thinned	55.3	11.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	316
									Subtotal: 355
Phascolarctos cinereus / Koala (Fauna)									
202_Thinned	40.3	0.11 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
277_Thinned	48.7	0.41 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	10
281_Mod_Good	66.4	0.63 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	21
281_Thinned	55.3	11.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	316
									Subtotal: 349

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Tyto novaehollandiae / Masked Owl (Fauna)									
281_DNG	22.9	2.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	27
281_Thinned	55.3	3.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	103
									Subtotal: 130

Table 10-34 Impacts that require an offset – species credits for the Inland Slopes IBRA subregion RNI1 stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Acacia ausfeldii / Ausfeld's Wattle (Flora)									
281_DNG	22.9	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
281_Mod_Good	73.8	0.08 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	3
281_Thinned	59	2.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	61
481_Mod_Good	48.4	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	25
481_Thinned	52.5	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	4
									Subtotal: 94

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Anthochaera phrygia / Regent Honeyeater (Fauna)									
281_Mod_Good	73.8	0.7 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	39
281_Thinned	59	1.3 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	56
461_Mod_Good	45.9	0.48 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	17
									Subtotal: 112
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
440_Mod_Good	62.3	8.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	265
440_Poor	21.5	0.53 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	6
440_Thinned	55.6	4.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	120
									Subtotal: 391

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
81_Mod_Good	47.6	1.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	43
266_Mod_Good	47.8	1.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	42
266_Thinned	37.8	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
1177_Thinned	35.9	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	18
									Subtotal: 122
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
81_Mod_Good	47.6	2.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	58
81_Thinned	39.6	0.44 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	9

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
266_Mod_Good	47.8	5.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	124
266_Thinned	37.8	6.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	119
440_Mod_Good	62.3	29.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	914
440_Poor	21.5	0.86 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	9
440_Thinned	55.6	6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	166
461_Mod_Good	45.9	6.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	140
461_Thinned	18.9	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
									Subtotal: 1540

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
277_Mod_Good	46.5	5.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	185
277_Thinned	44.9	3.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	131
281_Poor	43	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	4
281_Thinned	59	7.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	328
440_Mod_Good	62.3	14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	654
440_Poor	21.5	0.86 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	14
440_Thinned	55.6	4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	167

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
461_Mod_Good	45.9	5.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	205
461_Thinned	18.9	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
									Subtotal: 1689
Dichanthium setosum / Bluegrass (Flora)									
81_DNG	13.2	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	13
81_Mod_Good	47.6	0.42 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	10
81_Thinned	38.4	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
281_DNG	22.9	34.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	396
281_Mod_Good	73.8	3.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	119

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
281_Poor	43	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
281_Thinned	59	11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	324
461_Mod_Good	45.9	0.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	14
									Subtotal: 878
Eucalyptus cannonii / Capertee Stringybark (Flora)									
281_DNG	N/A	2 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	3
440_DNS	N/A	2 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	3
440_Mod_Good	N/A	4 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	6
478_Thinned	N/A	1 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	2
									Subtotal: 14

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Euphrasia arguta / Euphrasia arguta (Flora)									
266_Mod_Good	47.8	1.7 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	60
277_Mod_Good	46.5	1.4 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	50
281_Mod_Good	73.8	3.3 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	182
									Subtotal: 292
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	62.3	29.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	914
440_Poor	21.5	0.86 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	9
440_Thinned	55.4	7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	194
									Subtotal: 1117

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Ninox connivens / Barking Owl (Fauna)									
81_Mod_Good	47.6	0.84 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	20
266_DNG	18.4	1.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	15
266_Mod_Good	47.8	0.14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	3
266_Thinned	37.8	0.44 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	8
277_DNG	16.7	0.65 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	5
277_Mod_Good	46.5	4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	94
277_Thinned	44.9	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	3

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
281_DNG	22.9	0.36 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	4
281_Thinned	59	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	40
1177_Mod_Good	50.4	7.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	187
1177_Thinned	35.9	0.41 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	7
									Subtotal: 386
Petaurus norfolcensis / Squirrel Glider (Fauna)									
81_Mod_Good	47.6	2.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	58
81_Thinned	39.6	0.44 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	9
266_Mod_Good	47.8	5.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	123

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
266_Thinned	37.8	6.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	119
277_Mod_Good	46.5	6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	140
277_Thinned	44.9	6.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	146
281_Mod_Good	73.8	4.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	181
281_Poor	43	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
281_Thinned	59	25.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	753
440_Mod_Good	62.3	29.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	914

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
440_Poor	21.5	0.86 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	9
440_Thinned	55.6	6.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	175
461_Mod_Good	45.9	6.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	140
461_Thinned	18.9	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
1177_Mod_Good	50.4	35.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	899
1177_Thinned	35.9	2.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	49
									Subtotal: 3718

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petrogale penicillata / Brush-tailed Rock-wallaby (Fauna)									
277_Thinned	44.9	2.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	71
281_Thinned	59	0.51 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	23
440_Mod_Good	62.3	11.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	524
440_Poor	21.5	0.47 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	8
440_Thinned	55.4	2.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	106
									Subtotal: 732

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Phascolarctos cinereus / Koala (Fauna)									
81_Mod_Good	47.6	0.32 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	8
81_Thinned	39.6	0.32 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	9
266_Mod_Good	47.8	5.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	123
266_Thinned	37.8	6.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	119
277_Mod_Good	46.5	6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	140
277_Thinned	44.9	5.8 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	130
281_Mod_Good	73.8	4.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	181

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
281_Poor	43	0.11 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
281_Thinned	59	25.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	753
440_Mod_Good	62.3	15.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	476
440_Poor	21.5	0.86 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	9
440_Thinned	55.6	6.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	175
461_Mod_Good	45.9	6.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	140
461_Thinned	18.9	0.01 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
478_Mod_Good	58	0.24 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	7
478_Thinned	70.3	0.21 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	7
479_Mod_Good	63.4	10.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	327
479_Thinned	63.1	5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	158
481_Mod_Good	48.4	6.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	152
481_Thinned	52.5	3.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	85
1177_Mod_Good	50.4	5.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	128

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
1177_Thinned	35.9	2.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	49
									Subtotal: 3179
Swainsona recta / Small Purple-pea (Flora)									
266_Mod_Good	47.8	1.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	39
266_Thinned	37.8	2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	38
277_Mod_Good	46.5	0.29 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	7
									Subtotal: 84

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Swainsona sericea / Silky Swainson-pea (Flora)									
266_Mod_Good	47.8	1.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	39
266_Thinned	37.8	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	38
277_Mod_Good	46.5	0.97 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	23
281_Mod_Good	73.8	0.08 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	3
281_Thinned	59	0.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	9
440_Mod_Good	62.3	3.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	99
									Subtotal: 211

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Tyto novaehollandiae / Masked Owl (Fauna)									
81_DNG	13.2	0.49 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	3
81_Mod_Good	47.6	0.84 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	20
266_DNG	18.4	3.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	34
266_Mod_Good	47.8	0.14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	3
266_Thinned	37.8	0.44 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	8
277_DNG	16.7	1.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	14
277_Mod_Good	46.5	3.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	73

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
277_Thinned	44.9	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
281_DNG	22.9	0.09 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
281_Thinned	59	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	40
1177_Mod_Good	50.4	8.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	214
1177_Thinned	35.9	0.54 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	10
									Subtotal: 421

Table 10-35 Impacts that require an offset – species credits for the Inland Slopes IBRA subregion Stubbo stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
440_Mod_Good	58.3	0.07 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
440_Thinned	52.5	0.07 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
									Subtotal: 4
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
277_Mod_Good	45.3	0.49 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	11
281_Mod_Good	51.7	1.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	29
281_Thinned	46.5	0.31 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	7
440_DNS	23.4	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	12

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
440_Mod_Good	58.3	0.45 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	13
440_Thinned	52.5	0.34 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	9
									Subtotal: 81
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
440_Mod_Good	58.3	3.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	104
440_Thinned	52.5	0.73 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	19
									Subtotal: 123
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
281_Thinned	46.5	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
									Subtotal: 1

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Dichanthium setosum / Bluegrass (Flora)									
281_Mod_Good	51.7	0.19 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	5
281_Thinned	46.5	0.36 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	8
									Subtotal: 13
Eucalyptus cannonii / Capertee Stringybark (Flora)									
440_DNS	N/A	1 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	2
440_Mod_Good	N/A	1 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	2
									Subtotal: 4

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Euphrasia arguta / Euphrasia arguta (Flora)									
277_Mod_Good	45.3	0.11 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	4
281_Mod_Good	51.7	0.4 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ecology or response to management is poorly known	3	True	16
									Subtotal: 20
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	58.3	3.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	104
440_Thinned	52.5	0.73 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
									Subtotal: 123

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petaurus norfolcensis / Squirrel Glider (Fauna)									
277_Mod_Good	45.3	0.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	11
281_Mod_Good	51.7	1.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	44
281_Thinned	46.5	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	52
440_Mod_Good	58.3	3.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	104
440_Thinned	52.5	0.73 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
									Subtotal: 230

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Phascolarctos cinereus / Koala (Fauna)									
277_Mod_Good	45.3	0.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	11
281_Mod_Good	51.7	1.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	44
281_Thinned	46.5	2.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	52
440_Mod_Good	58.3	3.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	104
440_Thinned	52.5	0.73 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	19
478_Mod_Good	66.2	0.15 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	5
									Subtotal: 235

Table 10-36 Impacts that require an offset – species credits for the Kerrabee IBRA subregion Valley of the Winds stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
42_Thinned	62.2	0.62 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	23
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
									Subtotal: 43
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
599_Mod_Good	47	1.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	25
									Subtotal: 25

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
42_Thinned	62.2	0.62 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	19
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	23
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
									Subtotal: 43
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	34
618_Mod_Good	42	0.91 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	29
									Subtotal: 63

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Androcalva procumbens / Androcalva procumbens (Flora)									
440_Mod_Good	58.4	0.48 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	14
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
479_Mod_Good	57.5	3.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	102
									Subtotal: 117
Delma impar / Striped Legless Lizard (Fauna)									
42_DNG	54.4	0.18 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	4
42_Thinned	62.2	0.62 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	14
277_Mod_Good	89.7	0.14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	5

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
618_DNG	16.3	9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	55
618_Mod_Good	42	7.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	116
618_Thinned	25.4	11.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	107
									Subtotal: 301
Dichanthium setosum / Bluegrass (Flora)									
618_DNG	16.3	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	8
618_Thinned	25.4	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	13
									Subtotal: 21

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
42_Thinned	62.2	0.62 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	23
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
									Subtotal: 43
Monotaxis macrophylla / Large-leafed Monotaxis (Flora)									
440_Mod_Good	58.4	0.48 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	14
440_Thinned	60.4	0.03 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
479_Mod_Good	57.5	3.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	102
									Subtotal: 117

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petaurus norfolcensis / Squirrel Glider (Fauna)									
42_Thinned	62.2	0.62 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
277_Mod_Good	89.7	0.14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	6
281_Mod_Good	68.2	6.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	228
281_Thinned	54.7	6.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	170
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	23
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
									Subtotal: 447

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petrogale penicillata / Brush-tailed Rock-wallaby (Fauna)									
281_Thinned	54.7	0.92 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	38
440_Mod_Good	58.4	0.78 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	34
									Subtotal: 72
Phascolarctos cinereus / Koala (Fauna)									
42_Thinned	62.2	0.62 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	19
277_Mod_Good	89.7	0.14 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	6
281_Mod_Good	68.2	6.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	228
281_Thinned	54.7	6.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	170

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
440_Mod_Good	58.4	0.78 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	23
440_Thinned	60.4	0.03 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
479_Mod_Good	57.5	8.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	254
479_Thinned	50.4	2.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	62
618_Mod_Good	42	7.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	155
618_Thinned	25.4	11.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	141
									Subtotal: 1059

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Tylophora linearis / Tylophora linearis (Flora)									
479_Mod_Good	57.5	2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	56
479_Thinned	50.4	1.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	29
									Subtotal: 85
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
440_Mod_Good	58.4	0.78 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	34
									Subtotal: 34

Table 10-37 Impacts that require an offset – species credits for the Kerrabee IBRA subregion Liverpool Range stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Acacia ausfeldii / Ausfeld's Wattle (Flora)									
281_Thinned	53.3	0.21 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	6
									Subtotal: 6
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
281_DNG	26.3	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	19
477_Mod_Good	48.5	2.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	66
									Subtotal: 85
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
440_Mod_Good	53.6	1.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	33
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
477_Mod_Good	48.5	12.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	301
477_Thinned	50.1	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	51
									Subtotal: 386
Androcalva procumbens / Androcalva procumbens (Flora)									
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
479_Mod_Good	58.5	3.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	92
									Subtotal: 93
Homoranthus darwinioides / Fairy Bells (Flora)									
477_Mod_Good	48.5	3.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	92
477_Thinned	50.1	0.74 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	19
									Subtotal: 111

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	53.6	1.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	34
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
477_Mod_Good	48.5	12.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	301
477_Thinned	50.1	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	51
									Subtotal: 387
Monotaxis macrophylla / Large-leafed Monotaxis (Flora)									
477_Mod_Good	48.5	3.8 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	92
477_Thinned	50.1	0.74 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	19
									Subtotal: 111

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petaurus norfolcensis / Squirrel Glider (Fauna)									
281_Thinned	53.3	0.26 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	7
440_Mod_Good	53.6	1.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	34
440_Thinned	60.4	0.03 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
477_Mod_Good	48.5	12.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	301
477_Thinned	50.1	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	51
479_Mod_Good	58.5	16.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	493
									Subtotal: 887

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Phascolarctos cinereus / Koala (Fauna)									
281_Thinned	53.3	0.26 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	7
440_Mod_Good	53.6	1.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	34
440_Thinned	60.4	0.03 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
477_Mod_Good	48.5	0.56 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	14
477_Thinned	50.1	1.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	47
479_Mod_Good	58.5	22.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	670
1661_Thinned	31.8	0.69 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	11
									Subtotal: 784

Vegetation zone name	**Habitat condition (vegetation integrity) loss**	**Area / Count**	**Sensitivity to loss**	**Sensitivity to loss (Justification)**	**Sensitivity to gain**	**Sensitivity to gain (Justification)**	**Biodiversity risk weighting**	**Potential SAII**	**Species credits**
Tylophora linearis / Tylophora linearis (Flora)									
477_Mod_Good	48.5	1.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	39
477_Thinned	50.1	0.74 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	19
479_Mod_Good	58.5	8.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	260
									Subtotal: 318

Table 10-38 Impacts that require an offset – species credits for the Kerrabee IBRA subregion RNI1 stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Acacia ausfeldii / Ausfeld's Wattle (Flora)									
281_DNG	26.3	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
281_Mod_Good	55.8	0.08 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
281_Thinned	53.7	1.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	49
479_DNG	8.8	0.28 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
479_Mod_Good	56.1	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	38
479_Thinned	46.8	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
481_Mod_Good	39.6	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	20

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
481_Thinned	53.5	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	4
Subtotal: 117									
Anthochaera phrygia / Regent Honeyeater (Fauna)									
277_Mod_Good	60.1	0.17 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	8
277_Thinned	47.6	0.85 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	30
281_DNS	37.1	1.1 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	30
281_Mod_Good	55.8	20.6 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	864
281_Thinned	53.7	16.6 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	667
478_Mod_Good	45.3	6.2 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	212

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
618_Mod_Good	34.7	6.6 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	172
618_Thinned	24.2	4 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	72
1176_Thinned	23.2	1.9 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	33
1610_Mod_Good	47.5	24.8 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	883
1674_Mod_Good	25.7	10.6 hectares	Very High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	205
									Subtotal: 3176
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
440_Mod_Good	49.5	0.73 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	18
477_Thinned	68.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
									Subtotal: 20

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
461_Mod_Good	44	5.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	121
									Subtotal: 121
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
440_Mod_Good	49.5	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	54
461_Mod_Good	44	30.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	666
461_Thinned	17.2	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
477_Thinned	68.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
1674_Mod_Good	25.7	10.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	138
									Subtotal: 861

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
277_Mod_Good	60.1	0.17 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	8
277_Thinned	47.6	0.85 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	30
281_Mod_Good	55.8	20.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	870
281_Poor	37.5	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
281_Thinned	53.7	26.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1068
461_Mod_Good	44	27.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	913
461_Thinned	17.2	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
1674_Mod_Good	25.7	10.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	207
									Subtotal: 3099
Commersonia rosea / Commersonia rosea (Flora)									
1674_Mod_Good	25.7	3.3 hectares	Very High Sensitivity to Loss	Population size	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	3	True	63
									Subtotal: 63
Delma impar / Striped Legless Lizard (Fauna)									
277_Mod_Good	60.1	0.08 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	2
277_Thinned	47.6	0.46 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	8
618_DNG	16.6	42 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	261
618_Mod_Good	34.7	1.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	22

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
618_Thinned	24.2	3.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	29
									Subtotal: 318
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment (Flora)									
281_DNG	26.3	0.83 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Seedbank Persistence	2	False	11
281_Mod_Good	55.8	0.23 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Seedbank Persistence	2	False	6
281_Thinned	53.7	0.34 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Seedbank Persistence	2	False	9
									Subtotal: 26

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Homoranthus darwinioides / Fairy Bells (Flora)									
477_Thinned	68.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
1674_Mod_Good	25.7	3.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	42
									Subtotal: 44
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	49.5	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	54
477_Thinned	68.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
1674_Mod_Good	25.7	10.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	138
									Subtotal: 194

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bungaroides / Broad-headed Snake (Fauna)									
1674_DNG	30.4	0.02 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
1674_Mod_Good	25.7	10.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	270
									Subtotal: 208
Leucochrysum albicans subsp. tricolor / Hoary Sunray (Flora)									
461_Mod_Good	N/A	4 individuals	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	8
481_Thinned	N/A	1 individuals	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
									Subtotal: 10

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Monotaxis macrophylla / Large-leafed Monotaxis (Flora)									
1610_Mod_Good	47.5	17.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	416
1610_Thinned	46.9	1.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	30
									Subtotal: 446
Ozothamnus tesselatus / Ozothamnus tesselatus (Flora)									
1674_Mod_Good	25.7	3.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	31
									Subtotal: 30
Petaurus norfolcensis / Squirrel Glider (Fauna)									
277_Mod_Good	60.1	0.17 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	5
277_Thinned	47.6	0.85 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	20

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
281_Mod_Good	55.8	40.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1124
281_Poor	37.5	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
281_Thinned	53.7	42.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1136
440_Mod_Good	49.5	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	54
461_Mod_Good	44	30.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	666
461_Thinned	17.2	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
477_Thinned	68.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
1674_Mod_Good	25.7	10.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	138
									Subtotal: 3102
Petrogale penicillata / Brush-tailed Rock-wallaby (Fauna)									
277_Mod_Good	60.1	0.01 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
277_Thinned	47.6	0.01 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
281_Mod_Good	55.8	0.29 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	12
281_Thinned	53.7	0.39 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	16
461_Mod_Good	44	0.42 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	14
461_Thinned	17.2	0.01 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
1674_DNG	30.4	0.02 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	1
1674_Mod_Good	25.7	0.12 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	2
Subtotal: 47									
Phascolarctos cinereus / Koala (Fauna)									
277_Mod_Good	60.1	0.17 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	5
277_Thinned	47.6	0.85 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	20
281_Mod_Good	55.8	40.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1124
281_Poor	37.5	0.01 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
281_Thinned	53.7	42.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1136

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
440_Mod_Good	49.5	2.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	54
461_Mod_Good	44	30.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	666
461_Thinned	17.2	0.12 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
477_Thinned	68.1	0.05 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
478_Mod_Good	45.3	6.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	142
478_Thinned	38	0.15 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	3
479_Mod_Good	56.1	9.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	260

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
479_Thinned	46.8	16.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	391
481_Mod_Good	39.6	2.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	50
481_Thinned	53.5	9.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	246
483_Thinned	47.6	2.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	65
618_Mod_Good	34.7	8.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	141
618_Thinned	24.2	9.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	119
1610_Mod_Good	47.5	56.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1333

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
1610_Thinned	46.9	4.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	105
1674_Mod_Good	25.7	10.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	138
									Subtotal: 6002
Pomaderris cotoneaster / Cotoneaster Pomaderris (Flora)									
478_Mod_Good	45.3	2.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	54
1610_Mod_Good	47.5	17.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	416
1610_Thinned	46.9	1.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	30
									Subtotal: 500

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
461_Mod_Good	44	27.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	913
461_Thinned	17.2	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	2
1674_Mod_Good	25.7	10.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Very High Sensitivity to Gain	Species dependent on habitat attributes	3	True	207
									Subtotal: 1122

Table 10-39 Impacts that require an offset – species credits for the Liverpool Ranges IBRA subregion Valley of the Winds stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
440_Thinned	47.1	0.74 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	17
									Subtotal: 17
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
440_Thinned	47.1	0.74 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	17
									Subtotal: 17
Dichanthium setosum / Bluegrass (Flora)									
281_DNG	29.6	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
281_Thinned	51.1	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	3
483_DNG	30.9	2.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	36

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
483_Thinned	64.6	3.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	120
									Subtotal: 161
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Thinned	47.1	0.74 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	17
									Subtotal: 17
Petaurus norfolcensis / Squirrel Glider (Fauna)									
281_Thinned	51.1	0.52 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	13
440_Thinned	47.1	0.74 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	17
									Subtotal: 30

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Phascolarctos cinereus / Koala (Fauna)									
281_Thinned	51.1	0.52 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	13
440_Thinned	47.1	0.74 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	17
483_Thinned	64.6	5.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	176
									Subtotal: 206

Table 10-40 Impacts that require an offset – species credits for the Liverpool Ranges IBRA subregion Liverpool Range stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Dichanthium setosum / Bluegrass (Flora)									
483_DNG	30.9	6.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	102
483_Thinned	53.9	0.82 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	22
									Subtotal: 124
Phascolarctos cinereus / Koala (Fauna)									
483_Mod_Good	53.1	13 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	346
483_Poor	25.9	6.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	84
483_Thinned	53.9	24 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	644
									Subtotal: 1074

Table 10-41 Impacts that require an offset – species credits for the Pilliga IBRA subregion Valley of the Winds stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
440_DNG	7.5	0.16 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
440_Mod_Good	60.8	2.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	76
440_Thinned	54.6	0.31 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	8
481_Mod_Good	55.6	4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	111
483_Mod_Good	42.6	0.67 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	14
599_DNG	16.3	0.36 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	3
599_Mod_Good	63	0.87 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	27
									Subtotal: 240

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
440_Mod_Good	60.8	8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	243
440_Thinned	54.6	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	39
477_Mod_Good	50.7	0.18 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	5
									Subtotal: 287
Androcalva procumbens / Androcalva procumbens (Flora)									
440_Mod_Good	60.8	2.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	88
440_Thinned	54.6	0.8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	22
477_Mod_Good	50.7	0.07 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	2
									Subtotal: 112

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Dichanthium setosum / Bluegrass (Flora)									
483_Mod_Good	42.6	0.15 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	3
									Subtotal: 3
Digitaria porrecta / Finger Panic Grass (Flora)									
599_DNG	16.3	1.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	13
599_Mod_Good	63	0.31 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	10
599_Thinned	38.1	0.23 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	4
									Subtotal: 27
Homoranthus darwinioides / Fairy Bells (Flora)									
477_Mod_Good	50.7	0.07 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
									Subtotal: 2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	60.8	8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	243
440_Thinned	54.6	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	39
477_Mod_Good	50.7	0.18 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	5
									Subtotal: 287
Monotaxis macrophylla / Large-leafed Monotaxis (Flora)									
440_Mod_Good	60.8	2.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	88
440_Thinned	54.6	0.8 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	22
477_Mod_Good	50.7	0.07 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	2
									Subtotal: 112

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Petaurus norfolcensis / Squirrel Glider (Fauna)									
440_Mod_Good	60.8	8 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	243
440_Thinned	54.6	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	39
477_Mod_Good	50.7	0.18 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	5
									Subtotal: 287
Phascolarctos cinereus / Koala (Fauna)									
440_Mod_Good	60.8	8 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	243
440_Thinned	54.6	1.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	39
477_Mod_Good	50.7	0.18 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	5

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
481_Mod_Good	55.6	5.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	165
481_Thinned	68.5	0.88 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	30
483_Mod_Good	42.6	0.94 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	20
									Subtotal: 502
Thesium australe / Austral Toadflax (Flora)									
599_DNG	16.3	1.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	10
599_Mod_Good	63	0.31 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	7
599_Thinned	38.1	0.23 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	3
									Subtotal: 20

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Tylophora linearis / Tylophora linearis (Flora)									
440_Mod_Good	60.8	1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	32
440_Thinned	54.6	0.8 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	22
									Subtotal: 54
Tyto novaehollandiae / Masked Owl (Fauna)									
481_Mod_Good	55.6	0.53 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	15
									Subtotal: 15

Table 10-42 Impacts that require an offset – species credits for the Pilliga IBRA subregion Liverpool Range stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)									
477_Mod_Good	59.4	1.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	40
1661_Mod_Good	52.8	1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	26
									Subtotal: 66
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
477_Mod_Good	59.4	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	64
									Subtotal: 64
Androcalva procumbens / Androcalva procumbens (Flora)									
477_Mod_Good	59.4	1.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	31
479_Mod_Good	65.9	3.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	121

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
479_Thinned	64.5	0.02 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
									Subtotal: 153
Dichanthium setosum / Bluegrass (Flora)									
281_DNG	29.6	0.87 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	13
281_Mod_Good	49	0.13 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	3
281_Thinned	84.8	5.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	237
483_DNG	30.9	13.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	207
483_DNS	14.2	0.06 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
483_Mod_Good	43.4	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
483_Thinned	52.3	5.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	135
									Subtotal: 598
Eucalyptus cannonii / Capertee Stringybark (Flora)									
1661_Mod_Good	N/A	1 individuals	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	Moderate Sensitivity to Gain	Effectiveness of management in controlling threats	1.5	False	2
									Subtotal: 2
Homoranthus darwinioides / Fairy Bells (Flora)									
477_Mod_Good	59.4	1.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	37
477_Thinned	78.2	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
									Subtotal: 39

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
477_Mod_Good	59.4	2.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	64
477_Thinned	78.2	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
									Subtotal: 66
Monotaxis macrophylla / Large-leafed Monotaxis (Flora)									
477_Mod_Good	59.4	1.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	37
477_Thinned	78.2	0.05 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	2
479_Mod_Good	65.9	3.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	121
479_Thinned	64.5	0.02 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
483_Thinned	52.3	0.04 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
1661_Mod_Good	52.8	5.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	140
1661_Thinned	48.1	2.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	49
									Subtotal: 351
Petaurus norfolcensis / Squirrel Glider (Fauna)									
281_Mod_Good	49	0.82 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	20
281_Thinned	84.8	6.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	267
477_Mod_Good	59.4	0.32 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	10
477_Thinned	78.2	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
479_Mod_Good	65.9	0.68 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	22
618_Mod_Good	40.7	2.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	43
									Subtotal: 364
Phascolarctos cinereus / Koala (Fauna)									
281_Mod_Good	49	0.82 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	20
281_Thinned	84.8	6.3 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	267
477_Mod_Good	59.4	2.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	64
477_Thinned	78.2	0.05 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	2
479_Mod_Good	65.9	8.4 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	277

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
483_Mod_Good	43.4	0.63 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	14
483_Thinned	52.3	19.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	520
618_Mod_Good	40.7	2.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	43
1661_Mod_Good	52.8	15.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	419
1661_Thinned	48.1	4.5 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	109
1696_Mod_Good	31.2	2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	31
									Subtotal: 1766

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Pomaderris queenslandica / Scant Pomaderris (Flora)									
1661_Mod_Good	52.8	0.05 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
1661_Thinned	48.1	0.68 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	16
									Subtotal: 17
Swainsona sericea / Silky Swainson-pea (Flora)									
281_Mod_Good	49	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
281_Thinned	84.8	5.4 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	229
477_Mod_Good	59.4	1.3 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	37
									Subtotal: 267

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Tylophora linearis / Tylophora linearis (Flora)									
477_Thinned	78.2	0.05 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	2
479_Mod_Good	65.9	1.7 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	57
									Subtotal: 59

Table 10-43 Impacts that require an offset – species credits for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
202_Thinned	35.1	0.21 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	4
									Subtotal: 4
Dichanthium setosum / Bluegrass (Flora)									
81_DNG	14.7	0.04 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	1
									Subtotal: 1
Petaurus norfolcensis / Squirrel Glider (Fauna)									
202_Thinned	35.1	0.2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	4
									Subtotal: 4
Phascolarctos cinereus / Koala (Fauna)									
202_Thinned	35.1	0.2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	False	4
									Subtotal: 4

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Polytelis swainsonii / Superb Parrot (Fauna)									
202_Thinned	35.1	0.11 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	2
599_Thinned	40.6	0.02 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	False	1
									Subtotal: 3
Swainsona sericea / Silky Swainson-pea (Flora)									
277_Mod_Good	91.5	0.01 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	False	1
									Subtotal: 1
Tylophora linearis / Tylophora linearis (Flora)									
202_Thinned	35.1	0.14 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	False	2
									Subtotal: 2

Table 10-44 Impacts that require an offset – species credits for the Talbragar Valley IBRA subregion RNI1 stage

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
81_Mod_Good	71.1	0.82 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	29
81_Thinned	63.2	2.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	66
202_Mod_Good	44.7	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	44
202_Thinned	25.8	0.61 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	8
440_Mod_Good	87.8	4.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	216
440_Thinned	43.4	3.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	67
461_Mod_Good	60.3	2.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	77

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
461_Thinned	76.6	0.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	23
									Subtotal: 530
Dichanthium setosum / Bluegrass (Flora)									
81_DNG	14.7	1.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	11
81_Mod_Good	71.1	0.18 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	6
81_Thinned	63.2	1.5 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	47
461_Thinned	76.6	0.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	23
									Subtotal: 87
Homoranthus darwinioides / Fairy Bells (Flora)									
468_Thinned	77.5	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	5
									Subtotal: 5

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
440_Mod_Good	87.8	4.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	216
440_Thinned	43.4	3.1 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	67
468_Thinned	77.5	0.12 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	5
									Subtotal: 288
Petaurus norfolcensis / Squirrel Glider (Fauna)									
81_Mod_Good	71.1	0.82 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	29
81_Thinned	63.2	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	63
202_Mod_Good	44.7	2 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	44

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
202_Thinned	25.8	0.61 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	8
440_Mod_Good	87.8	4.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	216
461_Mod_Good	60.3	2.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	77
461_Thinned	76.6	0.6 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	23
									Subtotal: 460
Phascolarctos cinereus / Koala (Fauna)									
81_Mod_Good	71.1	0.82 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	29
81_Thinned	63.2	2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	63
202_Mod_Good	44.7	2 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	44

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
202_Thinned	25.8	0.61 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	8
440_Mod_Good	87.8	4.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	216
440_Thinned	43.4	3.1 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	67
461_Mod_Good	60.3	2.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	77
461_Thinned	76.6	0.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Effectiveness of management in controlling threats	2	FALSE	23
									Subtotal: 527
Polytelis swainsonii / Superb Parrot (Fauna)									
81_DNG	14.7	0.55 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	4
81_Mod_Good	71.1	0.05 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	2

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
202_Mod_Good	44.7	1.9 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Species dependent on habitat attributes	2	FALSE	43
									Subtotal: 49
Swainsona sericea / Silky Swainson-pea (Flora)									
202_Mod_Good	44.7	0.14 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	FALSE	3
440_Thinned	43.4	0.7 hectares	Moderate Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Ability to colonise improved habitat	2	FALSE	15
									Subtotal: 18
Tylophora linearis / Tylophora linearis (Flora)									
440_Mod_Good	87.8	4.9 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	FALSE	216
440_Thinned	43.4	0.6 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	FALSE	13
468_Thinned	77.5	0.12 hectares	High Sensitivity to Loss	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Quantity class of viable seeds produced	2	FALSE	5
									Subtotal: 234

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.

11 Biodiversity credit report

11.1 Summary

A summary of the ecosystem credits, species credits and scattered tree ecosystem credits required are provided in the tables below by IBRA subregion and by construction stage.

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.

11.1.1 Overall summary of credits required

Table 11-1 to Table 11-3 provide a summary of the total biodiversity credits required for the project.

Table 11-1 Summary of the total ecosystem credits required

Plant Community Type	Credits required
1176-Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	20
1177-Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	887
1610-White Box - Black Cypress Pine shrubby woodland of the Western Slopes	1276
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	475
1674-Red Ironbark - Brown Bloodwood - Black Pine heathy open forest on sandstone ranges of the Sydney Basin	104
1696-Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter	33
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	60
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	526
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1133
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	7050

Plant Community Type	Credits required
42-River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	24
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	1469
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	800
468-Narrow-leaved Ironbark - Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	3
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	330
478-Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	124
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	1802
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	549
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	3050
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	261
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	1290
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	168
Total	**21434**

Table 11-2 Summary of the total species credits required

Species name	Credits required
Acacia ausfeldii / Ausfeld's Wattle	217
Androcalva procumbens / Androcalva procumbens	475
Anthochaera phrygia / Regent Honeyeater	3288
Aprasia parapulchella / Pink-tailed Legless Lizard	475
Calyptorhynchus lathami / Glossy Black-Cockatoo	740
Cercartetus nanus / Eastern Pygmy-possum	3861
Chalinolobus dwyeri / Large-eared Pied Bat	4851
Commersonia rosea / Commersonia rosea	63
Delma impar / Striped Legless Lizard	676
Dichanthium setosum / Bluegrass	2290
Digitaria porrecta / Finger Panic Grass	27
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment	26
Eucalyptus cannonii / Capertee Stringybark	20
Euphrasia arguta / Euphrasia arguta	343
Homoranthus darwinioides / Fairy Bells	201
Hoplocephalus bitorquatus / Pale-headed Snake	2522
Hoplocephalus bungaroides / Broad-headed Snake	208
Leucochrysum albicans subsp. tricolor / Hoary Sunray	10
Monotaxis macrophylla / Large-leafed Monotaxis	1137
Ninox connivens / Barking Owl	518

Species name	Credits required
Ozothamnus tesselatus / Ozothamnus tesselatus	31
Petaurus norfolcensis / Squirrel Glider	9929
Petrogale penicillata / Brush-tailed Rock-wallaby	852
Phascolarctos cinereus / Koala	15685
Polytelis swainsonii / Superb Parrot	52
Pomaderris cotoneaster / Cotoneaster Pomaderris	500
Pomaderris queenslandica / Scant Pomaderris	17
Swainsona recta / Small Purple-pea	84
Swainsona sericea / Silky Swainson-pea	497
Thesium australe / Austral Toadflax	20
Tylophora linearis / Tylophora linearis	752
Tyto novaehollandiae / Masked Owl	566
Vespadelus troughtoni / Eastern Cave Bat	1156
Total	**52089**

Table 11-3 Summary of the total ecosystem credits required for Scattered Trees

Plant Community Type	Credits required
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	6
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	63
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	14
281-Rough-Barked Apple – Red Gum– Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	7
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	3
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	12
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	1
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	4
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	23
599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	30
Total	**163**

11.1.2 Summary of credits by IBRA subregion

Table 11-4 Summary of the ecosystem credits required by IBRA subregion

Row Labels	Sum of Credits
Inland Slopes	
1177-Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	887
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	4
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	526
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1093
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	2796
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	945
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	128
478-Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	15
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	364
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	177
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	73
Subtotal	**7008**

Row Labels	Sum of Credits
Kerrabee	
1176-Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	20
1610-White Box - Black Cypress Pine shrubby woodland of the Western Slopes	1276
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	11
1674-Red Ironbark - Brown Bloodwood - Black Pine heathy open forest on sandstone ranges of the Sydney Basin	104
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	39
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	3860
42-River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	24
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	85
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	584
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	278
478-Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	109
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	1229
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	225
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	121
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	91
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	1226

Row Labels	Sum of Credits
Subtotal	**9282**
Liverpool Ranges	
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	19
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	13
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	1944
Subtotal	**1976**
Pilliga	
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	464
1696-Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter	33
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	375
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	211
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	52
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	209
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	147
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	985
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	71
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	64

Row Labels	Sum of Credits
Subtotal	**2611**
Talbragar Valley	
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	56
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	215
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	88
468-Narrow-leaved Ironbark - Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	3
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	99
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	95
Subtotal	**557**
Grand Total	**21434**

Table 11-5 Summary of the species credits required by IBRA subregion

IBRA subregion and species	Sum of Credits
Inland Slopes	
Acacia ausfeldii / Ausfeld's Wattle	94
Anthochaera phrygia / Regent Honeyeater	112
Aprasia parapulchella / Pink-tailed Legless Lizard	395
Calyptorhynchus lathami / Glossy Black-Cockatoo	203
Cercartetus nanus / Eastern Pygmy-possum	1669
Chalinolobus dwyeri / Large-eared Pied Bat	1689
Delma impar / Striped Legless Lizard	53
Dichanthium setosum / Bluegrass	1295
Eucalyptus cannonii / Capertee Stringybark	18
Euphrasia arguta / Euphrasia arguta	343
Hoplocephalus bitorquatus / Pale-headed Snake	1240
Ninox connivens / Barking Owl	518
Petaurus norfolcensis / Squirrel Glider	4303
Petrogale penicillata / Brush-tailed Rock-wallaby	732
Phascolarctos cinereus / Koala	3761
Swainsona recta / Small Purple-pea	84
Swainsona sericea / Silky Swainson-pea	211
Tyto novaehollandiae / Masked Owl	551
Subtotal	**17271**

IBRA subregion and species	Sum of Credits
Kerrabee	
Acacia ausfeldii / Ausfeld's Wattle	123
Androcalva procumbens / Androcalva procumbens	210
Anthochaera phrygia / Regent Honeyeater	3176
Aprasia parapulchella / Pink-tailed Legless Lizard	63
Calyptorhynchus lathami / Glossy Black-Cockatoo	231
Cercartetus nanus / Eastern Pygmy-possum	1290
Chalinolobus dwyeri / Large-eared Pied Bat	3162
Commersonia rosea / Commersonia rosea	63
Delma impar / Striped Legless Lizard	623
Dichanthium setosum / Bluegrass	21
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment	26
Homoranthus darwinioides / Fairy Bells	155
Hoplocephalus bitorquatus / Pale-headed Snake	624
Hoplocephalus bungaroides / Broad-headed Snake	208
Leucochrysum albicans subsp. tricolor / Hoary Sunray	10
Monotaxis macrophylla / Large-leafed Monotaxis	674
Ozothamnus tesselatus / Ozothamnus tesselatus	31
Petaurus norfolcensis / Squirrel Glider	4481
Petrogale penicillata / Brush-tailed Rock-wallaby	120
Phascolarctos cinereus / Koala	7845

IBRA subregion and species	Sum of Credits
Pomaderris cotoneaster / Cotoneaster Pomaderris	500
Tylophora linearis / Tylophora linearis	403
Vespadelus troughtoni / Eastern Cave Bat	1156
Subtotal	**25195**
Liverpool Ranges	
Aprasia parapulchella / Pink-tailed Legless Lizard	17
Cercartetus nanus / Eastern Pygmy-possum	17
Dichanthium setosum / Bluegrass	285
Hoplocephalus bitorquatus / Pale-headed Snake	17
Petaurus norfolcensis / Squirrel Glider	30
Phascolarctos cinereus / Koala	1280
Subtotal	**1646**
Pilliga	
Androcalva procumbens / Androcalva procumbens	265
Calyptorhynchus lathami / Glossy Black-Cockatoo	306
Cercartetus nanus / Eastern Pygmy-possum	351
Dichanthium setosum / Bluegrass	601
Digitaria porrecta / Finger Panic Grass	27
Eucalyptus cannonii / Capertee Stringybark	2
Homoranthus darwinioides / Fairy Bells	41
Hoplocephalus bitorquatus / Pale-headed Snake	353

IBRA subregion and species	Sum of Credits
Monotaxis macrophylla / Large-leafed Monotaxis	463
Petaurus norfolcensis / Squirrel Glider	651
Phascolarctos cinereus / Koala	2268
Pomaderris queenslandica / Scant Pomaderris	17
Swainsona sericea / Silky Swainson-pea	267
Thesium australe / Austral Toadflax	20
Tylophora linearis / Tylophora linearis	113
Tyto novaehollandiae / Masked Owl	15
Subtotal	**5760**
Talbragar Valley	
Cercartetus nanus / Eastern Pygmy-possum	535
Dichanthium setosum / Bluegrass	88
Homoranthus darwinioides / Fairy Bells	5
Hoplocephalus bitorquatus / Pale-headed Snake	288
Petaurus norfolcensis / Squirrel Glider	464
Phascolarctos cinereus / Koala	531
Polytelis swainsonii / Superb Parrot	52
Swainsona sericea / Silky Swainson-pea	19
Tylophora linearis / Tylophora linearis	236
Subtotal	**2217**
Total	**52089**

Table 11-6 Summary of the scattered tree ecosystem credits required by IBRA subregion

IBRA subregion	Credits required
Inland Slopes	104
Kerrabee	23
Liverpool Range	4
Talbragar Valley	59
Total	**190**

11.1.3 Summary of credits by construction stage

Table 11-7 Summary of the ecosystem credits required by construction stage

Row Labels	Sum of Credits
CFG connection to Spicers Creek wind farm stage	
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	4
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	99
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	0
Subtotal	**104**
CFG connection to Tallawang stage	
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	4
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	89
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	836
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	6
Subtotal	**935**
Liverpool Range stage	
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	475
1696-Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter	33
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	412
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	26

Row Labels	Sum of Credits
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	326
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	711
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	2649
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	64
Subtotal	**4696**
RNI1 stage	
1176-Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	20
1177-Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	887
1610-White Box - Black Cypress Pine shrubby woodland of the Western Slopes	1276
1674-Red Ironbark - Brown Bloodwood - Black Pine heathy open forest on sandstone ranges of the Sydney Basin	104
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	52
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	526
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	1021
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	5135
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	1096
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	800
468-Narrow-leaved Ironbark - Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	3

Row Labels	Sum of Credits
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	1
478-Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	120
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	854
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	400
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	106
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	762
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	162
Subtotal	**13325**
Stubbo stage	
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	14
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	129
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	105
478-Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	4
Subtotal	**252**

Row Labels	Sum of Credits
Valley of the Winds stage	
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	8
281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	538
42-River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	24
440-Red Stringybark - Narrow-leaved Ironbark - Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	242
477-Inland Scribbly Gum - Red Stringybark - Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	3
479-Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	237
481-Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	149
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	295
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	162
618-White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	464
Subtotal	**2122**
Total	**21434**

Table 11-8 Summary of the species credits required by construction stage

Construction stage and species	Credits required
CFG connection to Spicers Creek wind farm stage	
Cercartetus nanus / Eastern Pygmy-possum	4
Dichanthium setosum / Bluegrass	1
Petaurus norfolcensis / Squirrel Glider	4
Phascolarctos cinereus / Koala	4
Polytelis swainsonii / Superb Parrot	3
Swainsona sericea / Silky Swainson-pea	1
Tylophora linearis / Tylophora linearis	2
Subtotal	**19**
CFG connection to Tallawang stage	
Cercartetus nanus / Eastern Pygmy-possum	8
Delma impar / Striped Legless Lizard	53
Dichanthium setosum / Bluegrass	404
Euphrasia arguta / Euphrasia arguta	31
Ninox connivens / Barking Owl	132
Petaurus norfolcensis / Squirrel Glider	355
Phascolarctos cinereus / Koala	349
Tyto novaehollandiae / Masked Owl	130
Subtotal	**1462**

Construction stage and species	Credits required
Liverpool Range stage	
Acacia ausfeldii / Ausfeld's Wattle	6
Androcalva procumbens / Androcalva procumbens	246
Calyptorhynchus lathami / Glossy Black-Cockatoo	151
Cercartetus nanus / Eastern Pygmy-possum	450
Dichanthium setosum / Bluegrass	722
Eucalyptus cannonii / Capertee Stringybark	2
Homoranthus darwinioides / Fairy Bells	150
Hoplocephalus bitorquatus / Pale-headed Snake	453
Monotaxis macrophylla / Large-leafed Monotaxis	462
Petaurus norfolcensis / Squirrel Glider	1251
Phascolarctos cinereus / Koala	3624
Pomaderris queenslandica / Scant Pomaderris	17
Swainsona sericea / Silky Swainson-pea	267
Tylophora linearis / Tylophora linearis	377
Subtotal	**8178**

Construction stage and species	Credits required
RNI1 stage	
Acacia ausfeldii / Ausfeld's Wattle	211
Anthochaera phrygia / Regent Honeyeater	3288
Aprasia parapulchella / Pink-tailed Legless Lizard	411
Calyptorhynchus lathami / Glossy Black-Cockatoo	243
Cercartetus nanus / Eastern Pygmy-possum	2929
Chalinolobus dwyeri / Large-eared Pied Bat	4787
Commersonia rosea / Commersonia rosea	63
Delma impar / Striped Legless Lizard	322
Dichanthium setosum / Bluegrass	965
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment	26
Eucalyptus cannonii / Capertee Stringybark	14
Euphrasia arguta / Euphrasia arguta	292
Homoranthus darwinioides / Fairy Bells	49
Hoplocephalus bitorquatus / Pale-headed Snake	1599
Hoplocephalus bungaroides / Broad-headed Snake	208
Leucochrysum albicans subsp. tricolor / Hoary Sunray	10
Monotaxis macrophylla / Large-leafed Monotaxis	446
Ninox connivens / Barking Owl	386
Ozothamnus tesselatus / Ozothamnus tesselatus	31
Petaurus norfolcensis / Squirrel Glider	7325

Construction stage and species	Credits required
Petrogale penicillata / Brush-tailed Rock-wallaby	780
Phascolarctos cinereus / Koala	9706
Polytelis swainsonii / Superb Parrot	49
Pomaderris cotoneaster / Cotoneaster Pomaderris	500
Swainsona recta / Small Purple-pea	84
Swainsona sericea / Silky Swainson-pea	229
Tylophora linearis / Tylophora linearis	234
Tyto novaehollandiae / Masked Owl	421
Vespadelus troughtoni / Eastern Cave Bat	1122
Subtotal	**36730**
Stubbo stage	
Aprasia parapulchella / Pink-tailed Legless Lizard	4
Calyptorhynchus lathami / Glossy Black-Cockatoo	81
Cercartetus nanus / Eastern Pygmy-possum	123
Chalinolobus dwyeri / Large-eared Pied Bat	1
Dichanthium setosum / Bluegrass	13
Eucalyptus cannonii / Capertee Stringybark	4
Euphrasia arguta / Euphrasia arguta	20
Hoplocephalus bitorquatus / Pale-headed Snake	123
Petaurus norfolcensis / Squirrel Glider	230
Phascolarctos cinereus / Koala	235
Subtotal	**834**

Construction stage and species	Credits required
Valley of the Winds stage	
Androcalva procumbens / Androcalva procumbens	229
Aprasia parapulchella / Pink-tailed Legless Lizard	60
Calyptorhynchus lathami / Glossy Black-Cockatoo	265
Cercartetus nanus / Eastern Pygmy-possum	347
Chalinolobus dwyeri / Large-eared Pied Bat	63
Delma impar / Striped Legless Lizard	301
Dichanthium setosum / Bluegrass	185
Digitaria porrecta / Finger Panic Grass	27
Homoranthus darwinioides / Fairy Bells	2
Hoplocephalus bitorquatus / Pale-headed Snake	347
Monotaxis macrophylla / Large-leafed Monotaxis	229
Petaurus norfolcensis / Squirrel Glider	764
Petrogale penicillata / Brush-tailed Rock-wallaby	72
Phascolarctos cinereus / Koala	1767
Thesium australe / Austral Toadflax	20
Tylophora linearis / Tylophora linearis	139
Tyto novaehollandiae / Masked Owl	15
Vespadelus troughtoni / Eastern Cave Bat	34
Subtotal	**4866**
Total	**52089**

Table 11-9 Summary of the scattered tree ecosystem credits required by construction stage

Construction stage	Credits required
CFG connection to Spicers Creek wind farm stage	36
CFG Connection to Tallawang stage	7
Liverpool Range stage	4
RNI1 stage	129
Stubbo stage	3
Valley of the Winds stage	11
Total	**190**

11.2 Ecosystem credits

This section provides a more detail of the ecosystem credits required.

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 11-10 Ecosystem credit summary for the Inland Slopes IBRA subregion CFG connection to Tallawang stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.16	6	0	6
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	0.18	4	0	4
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	7.3	0	89	89
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	39.4	461	375	836

Table 11-11 Ecosystem credit summary for the Inland Slopes IBRA subregion RNI1 stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	7.3	67	0	67
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	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	29.5	324	202	526
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	70.9	175	815	990
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	74.8	1216	615	1831
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	50.3	832	8	840
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Not a TEC	6.5	123	5	128

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	Not a TEC	0.45	11	0	11
479-Narrow-leaved Ironbark- Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Not a TEC	18.5	364	0	364
481-Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Not a TEC	9.5	177	0	177
1177-Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Not a TEC	41.7	818	69	887

Table 11-12 Ecosystem credit summary for the Inland Slopes IBRA subregion Stubbo stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	0.51	14	0	14
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	4.7	119	10	129
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	5.8	92	13	105
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Not a TEC	0.15	4	0	4

Table 11-13 Ecosystem credit summary for the Kerrabee IBRA subregion Valley of the Winds stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
42-River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	0.8	19	5	24
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	0.14	8	0	8
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	13.6	519	0	519
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine - hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	0.81	18	0	18
479-Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Not a TEC	11.5	237	0	237
481-Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Not a TEC	0.17	2	0	2

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	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	5.2	91	0	91
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	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	27.6	372	92	464

Table 11-14 Ecosystem credit summary for the Kerrabee IBRA subregion Liverpool Range stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	1.8	13	24	37
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	1.4	26	0	26
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	15.4	264	13	277
479-Narrow-leaved Ironbark- Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Not a TEC	23.3	502	0	502
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	0.87	15	0	15
1661-Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	2.8	11	0	11

Table 11-15 Ecosystem credit summary for the Kerrabee IBRA subregion RNI1 stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	1	6	25	31
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	110.7	2844	460	3304
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	3.9	41	0	41
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Not a TEC	30.4	583	1	584
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	0.05	1	0	1
478-Red Ironbark - Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Not a TEC	7	109	0	109

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
479-Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Not a TEC	33.7	488	2	490
481-Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Not a TEC	11.7	223	0	223
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	4.2	106	0	106
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	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	60.1	327	435	762
1176-Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	2	20	0	20
1610-White Box – Black Cypress Pine shrubby woodland of the Western Slopes	Not a TEC	62	1264	12	1276

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
1674-Red Ironbark – Brown Bloodwood – Black Pine heathy open forest on sandstone ranges of the Sydney Basin	Not a TEC	10.8	0	104	104

Table 11-16 Ecosystem credit summary for the Liverpool Ranges IBRA subregion Valley of the Winds stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	0.65	17	2	19
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	1.1	13	0	13
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	7.9	270	0	270

Table 11-17 Ecosystem credit summary for the Liverpool Ranges IBRA subregion Liverpool Range stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	60.3	1674	0	1674

Table 11-18 Ecosystem credit summary for the Pilliga IBRA subregion Valley of the Winds stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	9.6	211	0	211
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	0.18	3	0	3
481-Rough-barked Apple – Blakely's Red Gum – Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	Not a TEC	6.8	147	0	147
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	0.94	25	0	25
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	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	3.3	55	16	71

Table 11-19 Ecosystem credit summary for the Pilliga IBRA subregion Liverpool Range stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	8	359	16	375
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	2.2	49	0	49
479-Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Not a TEC	15.7	209	0	209
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	35.5	960	0	960
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	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	3.1	54	10	64

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
1661-Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	25.7	464	0	464
1696-Blakely's Red Gum – Rough-barked Apple shrubby woodland of central and upper Hunter	Not a TEC	3.6	0	33	33

Table 11-20 Ecosystem credit summary for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.04	0	0	0
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	0.21	4	0	4
277-Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	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	0.01	1	0	1
599-Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	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	4.1	89	10	99

Table 11-21 Ecosystem credit summary for the Talbragar Valley IBRA subregion RNI1 stage

PCT	TEC	Area	HBT Cr	No HBT Cr	Credits
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	12.8	95	0	95
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	2.6	52	0	52
440-Red Stringybark – Narrow-leaved Ironbark – Black Cypress Pine – hill red gum sandstone woodland of southern NSW Brigalow Belt South Bioregion	Not a TEC	13.1	215	0	215
461-Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Not a TEC	3.2	68	20	88
468-Narrow-leaved Ironbark – Black Cypress Pine +/- Blakely's Red Gum shrubby open forest on sandstone low hills in the southern Brigalow Belt South Bioregion (including Goonoo)	Not a TEC	0.12	3	0	3

11.3 Species credits

This section provides a summary of the ecosystem credits required.

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 11-22 Species credit summary for the Inland Slopes IBRA subregion CFG connection to Tallawang stage

Species	**Vegetation Zone/s names**	**Area / Count**	**Credits**
Cercartetus nanus / Eastern Pygmy-possum	81_Thinned, 202_Thinned	0.27	8
Delma impar / Striped Legless Lizard	277_DNG, 277_Thinned	7.3	53
Dichanthium setosum / Bluegrass	281_DNG, 281_Mod_Good, 281_Thinned, 81_Thinned	27.3	404
Euphrasia arguta / Euphrasia arguta	281_Mod_Good	0.63	31
Ninox connivens / Barking Owl	281_DNG, 281_Thinned	6.2	132
Petaurus norfolcensis / Squirrel Glider	277_Thinned, 281_Mod_Good, 281_Thinned, 81_Thinned, 202_Thinned	12.7	355
Phascolarctos cinereus / Koala	202_Thinned, 277_Thinned, 281_Mod_Good, 281_Thinned	12.6	349
Tyto novaehollandiae / Masked Owl	281_DNG, 281_Thinned	6.1	130

Table 11-23 Species credit summary for the Inland Slopes IBRA subregion RNI1 stage

Species	Vegetation Zone/s names	Area / Count	Credits
Acacia ausfeldii / Ausfeld's Wattle	281_DNG, 281_Mod_Good, 281_Thinned, 481_Mod_Good, 481_Thinned	3.5	94
Anthochaera phrygia / Regent Honeyeater	461_Mod_Good, 281_Mod_Good, 281_Thinned	2.4	112
Aprasia parapulchella / Pink-tailed Legless Lizard	440_Mod_Good, 440_Poor, 440_Thinned	13.3	391
Calyptorhynchus lathami / Glossy Black-Cockatoo	266_Mod_Good, 266_Thinned, 1177_Thinned, 81_Mod_Good	5.6	122
Cercartetus nanus / Eastern Pygmy-possum	81_Thinned, 266_Mod_Good, 266_Thinned, 440_Mod_Good, 440_Poor, 440_Thinned, 461_Mod_Good, 81_Mod_Good, 461_Thinned	56.7	1538
Chalinolobus dwyeri / Large-eared Pied Bat	277_Mod_Good, 277_Thinned, 281_Thinned, 440_Mod_Good, 440_Poor, 440_Thinned, 461_Mod_Good, 281_Poor, 461_Thinned	41.5	1688
Dichanthium setosum / Bluegrass	81_DNG, 81_Thinned, 281_DNG, 461_Mod_Good, 281_Mod_Good, 281_Thinned, 81_Mod_Good, 281_Poor	51.9	878
Eucalyptus cannonii / Capertee Stringybark	281_DNG, 440_Mod_Good, 478_Thinned, 440_DNS	9	14
Euphrasia arguta / Euphrasia arguta	266_Mod_Good, 277_Mod_Good, 281_Mod_Good	6.4	292
Hoplocephalus bitorquatus / Pale-headed Snake	440_Mod_Good, 440_Poor, 440_Thinned	37.2	1117
Ninox connivens / Barking Owl	266_DNG, 266_Mod_Good, 266_Thinned, 277_DNG, 277_Mod_Good, 277_Thinned, 281_DNG, 281_Thinned, 1177_Mod_Good, 1177_Thinned, 81_Mod_Good	17.4	386
Petaurus norfolcensis / Squirrel Glider	81_Thinned, 266_Mod_Good, 266_Thinned, 277_Mod_Good, 277_Thinned, 281_Mod_Good, 281_Thinned, 440_Mod_Good, 440_Poor, 440_Thinned, 461_Mod_Good, 1177_Mod_Good, 1177_Thinned, 81_Mod_Good, 281_Poor, 461_Thinned	138.4	3718
Petrogale penicillata / Brush-tailed Rock-wallaby	277_Thinned, 281_Thinned, 440_Mod_Good, 440_Poor, 440_Thinned	16.9	732

Species	Vegetation Zone/s names	Area / Count	Credits
Phascolarctos cinereus / Koala	81_Mod_Good, 81_Thinned, 266_Mod_Good, 266_Thinned, 277_Mod_Good, 277_Thinned, 281_Mod_Good, 281_Poor, 281_Thinned, 440_Mod_Good, 440_Poor, 440_Thinned, 461_Mod_Good, 461_Thinned, 478_Mod_Good, 478_Thinned, 479_Mod_Good, 479_Thinned, 481_Mod_Good, 481_Thinned, 1177_Mod_Good, 1177_Thinned	116.1	3177
Swainsona recta / Small Purple-pea	266_Mod_Good, 266_Thinned, 277_Mod_Good	3.9	84
Swainsona sericea / Silky Swainson-pea	440_Mod_Good, 266_Mod_Good, 266_Thinned, 277_Mod_Good, 281_Mod_Good, 281_Thinned	8.2	211
Tyto novaehollandiae / Masked Owl	81_DNG, 266_DNG, 266_Mod_Good, 266_Thinned, 277_DNG, 277_Mod_Good, 277_Thinned, 281_DNG, 281_Thinned, 1177_Mod_Good, 1177_Thinned, 81_Mod_Good	21	421

Table 11-24 Species credit summary for the Inland Slopes IBRA subregion Stubbo stage

Species	Vegetation Zone/s names	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	440_Mod_Good, 440_Thinned	0.14	4
Calyptorhynchus lathami / Glossy Black-Cockatoo	277_Mod_Good, 281_Mod_Good, 281_Thinned, 440_DNS, 440_Mod_Good, 440_Thinned	3.7	81
Cercartetus nanus / Eastern Pygmy-possum	440_Mod_Good, 440_Thinned	4.3	123
Chalinolobus dwyeri / Large-eared Pied Bat	281_Thinned	0.03	1
Dichanthium setosum / Bluegrass	281_Mod_Good, 281_Thinned	0.55	13
Eucalyptus cannonii / Capertee Stringybark	440_DNS, 440_Mod_Good	2	4
Euphrasia arguta / Euphrasia arguta	277_Mod_Good, 281_Mod_Good	0.51	20
Hoplocephalus bitorquatus / Pale-headed Snake	440_Mod_Good, 440_Thinned	4.3	123
Petaurus norfolcensis / Squirrel Glider	277_Mod_Good, 281_Mod_Good, 281_Thinned, 440_Mod_Good, 440_Thinned	8.7	230
Phascolarctos cinereus / Koala	277_Mod_Good, 281_Mod_Good, 281_Thinned, 440_Mod_Good, 440_Thinned, 478_Mod_Good	8.9	235

Table 11-25 Species credit summary for the Kerrabee IBRA subregion Valley of the Winds stage

Species	**Vegetation Zone/s names**	**Area / Count**	**Credits**
Aprasia parapulchella / Pink-tailed Legless Lizard	42_Thinned, 440_Mod_Good, 440_Thinned	1.4	43
Calyptorhynchus lathami / Glossy Black-Cockatoo	599_Mod_Good	1.1	25
Cercartetus nanus / Eastern Pygmy-possum	42_Thinned, 440_Mod_Good, 440_Thinned	1.4	43
Chalinolobus dwyeri / Large-eared Pied Bat	440_Mod_Good, 618_Mod_Good	1.7	63
Androcalva procumbens / Androcalva procumbens	440_Mod_Good, 440_Thinned, 479_Mod_Good	4.1	117
Delma impar / Striped Legless Lizard	42_DNG, 42_Thinned, 618_DNG, 618_Mod_Good, 618_Thinned, 277_Mod_Good	28.6	301
Dichanthium setosum / Bluegrass	618_DNG, 618_Thinned	2	21
Hoplocephalus bitorquatus / Pale-headed Snake	42_Thinned, 440_Mod_Good, 440_Thinned	1.4	43
Monotaxis macrophylla / Large-leafed Monotaxis	440_Mod_Good, 440_Thinned, 479_Mod_Good	4.1	117
Petaurus norfolcensis / Squirrel Glider	42_Thinned, 281_Mod_Good, 281_Thinned, 440_Mod_Good, 277_Mod_Good, 440_Thinned	14.5	447
Petrogale penicillata / Brush-tailed Rock-wallaby	281_Thinned, 440_Mod_Good	1.7	72
Phascolarctos cinereus / Koala	42_Thinned, 277_Mod_Good, 281_Mod_Good, 281_Thinned, 440_Mod_Good, 440_Thinned, 479_Mod_Good, 479_Thinned, 618_Mod_Good, 618_Thinned	44.3	1059
Tylophora linearis / Tylophora linearis	479_Mod_Good, 479_Thinned	3.1	85
Vespadelus troughtoni / Eastern Cave Bat	440_Mod_Good	0.78	34

Table 11-26 Species credit summary for the Kerrabee IBRA subregion Liverpool Range stage

Species	Vegetation Zone/s names	Area / Count	Credits
Acacia ausfeldii / Ausfeld's Wattle	281_Thinned	0.21	6
Calyptorhynchus lathami / Glossy Black-Cockatoo	281_DNG, 477_Mod_Good	4.2	85
Cercartetus nanus / Eastern Pygmy-possum	477_Mod_Good, 477_Thinned, 440_Mod_Good, 440_Thinned	15.7	386
Androcalva procumbens / Androcalva procumbens	440_Thinned, 479_Mod_Good	3.2	93
Homoranthus darwinioides / Fairy Bells	477_Mod_Good, 477_Thinned	4.6	111
Hoplocephalus bitorquatus / Pale-headed Snake	477_Mod_Good, 477_Thinned, 440_Mod_Good, 440_Thinned	15.7	387
Monotaxis macrophylla / Large-leafed Monotaxis	477_Mod_Good, 477_Thinned	4.6	111
Petaurus norfolcensis / Squirrel Glider	281_Thinned, 440_Mod_Good, 440_Thinned, 477_Mod_Good, 477_Thinned, 479_Mod_Good	32.9	887
Phascolarctos cinereus / Koala	281_Thinned, 440_Mod_Good, 440_Thinned, 477_Mod_Good, 477_Thinned, 479_Mod_Good, 1661_Thinned	27.6	784
Tylophora linearis / Tylophora linearis	477_Mod_Good, 477_Thinned, 479_Mod_Good	11.3	318

Table 11-27 Species credit summary for the Kerrabee IBRA subregion RNI1 stage

Species	**Vegetation Zone/s names**	**Area / Count**	**Credits**
Acacia ausfeldii / Ausfeld's Wattle	281_DNG, 281_Mod_Good, 281_Thinned, 479_DNG, 479_Mod_Good, 479_Thinned, 481_Mod_Good, 481_Thinned	4.9	117
Anthochaera phrygia / Regent Honeyeater	277_Thinned, 277_Mod_Good, 281_DNS, 281_Mod_Good, 281_Thinned, 478_Mod_Good, 618_Mod_Good, 618_Thinned, 1176_Thinned, 1610_Mod_Good, 1674_Mod_Good	93.4	3176
Aprasia parapulchella / Pink-tailed Legless Lizard	440_Mod_Good, 477_Thinned	0.78	20
Calyptorhynchus lathami / Glossy Black-Cockatoo	461_Mod_Good	5.5	121
Cercartetus nanus / Eastern Pygmy-possum	440_Mod_Good, 461_Mod_Good, 461_Thinned, 477_Thinned, 1674_Mod_Good	43.4	861
Chalinolobus dwyeri / Large-eared Pied Bat	277_Thinned, 277_Mod_Good, 281_Mod_Good, 281_Poor, 281_Thinned, 461_Mod_Good, 461_Thinned, 1674_Mod_Good	86.8	3099
Commersonia rosea / Commersonia rosea	1674_Mod_Good	3.5	63
Delma impar / Striped Legless Lizard	277_Mod_Good, 277_Thinned, 618_DNG, 618_Mod_Good, 618_Thinned	47.5	322
Eucalyptus camaldulensis - endangered population / Eucalyptus camaldulensis population in the Hunter catchment	281_DNG, 281_Mod_Good, 281_Thinned	1.4	26
Homoranthus darwinioides / Fairy Bells	477_Thinned, 1674_Mod_Good	3.3	44
Hoplocephalus bitorquatus / Pale-headed Snake	440_Mod_Good, 477_Thinned, 1674_Mod_Good	13	194
Hoplocephalus bungaroides / Broad-headed Snake	1674_DNG, 1674_Mod_Good	10.8	208
Leucochrysum albicans subsp. tricolor / Hoary Sunray	461_Mod_Good, 481_Thinned	5	10
Monotaxis macrophylla / Large-leafed Monotaxis	1610_Mod_Good, 1610_Thinned	18.8	446
Ozothamnus tesselatus / Ozothamnus tesselatus	1674_Mod_Good	3.3	31

Species	Vegetation Zone/s names	Area / Count	Credits
Petaurus norfolcensis / Squirrel Glider	277_Mod_Good, 277_Thinned, 281_Mod_Good, 281_Poor, 281_Thinned, 440_Mod_Good, 461_Mod_Good, 461_Thinned, 477_Thinned, 1674_Mod_Good	126.9	3147
Petrogale penicillata / Brush-tailed Rock-wallaby	277_Mod_Good, 277_Thinned, 281_Mod_Good, 281_Thinned, 461_Mod_Good, 461_Thinned, 1674_DNG, 1674_Mod_Good	1.3	48
Phascolarctos cinereus / Koala	277_Mod_Good, 277_Thinned, 281_Mod_Good, 281_Poor, 281_Thinned, 440_Mod_Good, 461_Mod_Good, 461_Thinned, 477_Thinned, 478_Mod_Good, 478_Thinned, 479_Mod_Good, 479_Thinned, 481_Mod_Good, 481_Thinned, 483_Thinned, 618_Mod_Good, 618_Thinned, 1610_Mod_Good, 1610_Thinned, 1674_Mod_Good	252.4	6002
Pomaderris cotoneaster / Cotoneaster Pomaderris	478_Mod_Good, 1610_Mod_Good, 1610_Thinned	21.2	500
Vespadelus troughtoni / Eastern Cave Bat	461_Mod_Good, 461_Thinned, 1674_Mod_Good	38.5	1122

Table 11-28 Species credit summary for the Liverpool Ranges IBRA subregion Valley of the Winds stage

Species	Vegetation Zone/s names	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	440_Thinned	0.74	17
Cercartetus nanus / Eastern Pygmy-possum	440_Thinned	0.74	17
Dichanthium setosum / Bluegrass	281_DNG, 281_Thinned, 483_DNG, 483_Thinned	6.3	161
Hoplocephalus bitorquatus / Pale-headed Snake	440_Thinned	0.74	17
Petaurus norfolcensis / Squirrel Glider	281_Thinned, 440_Thinned	1.3	30
Phascolarctos cinereus / Koala	281_Thinned, 440_Thinned, 483_Thinned	6.7	206

Table 11-29 Species credit summary for the Liverpool Ranges IBRA subregion Liverpool Range stage

Species	Vegetation Zone/s names	Area / Count	Credits
Dichanthium setosum / Bluegrass	483_DNG, 483_Thinned	7.4	124
Phascolarctos cinereus / Koala	483_Mod_Good, 483_Poor, 483_Thinned	43.4	1074

Table 11-30 Species credit summary for the Pilliga IBRA subregion Valley of the Winds stage

Species	Vegetation Zone/s names	Area / Count	Credits
Calyptorhynchus lathami / Glossy Black-Cockatoo	440_DNG, 440_Mod_Good, 440_Thinned, 483_Mod_Good, 481_Mod_Good, 599_DNG, 599_Mod_Good	8.9	240
Cercartetus nanus / Eastern Pygmy-possum	440_Mod_Good, 440_Thinned, 477_Mod_Good	9.6	287
Androcalva procumbens / Androcalva procumbens	440_Mod_Good, 440_Thinned, 477_Mod_Good	3.8	112
Dichanthium setosum / Bluegrass	483_Mod_Good	0.15	3
Digitaria porrecta / Finger Panic Grass	599_DNG, 599_Mod_Good, 599_Thinned	2.2	27
Homoranthus darwinioides / Fairy Bells	477_Mod_Good	0.07	2
Hoplocephalus bitorquatus / Pale-headed Snake	440_Mod_Good, 440_Thinned, 477_Mod_Good	9.6	287
Monotaxis macrophylla / Large-leafed Monotaxis	440_Mod_Good, 440_Thinned, 477_Mod_Good	3.8	112
Petaurus norfolcensis / Squirrel Glider	440_Mod_Good, 440_Thinned, 477_Mod_Good	9.6	287
Phascolarctos cinereus / Koala	440_Mod_Good, 440_Thinned, 477_Mod_Good, 483_Mod_Good, 481_Mod_Good, 481_Thinned	17.3	502
Thesium australe / Austral Toadflax	599_DNG, 599_Mod_Good, 599_Thinned	2.2	20
Tylophora linearis / Tylophora linearis	440_Mod_Good, 440_Thinned	1.8	54
Tyto novaehollandiae / Masked Owl	481_Mod_Good	0.53	15

Table 11-31 Species credit summary for the Pilliga IBRA subregion Liverpool Range stage

Species	Vegetation Zone/s names	Area / Count	Credits
Calyptorhynchus lathami / Glossy Black-Cockatoo	477_Mod_Good, 1661_Mod_Good	2.4	66
Cercartetus nanus / Eastern Pygmy-possum	477_Mod_Good	2.2	64
Androcalva procumbens / Androcalva procumbens	477_Mod_Good, 479_Mod_Good, 479_Thinned	4.8	153
Dichanthium setosum / Bluegrass	281_Mod_Good, 281_Thinned, 483_DNG, 483_DNS, 483_Mod_Good, 483_Thinned, 281_DNG	25.3	598
Eucalyptus cannonii / Capertee Stringybark	1661_Mod_Good	1	2
Homoranthus darwinioides / Fairy Bells	477_Mod_Good, 477_Thinned	1.3	39
Hoplocephalus bitorquatus / Pale-headed Snake	477_Mod_Good, 477_Thinned	2.2	66
Monotaxis macrophylla / Large-leafed Monotaxis	477_Mod_Good, 477_Thinned, 479_Mod_Good, 479_Thinned, 483_Thinned, 1661_Mod_Good, 1661_Thinned	12.4	351
Petaurus norfolcensis / Squirrel Glider	281_Mod_Good, 281_Thinned, 477_Mod_Good, 477_Thinned, 479_Mod_Good, 618_Mod_Good	10.3	364
Phascolarctos cinereus / Koala	281_Mod_Good, 281_Thinned, 477_Mod_Good, 479_Mod_Good, 483_Mod_Good, 483_Thinned, 618_Mod_Good, 1661_Mod_Good, 1661_Thinned, 1696_Mod_Good, 477_Thinned	62.7	1766
Pomaderris queenslandica / Scant Pomaderris	1661_Mod_Good, 1661_Thinned	0.73	17
Swainsona sericea / Silky Swainson-pea	281_Mod_Good, 281_Thinned, 477_Mod_Good	6.7	267
Tylophora linearis / Tylophora linearis	479_Mod_Good, 477_Thinned	1.8	59

Table 11-32 Species credit summary for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

Species	**Vegetation Zone/s names**	**Area / Count**	**Credits**
Cercartetus nanus / Eastern Pygmy-possum	202_Thinned	0.21	4
Dichanthium setosum / Bluegrass	81_DNG	0.04	1
Petaurus norfolcensis / Squirrel Glider	202_Thinned	0.2	4
Phascolarctos cinereus / Koala	202_Thinned	0.2	4
Polytelis swainsonii / Superb Parrot	202_Thinned, 599_Thinned	0.13	3
Swainsona sericea / Silky Swainson-pea	277_Mod_Good	0.01	1
Tylophora linearis / Tylophora linearis	202_Thinned	0.14	2

Table 11-33 Species credit summary for the Talbragar Valley IBRA subregion RNI1 stage

Species	Vegetation Zone/s names	Area / Count	Credits
Cercartetus nanus / Eastern Pygmy-possum	81_Mod_Good, 81_Thinned, 202_Mod_Good, 202_Thinned, 440_Mod_Good, 440_Thinned, 461_Mod_Good, 461_Thinned	16.7	530
Dichanthium setosum / Bluegrass	81_DNG, 461_Thinned, 81_Mod_Good, 81_Thinned	3.8	87
Homoranthus darwinioides / Fairy Bells	468_Thinned	0.12	5
Hoplocephalus bitorquatus / Pale-headed Snake	81_Thinned, 440_Mod_Good, 440_Thinned, 468_Thinned	8.2	288
Petaurus norfolcensis / Squirrel Glider	202_Thinned, 440_Mod_Good, 440_Thinned, 461_Mod_Good, 461_Thinned, 81_Thinned	13.5	460
Phascolarctos cinereus / Koala	81_Mod_Good, 81_Thinned, 202_Mod_Good, 202_Thinned, 440_Mod_Good, 440_Thinned, 461_Mod_Good, 461_Thinned	16.6	527
Polytelis swainsonii / Superb Parrot	81_DNG, 81_Mod_Good, 202_Mod_Good	2.5	49
Swainsona sericea / Silky Swainson-pea	202_Mod_Good, 440_Thinned	0.84	18
Tylophora linearis / Tylophora linearis	440_Mod_Good, 440_Thinned, 468_Thinned	5.7	234

11.4 Scattered trees

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.

Table 11-34 Ecosystem credit summary for the Inland Slopes IBRA subregion CFG Connection to Tallawang stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	7	0	7

Table 11-35 Ecosystem credit summary for the Inland Slopes IBRA subregion RNI1 stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	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	86	3	89
281-Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	5	0	5

Table 11-36 Ecosystem credit summary for the Inland Slopes IBRA subregion Stubbo stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	3	0	3

Table 11-37 Ecosystem credit summary for the Kerrabee IBRA subregion Liverpool Range stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	2	0	2

Table 11-38 Ecosystem credit summary for the Kerrabee IBRA subregion Valley of the Winds stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
281-Rough-Barked Apple – Red Gum– Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	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	7	0	7
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	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	2	0	2

Table 11-39 Ecosystem credit summary for the Kerrabee IBRA subregion RNI1 stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
478-Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Not a TEC	12	0	12

Table 11-40 Ecosystem credit summary for the Liverpool Range IBRA subregion Valley of the Winds stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
618-White Box x Grey Box – red gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	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	2	0	2

Table 11-41 Ecosystem credit summary for the Pilliga IBRA subregion Liverpool Range stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
477-Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Not a TEC	1	0	1
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	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	1	0	1

Table 11-42 Ecosystem credit summary for the Talbragar Valley IBRA subregion CFG connection to Spicers Creek wind farm stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
202-Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	6	0	6
PCT 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	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	30	0	30

Table 11-43 Ecosystem credit summary for the Talbragar Valley IBRA subregion RNI1 stage

PCT	TEC	HBT Cr	No HBT Cr	Credits
81-Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	22	1	23

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